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THE

Vol III
1665-1700

PHILOSOPHICAL
TRANSACTIONS
AND
COLLECTIONS

To the End of the Year M.DCC.

ABRIDGED and DISPOSED

UNDER

GENERAL HEADS.

VOL. III. In TWO PARTS.

The First Containing all the

Anatomical, Medical and Chymical ;

And the Second all the

Philological and Miscellaneous PAPERS.

By JOHN LOWTHORP, M. A. and F. R. S.

The FIFTH EDITION, Corrected,
In WHICH the *LATIN* PAPERS are now FIRST translated into *ENGLISH*.

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M.DCC.XLIX.

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AND
COLLECTIONS

To the Hon. of the Socy M.D.C.C.
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M.DCCXIX.

To the Right Honourable
ROBERT HARLET, Esq;
ONE OF
Her Majesty's
Principal Secretaries of State, &c.

THESE
Medical and Philological P A P E R S,

ABRIDGED and DISPOSED under

GENERAL HEADS,

Are most humbly

Dedicated by



JOHN LOWTHORP.

To the Right Honourable

ROBERT HARTLEY, Esq.

ONE OF

Her Majesty's

Principal Secretaries of State, &c.

THREE

Medical and Physiological PAPERS,

Assembled and Directed under

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JOHN LOWTHORP,





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Anatomical, Medical, and Chymical Papers,
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 Philosophical Transactions
 AND
 COLLECTIONS,
 ABRIDGED, and DISPOSED under
 GENERAL HEADS.

CHAP. I.

ANATOMY. PHYSICK.

*The Structure, External Parts, and common Teguments,
 of Human Bodies.*

I. 1.  EDMUND MALLONE (born at Port Leicester in *An Irishman of an extraordinary Size; by Dr. Plot. n. 240. p. 184. 1698.* Ireland, and shewn at Oxford 1684, being then 19 Years old) was 7 Foot 6 Inches high; his Finger $6\frac{3}{4}$ Inches long, the length of his Span 14 Inches, of his Cubit 2 Foot 2 Inches, of his Arm 3 Foot $2\frac{1}{2}$ Inches, from the

Shoulder to the Crown of his Head $11\frac{3}{4}$ Inches.

2. In the Year 1682, I saw and measured Edmund Mallone at Dublin; his Father, though a proper Man, no way remarkable for his Height, but his Mother

By Dr. Molyneux. n. 261. p. 502.

Mother was of a more than ordinary low Stature: When he stood on the bare Ground with his Shoes off, he measured full 7 Foot 7 Inches in Height; that is, about 2 Foot taller than a Man of a common Size.

*A prodigious
Os Frontis;
by Dr. Tho.
Molyneux.
n. 168. p. 880.
1685.*

II. 1. I have measured a prodigious large *Os Frontis*, which is reserved in the *Medicine School* at *Leyden*. It is entire, and differs in no Respects from that of a Man, but in its Largeness; and since there's no Creature, especially of the larger sort, that has this Bone at all resembling ours, there's not the least Question to be made, but this formerly belonged to a Man, and that of a most extravagant Size. From its Juncture with the Nasal Bones, to the Place where the *Sutura Sagittalis* terminated, the Convex way, it was 9 Inches $\frac{1}{4}$; transversly from Side to Side, still measuring the Convex way, it was 12 Inches $\frac{3}{4}$; in Thickness about $\frac{1}{2}$ Inch. I find ordinary Skulls scarce answer it in half Proportion; being one with another about 4 $\frac{1}{2}$ Inches long, 6 broad, and $\frac{1}{4}$ thick. So that supposing this Bone bore the same Proportion to his Stature, which the same in other Men does to theirs, the Man to whom this Bone belonged must have been 11 or 12 Foot high. *Dr. Drelincourt*, the present Professor of *Anatomy*, told me, That he found it there when he first came into that Place, but never could learn who gave it, where it was found, or whence it came.

That there are some whose Heads are very large in proportion to their Bodies cannot be denied; yet generally such Skulls want in Thickness (as this does not) are ill shaped, and not proportionable; and moreover, I am perswaded, there never yet was an Instance of any Head, which by a præternatural Growth, came the least nigh this for Bulk.

*Giants; by
Dr. Tho.
Molyneux.
n. 261. p. 487.
1700.*

2. I am not ignorant, that several Authors (as *Tho. Fazellus*, *Atban. Kircher*, *Gaspar Shottus*, and others) both antient and modern, have taken Pains to register Accounts, not of Gigantick Bones only, but of entire Bodies of vastly Gigantick Men, found buried under Ground, or in the hollow Caverns of Mountains: But these Relations are commonly taken up by Hear-say only, and so ill attested, that they deserve but very little Credit. And though there is hardly any considerable Collection of Natural Curiosities, or a printed Description of a *Museum*, extant, where some Part or other of a Giant is not to be met with, yet I am much of the same Opinion, as to most of these Gigantick Remains, with the Historian *Suetonius Tranquillus*, who says of *Augustus Cæsar*, that *Ædes suas non tam Statuarum Tabularumque pictarum Ornatu, quam Rebus Vetustate ac Raritate notabilibus, excoluit; qualia sunt Capreis immanium Belluarum Ferrarumque Membra prægrandia, quæ dicuntur Gigantum Ossa*. And certainly, most of pretended Giants Remains in our Days, such I mean as are truly Bone (for some are only natural Petrifications, and *Lapides sui Generis*, accidentally so figured as to resemble this or that Part of a Man) were Bones belonging to some of the biggest Quadrupeds, as Elephants, or some of the largest sort of Fishes of the Whale Kind, called by *Pliny*, as well as *Suetonius*, *Belluæ* and *Belluæ Marinæ*. And I am perswaded, that the large Tooth, mentioned by *Ol. Wormius*, and figured by *Tho.*

Museum.

Bartholine,

Bartoline, was nothing else than a Tooth of the *Cetus Dentatus*, or *Sperma-Ceti-Whale*. Nor is it long since, that the Bones of the Fore-fin of a Porpefs or a small Whale, artificially joined together, were exposed in *London*, by way of publick Shew, as the Skeleton of a Giant's Hand: For all Fish of the *Cetaceus* or Whale-kind, have this Fin made up of just so many Ranges of Joints, as naturally answer our 5 Fingers, and all together does not a little resemble a Man's Hand.

Cent. I. Hist.
Anatom. Hist.
98.

But the prodigious large *Os Frontis* reserved in the *Medicine School* at *Leyden*, cannot be suspected to appertain to any other Creature than a Man: For this Bone in a Man, is of so peculiar a Make from the Globose Shape of the Head, that there is not to be found a Bone among all the Animals of the Creation, that bears any Resemblance to its Figure, if we except that of a Monkey; but all this Genus being of a much smaller Size than a Man, gives us no Umbrage of Scruple. So that there is no Room to doubt of its being a true and genuine Part of a large human Animal; as will more clearly appear by comparing the neat Sketches drawn from the Bone itself by *Mr. Hugh Howard*, with a common *Os Frontis* of the ordinary Size in the following Figures; where

Figure 1, shews the common Shape and Size of the Fore-head Bone of a *Fig. 1.*
Man of an ordinary Stature, with its Convex or Out-side forward. *a b c d e*, The Line the *Coronal Suture* makes with Indentures, elegantly expressed, going round the upper Edge of the Bone by which it's joined to both the *Ossa Bregmatis*, or *Verticis*. *e*, The place where the *Coronal* and *Sagittal* Sutures meet. *f*, The Part to which the Bones of the Nose are fastened. *g g*, The upper Part of the Orbits of the Eyes. *b b*, The Holes in the Bone over the Eyes, that give Passage to the two large Branches of Nerves that supply the Frontal Muscle, and those of the Eye-brows. *i i*, The two Processes or Protuberances that join with the first Bone of the upper Jaw: These by some Accident were broken off the large Bone, and therefore are not expressed in *Fig. 2*. The Measure round the Ambit of the *Coronal Suture* from *a* to *g*, was 10 Inches and $\frac{1}{5}$ of an Inch; in this Bone from *c*, where the *Coronal* and *Sagittal* Sutures meet, to *f*, where the Bones of the Nose are fastened, $4\frac{1}{2}$ Inches; from *b*, drawing a transverse Line cross the Fore-head to *d*, 6 Inches; the Thickness of the Bone was about $\frac{1}{4}$ of an Inch.

Figure 2, represents the Gigantick Fore-head Bone, expressed in the same *Fig. 2.*
Posture with the former, and drawn exactly to the same Proportion. *a b c d e*, The *Coronal Suture*, in some Places a little worn and defaced. *c*, The Place where the *Coronal* and *Sagittal* Sutures meet. *f*, The Part where the Bones of the Nose were fastened. *g g*, The upper Part of the Orbits of the Eyes. *b b*, The two Holes for the Nerves that pass into the Muscles of the Eye-brows and the Frontal Muscle. The Measure round the Ambit of the *Coronal Suture* in this Bone from *a* to *e*, was about 21 Inches; from *c*, where the *Sagittal* and *Coronal* Sutures meet, to *f*, where the Bones of the Nose are fastened, 9 Inches and one 10th of an Inch; *b*, from drawing a transverse Line across the Fore-head to *d*, $12\frac{1}{5}$ Inches; the Thickness of the Bone, from one Table to the other, about $\frac{1}{2}$ an Inch.

Fig. 3.

Figure 3, shews the Inside of the same Gigantick Bone, drawn likewise in the same Proportion. *k k*, The thickness of the Bone. *l*, The sharp and high Process of the *Os cribrosum*, called by Anatomists *Crista Galli*.

By comparing these Figures, 'tis evident, what an exact Conformity there is in all Particulars between this large Bone and the like Bone in a Man of a just Height; and that they no ways differ but in Magnitude. 'Tis also evident, that all the next immediately adjoining Bones, which near make up the entire Head, must necessarily have been as well shaped, and of the same Proportion with this Bone; otherwise they could not possibly cohere, so as to adapt themselves closely to one another, and make an entire Globose Skull. Whence it must follow, that the Man, to whom it belonged, was more than twice the Height that Men usually are, according to the common Course of Nature; that is, more than 11 or 12 Foot high.

It cannot reasonably be supposed, that a Man of an ordinary Size could have had such an exceeding large Head; for I conceive, he could not possibly subsist, whilst so ponderous and excessive a Mass of Bone as this Skull, with all that super-abundant Quantity of Brain requisite to fill its spacious Cavity, was growing: Much less continue so long alive, as to come to Maturity of Years, or Adult and full Manhood; to which, we are sure, this Person must have attained, by the great Thickness and Solidity of this Bone, as well as its large Size. And though sometimes from Obstructions, or other Morbifick Causes, our Glands and softer *Viscera* are so unequally nourished, as to grow to an immense Size, yet such a præternatural Excess of Growth in a hard and bony Part, I do not think, has ever yet been observed.

'Tis true, Infants far gone in the *Rickets* are frequently observed to have great Heads in Proportion to their small emaciated Bodies, and that young Children are also liable to the *Hydrocephalus* or *Dropsy* in the Head, which sometimes so dilates it, as to swell their Skulls to a more immense Size. But neither of these Disorders (for I take the Cause to be much the same in both Cases, only differing in Degree) otherwise affect the Head, than by a præternatural Collection of serous Humours inclosed in the Brain, they extend the yielding Sides of the weak and tender Skull, but do not in the least increase its bony Substance; nay, on the contrary, they rather diminish it; for it is always observed, that they reduce it to a more than usual Thinness, and sometimes, as I have seen myself, to be no thicker than an Egg-shell or Parchment. Nor can such Distempers possibly affect those of adult Ages, so as to enlarge their Skulls; because all the Bones by that time are become solid, and firmly knit together, so as to be no way capable of further Growth or Extension: And hence it is, those Maladies are incident to Children, and them only, whilst their Skulls are soft, pliable, and truly Membranous, rather than Bony. And daily Experience assures us, that unless such Diseases be timely removed, either by the Physician's or Chirurgion's Art, or overcome so early by the Strength of Nature, as the Children have Time enough to out-grow this Disproportion in their Heads, by the Bulk of their Body coming up to it, e'er it arise to too exorbitant a Degree of Magnitude; they all die in their Infancy, and their unshapely Skulls are easily distinguished from

from all others, by the large Fontanell, or Open in the Mole of the Head, that remains Membranous, and never becomes, like the rest of the Skull, a Bony Substance. And that they cannot possibly arrive at Manhood is plain; for this monstrous and unequal Growth, or rather Swelling of their Heads, meeting with no Check, but still every Day increasing upon them, when it arrives to such a certain Degree, that its extravagant Dimensions become irreconcilable with the natural Functions of the Body, the *Oeconomia Animalis* must inevitably sink under the Pressure of so great a Load, and the whole Machine tend to its Dissolution, as not being able to bear any longer with so highly morbid a Disposition, in so principal, and so extremely necessary a Part to Life as the Brain, the Fountain of all Spirit, Sense and Motion.

I shall not deny, but by one Accident or other, some Disproportion between the Head and the rest of the Body, in such as are grown up to the compleat Stature of Man, does sometimes happen. But a Disproportion of this Kind, however remarkable to the Eye and unseemly, is never so extraordinary as to be very considerable in its self. For I find the Circumference of a Man's Head of a moderate, that is the most common size, is usually about 22 Inches, and if we chance to see one of 25 or 26 on a Man of ordinary Height, which certainly is very rare, it appears large and remarkable; but should there be found a Head still bigger, so as to be 28 or 29 Inches in Ambit (which I am apt to think, for the Reasons above-mentioned, has scarce or ever happened, unless where the Proportion of the other Parts of the Body were such as necessarily required it) such a one, I say, would be really wonderful, and counted monstrous. Yet the Circumference of the Head, of which this large Fore-head Bone was a Part, so far exceeded the largest of these Measures, that, as I computed its Dimensions, when it was entire and covered with the hairy Scalp, it was about 44 Inches round; and therefore must have had a Body belonging to it, that bore a proper Conformity to this its spacious Circumference.

Nor do I apprehend so great a Stature as this in a human Body, though it be indeed extraordinary, any way absurd or repugnant to the Course of Nature; but rather, if duely weighed, very conformable to a certain anomalous Method, if I may so call it, that she apparently affects in the producing most of her Works. Thus we cannot but observe in the Vegetable Kingdom, that some are of the Dwarf-kind, while others arise to so stupendous a Growth, that they more than double the Bulk even of such as are esteemed large in the same Tribe. Several Examples of such like Gigantick Oaks, and other Sorts of exceeding vast Trees, may be seen registred by Mr. *Evelyn*. Sylva. c. xxx. And amongst Animals, if we compare that little low Breed of Race-Horses from the *Isle of Man*, usually called *Mank's* Horses, to that large Breed they have in *Northamptonshire* in *England*, or in the Bishoprick of *Liege* in *Flanders*, we may properly enough esteem these, in Comparison with those, a Sort of Gigantick Horses. Or, if the *Irish Wolf Dog*, which is of the Grey-hound kind, and of so beautiful and large a Make, that for its curious Form, as well as goodly Size, it far surpasses all other Dogs of the Creation, be compared to a common Greyhound, it appears truly of a Gigantick Breed; and we may
further

further add concerning it, As the Giant's Stock of old is extinct, at least in these Countries, so this Gigantick Dog is now so rare, that in a few Generations more, I doubt not but it will be quite lost in these Parts, and the Species perish, for ought I know, off the Face of the Earth.

And that Nature takes the same uncertain Measures in the Generation of Mankind, I think, is not less apparent. Thus the *Laplanders* are a Nation remarkable for their low Stature; and 'tis sure, there are, and have been in all Ages and Countries, those we call *Dwarfs*, and some of them of a most extraordinary small Size of Body. The Duke of *Crequi's* famous Dwarf, as described by *Aldrovandus*, was not in Height above 30 Inches; and the same Author speaks of others still shorter. Now since natural Causes operate so as to produce human Creatures, partaking of all Properties common to their Kind, of so small a Model as to fall short even of half the common Standard of their Species, I cannot think it unreasonable, supposing we had no other Authority for it, to imagine that the same natural Causes may sometimes act in the other Extream likewise.

There is a manifest Alliance and Congruity observable in Nature, between the Stature of Man's Body, and his Age during the Time of his Growth; whence the *Greeks* thought it not improper to express both these by one and the same Word *ἡλικία*, which signifies promiscuously Stature as well as Age. And as $5\frac{1}{2}$ Feet may well be esteemed the most settled and ordinary Degree of Height in a Man; so about 70 Years may justly be allowed the most common Period of his Age: Yet daily Experience and Observation acquaint us with those that vastly exceed these Limits, in both these Respects: And as we have certain History that informs, That the youngest of these, *Thomas Parr*, and *Henry Jenkins*, both of *England*, and the old Countess of *Desmond*, and *Mrs. Eckleston*, both of *Ireland*, fully compleated double that usual Term of Life; so we have no Reason to question the Accounts given us of others, that have been found in Stature double the common Standard of Man. Nay, both these Properties, Longævity and high Stature, do so naturally result each from their proper Causes, that they are often observed to become Hereditary, and run in whole Families; whence the *Greeks* had their *μακρόβιοι*, and the *Romans* their *Celfi*; and in *Palestine* of old, they had their *Anakims*, or Sons of the Giants. So that human Gigantick Bodies are no way inconsistent with the Course of Nature. And indeed, we have some clear Testimonies given us by Authors of unquestionable Credit and Veracity, that there actually have been Men in the World, and likely still are, of so large a Bulk, and so high a Stature of Body, as properly to deserve the Name of Giants. *Edmund Mallone*, when he stood on the bare Ground with his Shoes off, measured full 7 Foot 7 Inches in Height; *Walter Parsons*, Porter to King *James I.* born in *Staffordshire*, was much of the same Stature. In *Flanders* and *Germany*, where Men are usually of a larger Size, and their Bodies of a grosser Make than with us, we meet with Examples that have been much taller. *Isbrand Diemberbroeck* tells us, he saw himself at *Utrecht*, in the Year 1665, a Man 8 Foot and a half high, all his Limbs well shaped, and his Strength proportionable to his Height. He was born at *Schoonhoven* in *Holland*, of Parents of

an

Vid. Sup.
Sect. I.

Anat. c. i.
lib. I.

an ordinary Stature ; and Mr. *Ray* mentions, That he saw this very Man at *Travels.*
Bruges in *Flanders*. *Jo. Goropius Becanus* says, he saw a Youth almost 9 Foot
 high, a Man near 10 Foot, and a Woman that was quite 10 Foot in *Origen Ant-*
 Height. *Pliny* the Naturalist speaks of several Men in his Age, much of *werp, P. 207,*
 the same Height, or something taller, than those mentioned by *Becanus*. *212.*
 And it is not improbable, that where both the Soil and Climate concur, *Nat. Hist.*
 and are naturally disposed to produce Plants, Fruits, and several Kind of *l. VII. c. xvi.*
 Animals, of a much larger Bulk than any our Countries afford, such as the
Ostridges and *Cunters* among Birds ; the largest *Crocodiles*, the *Moose*
Deer, the *Elephant*, the *Rhinoceros*, the *Hippopotamus*, &c. among
Quadrupeds : In those Parts of the World, I say, where such like vast Crea-
 tures are met with, it is not unlikely that human Animals may also be some-
 times found of a much greater Size than any here among us. Thus *Andreas*
Thevet, the famous Voyager, tells us, That being himself on the Coast of *Descript.*
Africk, in the Territory of *Arguin*, for three Weeks together, he chanced *of America,*
 to meet with a rich *Spanish* Merchant, who had some while before suffered *l. XXVII.*
 Shipwreck there by a Storm, yet had luckily saved a Coffin, wherein he had *c. i.*
 carefully preserved the Skull and Bones of an *American* Giant, he had brought
 along with him from that Country ; who was 11 Foot and 5 Inches in
 Height, and died in the Year 1559. These Bones he shewed to Mr. *Thevet*,
 who was so curious, that he took the Measures of the most principal of
 them, as follows : The Bones of the Legs measured full 3 Foot 4 Inches in
 Length, and the Skull was 3 Foot 1 Inch about. Which Circumference, I
 observe, is exactly proportionable to the Length of the Legs, and if we
 make an Allowance for the Hair and Skin that covered the Skull when he
 was alive, it falls very little short of the Dimensions we have before set down
 in computing the Size of our Giant's Head when it was entire.

And this brings into my Thoughts, as if it were not unlikely, that this
 large *Os Frontis* we have described, might about 70 or 80 Years ago (for
 it seems fresh, and is still solid and ponderous, so that it cannot be very old)
 have been brought into *Europe* by some of the Trading *Hollanders*, as a pro-
 per Sample of some huge Gigantick Man, met with in some of their Voy-
 ages into *America*. But this is only Conjecture ; and indeed, it does not
 import much whether he discover the true Original of it or no.

From these warrantable Histories, and this particular Bone before us as
 a fair Specimen, we may clearly deduce, that there have been in Nature hu-
 man Bodies 11 and 12 Foot high ; which equals, if not surpasses the Stature
 of the tallest Giant mentioned in *Holy Writ*. For the Height of *Goliath* of *1 Sam. xvii. 4.*
Gath is said expressly to be but 6 *Cubits* and a *Span* ; and taking a *Cubit*, in
 the most vulgar and usual Acceptation, for a Foot and a half, his Stature will
 not amount to above 9 Foot 9 Inches. Indeed we may reasonably conclude,
 that *Og* the the King of *Basan* must have considerably exceeded *Goliath* in
 Height, if we make an Estimate of his Stature by the Dimensions which are
 given of his Bedstead, which is said to have been kept as a Memorial of him
 at *Rabbath of the Children of Ammon*, and to have been 9 *Cubits* in Length ; *Deut. iii. 11.*
 but then we cannot imagine, but that his Bed must of Necessity have been
 much

much longer than his Body ; and the least Allowance we can make for the Overplus, is the Space of 9 Inches above his Head, and as much below his Feet ; and if we make this Distinction, it will follow he was not above 12 Foot high ; much of the same Standard with this our Giant, whose Fore-head Bone is still kept in the *Medicine-School* at *Leyden*.

*A Man of a
strange imita-
sing Nature ;
by Dr. Geo.
Garden.*

n. 134. p. 842.
1677.

III. At *Strathbogie*, not far from *Aberdeen*, there is a Man who hath something peculiar in his Temper, that inclines him to imitate unawares, all the Gestures and Motions of those with whom he converseth. His Name is *Donald Monro* ; he is a little, old, and very plain Man, of a thin slender Body ; he hath been subject to this Infirmary, as he told us, from his very Infancy. He is very loath to have it observed, and therefore casts down his Eyes when he walks in the Streets, and turns them aside when he is in Company. We had made several Trials before he perceived our Design ; and afterward had much ado to make him stay. We carested him as much as we could, and had then the Opportunity to observe, that he imitated not only the scratching of the Head, but also the wringing of the Hands, wiping of the Nose, stretching forth of the Arms, &c. And we needed not strain Compliment to persuade him to be covered ; for he still put off and on as he saw us do ; and all this with so much Exactness, and yet with such a natural and unaffected Air, that we could not so much as suspect he did it on Design. When we held both his Hands, and caused another to make such Motions, he pressed to get free ; but when we would have known more particularly, how he found himself affected, he could only give us this simple Answer, That it vexed his Heart and his Brain.

*A Negro-Boy
dappled with
white Spots ;
by Mr. Will.
Byrd. n. 235.
p. 781.*

1697.

IV. Capt. *Cha. Wager* has a *Negro-Boy*, about 11 Years old, who was born in the upper Parts of *Rappahanock* River in *Virginia* : His Father and Mother were both perfect Negroes. This Boy, till he came to be three Years old, was in all Respects like other Black Children, and then, without having any Distemper, began to have several little white Specks in his Neck and upon his Breast, which with his Age, have since been observed to increase continually very much, both in Number and Bigness ; so that now, from the upper Part of his Neck (where some of his Wool is already turned White) down to his Knees, he is every where dappled with white Spots, some of which are broader than the Palm of a Man's Hand, and others of a smaller Proportion. The Spots are wonderfully White, at least equal to the Skin of the fairest Lady, and are not liable to be tan'd : But they are, I think, of a paler White, and do not shew Flesh and Blood so lively through them as the Skin of white People ; but possibly the Reason of that may be, because the Skin of a Negro is much thicker. His Face, Arms and Legs, are perfectly Black : He has all along been very sprightly and active, and has more Ingenuity too, than is common to that Generation.

*Physiognomy ;
by Dr. Gwi-
ther. n. 210.
p. 118.*

1694.

V. Soft Wax cannot receive more numerous and various Impressions, than are imprinted on Man's Face by Objects moving his Affections : And not only

only the Objects themselves have this Power, but also the very Images or Ideas; that is to say, any thing that puts the Animal Spirits into the same Motion that the Object present did, will have the same Effect with the Object. To prove the first, let one observe a Man's Face looking on a pitiful Object, then a ridiculous, then a strange, then on a terrible or dangerous Object, and so forth: For the second, that Ideas have the same Effect with the Object, Dreams confirm too often.

The Manner I conceive to be thus; the Animal Spirits moved in the Sensory by an Object, continue their Motion to the Brain, whence the Motion is propagated to this or that particular Part of the Body, as is most suitable to the Design of its Creation, having first made an Alteration in the Face by its Nerves, especially the *Pathetick* and *Oculorum Motorii*, actuating its many Muscles, as the Dial-plate to that stupendious Piece of Clock-work, which shews what is to be expected next from the striking Part: Not that I think the Motion of the Spirits in the Sensory continued by the Impression of the Object all the way, as from a Finger to the Foot; I know it too weak, though the Tenseness of the Nerves favours it: But I conceive it done in the Medulla of the Brain, where is the common Stock of Spirits; as in an Organ, whose Pipes being uncovered, the Air rushes into them, but the Keys let go, are stopped again: Now if by repeated Acts or frequent entertaining of the Ideas of a favourite Passion or Vice, which natural Temperament has hurried one to, or Custom dragged, the Face is so often put into that Posture which attends such Acts, that the Animal Spirits find such latent Passages into its Nerves, that it is sometimes unalterably set (as the *Indian Religious* are, by long continuing in strange Postures in their *Pagods*) but most commonly such a Habit is contracted, that it falls insensibly into that Posture, when some present Object does not obliterate that more natural Impression by a new, or Dissimulation hide it. Hence it is, that we see great Drinkers with Eyes generally set towards the Nose, the adducent Muscles being often employed to let them see their loved Liquor in the Glass in the Time of drinking, which were therefore called *Bibitory*; lascivious Persons are remarkable for the *Oculorum Mobilis petulantia*, as *Petronius* calls it. From this also we may solve the *Quaker's* expecting Face, waiting the pretended Spirit, and the melancholy Face of the Sectaries; the studious Face of Men of great Application of Mind; revengeful and bloody Men, like Executioners in the Act; and though Silence in a Sort may a while pass for Wisdom, yet sooner or later *Sir Martin* peeps through the Disguise to undo all; a changeable Face I have observed to shew a changeable Mind. But I would by no means have what has been said understood as without Exception; for I doubt not, but sometimes there are found Men with great and vertuous Souls under very unpromising Outfides.

VI. By *Pores*, Physicians mean no more, than certain permeable Spaces between the Parts of a Body. Wherefore that there are Pores in the Skin of every Man's Body, is no more to be questioned, than whether Men do

ever sweat or perspire. But in the Hands and Feet, these Pores are very remarkable. For if one will with an indifferent Glass, survey the Palm of his Hand very well washed with a Ball, he may perceive innumerable little Ridges, of equal Bigness and Distance, and every where running parallel one with another; and especially upon the Ends and first Joints of the Fingers and Thumb, upon the Top of the Ball, and near the Root of the Thumb a little above the Wrist. In all which Places they are very regularly disposed into Spherical Triangles, and Ellipticks. Upon these Ridges stand the Pores, all in even Rows, and of that Magnitude, as to be visible to a very good Eye without a Glass. But being viewed with one, every Pore looks like a little Fountain, and the Sweat may be seen to stand therein, as clear as Rock-water, and as often as it is wiped off, to spring up within them again. That which Nature intends in the Position of these Ridges is, that they may the better suit with the Use and Motion of the Hand: Those of the lower Side of every Triangle, to the Bending in or Clutching of the Fingers; and those of the other two Sides, and of the Ellipticks, to the Pressure of the Hand or Fingers Ends against any body, requiring them to yield to the Right and Left. And the Pores are placed upon these Ridges, and not in the Furrows which lie between them, that so their Structure might be the more sturdy, and less liable to be depraved by Compression; whereby only the Furrows are dilated or contracted, the Ridges constantly maintaining themselves, and so the Pores unaltered. And for the same Reason, the Pores are also very large, that they may still be the better preserved, though the Skin be never so much compressed and condensed, by the constant Use and Labour of the Hand; and so those of the Feet, notwithstanding the Compression of the Skin by the Weight of the whole Body.

These Pores are a very convenient and open Passage for the Discharge of the more noxious and perspirable Parts of the Blood; which, by the continual use of the Hands and Feet, are plentifully brought into them. Whence it is, that many hypochondriacal Men, and hysterical Women, have almost a continual Burning in the Soles of their Feet, and the Palms of their Hands; yet not on the Top of their Feet, or Back of their Hands; which being less disposed to receive the noxious Parts, are therefore unfurnished with this Kind of Pores.

The Pores of the Skin wholly obstructed by nocturnal Air; by —
n. 8. p. 138.
1665.

The great Effects of Touch, and Friction; by —

n. 12. p. 206.
Hist. of Life and Death. 6.
Sect. 3.
1666.

VII. Not many Years since, there was in this Country (near *Leyden*) a Student, who being much addicted to the Study of Astronomy, and spending very many Nights in Star-gazing, had, by the nocturnal wet and cold Temper of the Air, in such a Manner obstructed the Pores of his Skin, that little or nothing exhaled from his Body; which appeared hence, because that the Shirt he had worn 5 or 6 Weeks, was then as white as if he had worn it but one Day. In the mean while, he gathered a subcutaneous Water, of which he was afterwards well cured.

VIII. 1. My Lord *Verulam* observes, that Motion and Warmth (of which two Friction consists) draw forth into the Parts new Juice and Vigour, and con-

conduce much to Longevity. And Mr. *Boyle* observes, how in our Stables a Horse well curried is half fed; and how some can tell by the Milk of their Asses, whether that Day they have been well curried or not; arguing hence, That if in Milk the Alteration is so considerable, it should be so likewise in the Blood, or other Juices, of which the Blood is elaborated, and consequently in divers of the principal Parts of the Body. To these Observations may be added what Dr. *Beal* not long since communicated. 1. That he could make good Proof of the Curing or Killing a very great and dangerous Wen (that had been very troublesome for 2 or 3 Years) by the Application of a Dead Man's Hand; whence the Patient felt such a cold Stream pass to the Heart, that it did almost cause in him a Fit of Swooning. 2. That upon his Brother's Knowledge, a certain Cook in a Noble Family, being reproached for the Ugliness of his Warty Hands, was bid by his Lord to rub his Hand with that of a Dead Man; and that his Lord dying soon after, the Cook made use both of his Lord's Advice and Hand, and speedily found good Effect. 3. That a Gentleman, who came lately out of *Ireland*, informed him of an aged Knight there, who having great Pain in his Feet, inso-much that he was unable to use them, suffered a loving Spaniel to lick his Feet, Mornings and Evenings, till he found the Pain appeased, and the Use of his Feet restored. This, saith the Relator, was a gentle Touch, and Transpiration; for he found the Spirits transpire with a pleasing Kind of Titillation. 4. That he can assure of an honest Blacksmith, who caused Vomitings by stroaking the Stomach; gave the Stool by stroaking the Belly; appeased the Gout and other Pains, by stroaking the Parts affected.

2. 'Tis near 20 Years since I saw Mr. *Greatrix* stroak any: But I give you nothing here, which several Friends, who were Eye-witnesses, as well as myself, do not remember, and think exactly true.

My own Brother, *John D* — — *n* was seized with a violent Pain in his Head and Back; Mr. *Greatrix* (coming by Accident to our House) gave present Ease to his Head, by only stroaking it with his Hands. He then fell to rub his Back, which he most complained of; but the Pain immediately fled from his Hand to his right Thigh; then he pursued it with his Hand to his Knee, from thence to his Leg and Ankle and Foot, and at last to his great Toe. As it fell lower, it grew more violent, and when in his Toe it made him roar out; but upon rubbing it there it vanished.

My Uncle's Daughter was seized, when a Girl, with a great Pain and Weakness in her Knees, which occasioned a white Swelling; this followed her for several Years, and having used divers Means to no Effect, after 6 or 7 Years time, Mr. *Greatrix* coming to *Dublin*, and lodging at my Father's, my Aunt brought her to him. He stroaked both her Knees, and gave her present Ease, the Pain flying downwards from his Hand, till he drove it out of her Toes, and the Swelling, in a short Time, wore away, and never troubled her after.

I had also a Comrade, who, after a Fever, was much troubled with a Pain in her Ears, and very deaf; Mr. *Greatrix* put some of his Spittle into her Ears, and turning his Finger in her Ears, rubbed and chafed them well,

*Usefulness of
Exper. Phil.
c. xv. Sect. 2.*

*Cures done by
Mr. Greatrix
the Stroaker,
by M. M;
Communicated by Mr.
Thoresby. n.
256. p. 332.
1699.*

which cured her both of the Pain and Deafness: And an opposite Neighbour tells me, That her Uncle was cured by him of the same Malady. Another told me, That when a Child, being extremely troubled with the King's Evil, she was touched by King *Charles II.* but she was nothing the better; but Mr. *Greatrix* perfectly cured her. A Smith near us had two Daughters extremely troubled with the Evil, the one in the Thigh, and the other in the Arm; he cured them both: One of them lives still there; she is a healthy Woman, and the Mother of several Children. The Scars of the Evil Sores still remain on her Arms, though it is 20 Years since it was cured; since when she never had any Symptoms of it.

Where Mr. *Greatrix* stroaked for Pains, he used nothing but his dry Hand; if Ulcers or running Sores, he would use Spittle on his Hand or Finger; and for the Evil, if they came to him before it was broke, he stroaked it, and ordered them to poultice it with boiled Turneps, and did so every Day till it grew fit for Lancing: He then Lanced it, and with his Fingers would squeeze out the Cores and Corruption, and then in a few Days it would be well with only his Stroaking of it every Morning; but if it were broke before he saw them, he only squeezed out the Core, and healed it by Stroaking. Such as were troubled with Fits of the Mother, he would presently take off the Fit, by only laying his Glove on their Head; but I never knew any that he cured of that Distemper, for their Fits would return; but I have heard he cured many of the Falling Sickness, if they stayed with him, so that he might see them in 3 or 4 Fits, else he could not cure them.

A Girl in Ireland with Horny Excrescencies: by Mr. St. Geo. Ash. n. 176. p. 1202. 1685.

IX. 1. This Horny Girl is called *Anne Jackson*, born in *Waterford* of *English* Parents, who are both said to have been sound and healthy: This Infirmity did not shew itself, till she was about 3 Years old. She is now about 13 or 14 Years of Age, yet can scarce go, and is so little in Stature, that I have seen Children of 5 Years old taller. She is very silly, speaks but little, and that not plainly, hastily and with Difficulty: Her Voice is low and rough; her Complexion and Face well enough, except her Eyes, which look very dead, and seem to have a Film or Horn growing over them, so that she can hardly now perceive the Difference of Colours. The Horns abound chiefly about the Joints and Flexures, and not on the brawny fleshy Parts of her Body; they are fastened to the Skin like Warts, and about the Roots resemble them much in Substance, though toward the Extremities they grow much harder and more horny: At the End of each Finger and Toe, grows one as long as the Finger or Toe; not straight forwards, but rising a little between the Nail and the Flesh (for near the Roots of these Excrescencies is something like a Nail) and bending again like a Turkey's Claw, which too it much resembles in Colour: On the other Joints of her Fingers and Toes are smaller ones, which sometimes fall off, others growing in their Places. The whole Skin of her Feet, Legs and Arms, is very hard and callous, and does daily grow more and more so: On her Knees and Elbows, and round about the Joints, are many Horns; two more remarkable at the Point of each Elbow, which twist like Rams Horns: That on the left Arm

Arm is above $\frac{1}{2}$ Inch broad, and 4 Inches long: On her Buttocks grow a great Number, which are flat by frequent sitting: At her Arm-pits and the Nipples of her Breasts, small hard Substances shoot out, much slenderer and whiter than the rest: At each Ear also grows a Horn; the Skin of her Neck does of late begin to turn callous and horny, like that of her Hands and Feet. She eats and drinks heartily, sleeps soundly, and performs all the Offices of Nature, like other healthy People, except that she never had the Evacuation proper to her Sex.

2. In May, 1678, at the Hospital at Paris, called *La Charité*, I saw a young Lad of *Brie*, between 19 and 20 Years old, who had, upon the Ends of all his Fingers, as it were, Horns grew out; one whereof, upon the middle Finger of his Right-hand, was 310 *Grys* long, and 130 *Grys* in Circumference. He told me, he had one formerly on his Thumb, much bigger and longer than this, but it was now very short. The like grew also upon the Toes of his Feet, only excepting the two small Toes of each Foot, where there are now none, and upon three of them there never had been: Upon the fourth there had been one, but it having fallen off about 6 Months since, came no more, but left the Nail very little different from Natural. This Horny Substance grew not out of the End of the Fingers, but was, as it were, a Thickning of the Nail, which, instead of growing out in Length, increased in Thickness; but rose not up straight in a perpendicular Line to the Finger, but as it augmented bended forwards, and so grew somewhat into the Shape of a Bird's Claw, but that it was not taper and sharp like that, but blunt at the End, and almost of the same Bigness all along, and full of pretty deep Chaps in the Convex Part, but the Concave was without any. He had no Sense in the Horny Part itself, but that Part where it joins to the Flesh is very sensible and tender. There are also, in several Parts of the Back of his Hands, Horny Excrecencies, some pretty broad, and others less, but none rising much above the Skin; but they look there, those that are broad, like flat, but very broad Warts; but to the Touch they feel much harder.

This Disease began about 3 Years before, after having had the Small-pox. His Food was the usual Food of the Country. He has been purged twice since he came into the *Charité*; and some of the Horns of his Fingers begin to loosen at the Roots.

N. B. A *Gry* is the one thousandth Part of a *Philosophical Foot*, which is the third Part of a Pendulum of Seconds; so that 310 *Grys* is a little more than 4 *English* Inches.

X. 1. About 43 Years since, the Body of a Woman was buried here (at *Norimberg*) in a Coffin of Wood, painted (according to the Custom here used) with Black. The Earth in which it was buried was dry and yellow, as the Earth, for the most Part, is near this City round about. The Corps lay the lowest of three in the same Grave, there being two other Corps over it. Through the Clefts of the Coffin, much Hair was thrust out, and had grown very plentifully, insomuch, that it is believed that the whole Coffin may, for some time, have been all covered with *Hair*. The Cover of this Coffin

A Boy in France with Horny Excrecencies; by Mr. Locke. n. 230. p. 594. 1687.

A Body, after being long buried, almost wholly converted into Hair; by — Ph. Col. n. 2. p. 10.

Coffin being removed, the whole Corps appeared perfectly resembling an human Shape, exhibiting the Eyes, Nose, Mouth, Ears, and all the other Parts; but from the very Crown of the Head to the Sole of the Foot, covered over with a very thick set *Hair*, long and much curled. The Sexton, after a little viewing of it, going to handle the upper Part of the Head with his Fingers, found immediately all the Shape of the Body to fall, and left nothing in his Hand but a Handful of *Hair*; there being neither Skull, nor any other Bone left, unless it were a very small Part of that which he suspected to be the great Toe of the Right Foot. This *Hair* was somewhat rough at first, but afterwards it grew very much harder, and of a Brown Red Colour.

By Mr. Chr. Arnold. *ibid.* P. 50.

2. Besides the Relation of M. *Wulferus*, concerning the *Hairy Corps* here lately discovered, it hath likewise been observed, that one executed and hanged at this Town for Theft, within some Space of Time, was strangely over-grown with *Hair* all his Body over upon the Gallows.

Observations of Hair found in several Parts of the Body; by Dr. Ed. Tyson. Ph. Col. n. 2. p. 11. * Lib. III, de Plantis. † *Hist. & Obs. med. Cent. 1. Obs. 10.*

3. It is the Opinion of the Learned *Honoratus Fabri*, * and others, that *Hair*, Wool, Feathers, Nails, Horns, Teeth, &c. are but Animal Vegetables or Plants; if so, we may be the less surpris'd at their Growth on the Body, even after the Decease of the Animal: And as there have been other Examples, so the foregoing Observation is a remarkable Instance thereof. *Petrus Borellus* † thinks, that as Plants, they may be transplanted, and made to grow in a Soil they did not at first; and some Remarks he gives thereon. What he relates concerning Teeth being drawn and set again, I know to be true, having tried it formerly in myself, and have heard of the like done by others.

As for *Hair*, though the outward Surface of the Body be the usual Place where it grows, yet hath it been sometimes found on the Tongue, upon, and in the Heart, in the Breasts and Kidneys, and other Glandulous and Muscular Parts of the Body: But there is scarce any inward Part more subject to it than the *Ovarium*, or Testicles of Females. I have lately met with three Instances of it; an Account of which may possibly gratify the Curious.

The first was in a Bitch I dissected in my Chamber at *Oxford*, An. 1674; where I observed the *Omentum* larger than usual, but so fastened to the *Intestines*, the Extremes of the *Cornua Uteri*, and to the Right-side, that I could not readily separate it. Where the Adhesion was, it was somewhat inflamed, and had there several small Glands. But I very much wondered to find here *Hair* growing, some on the *Omentum*, others on the *Cornua Uteri*, others in the *Ovarium*: Several of them did lie loose in the Veins, and two or three I found in the right *Ventricle* of the *Heart*; others were rooted in small Glands. The *Cornua Uteri*, at their Extrems, were joined together; and both *Testicles* made but one large rude *Glandule*. It had several Sinous Cavities within, filled with purulent Matter and *Hair*. In the *Cornua Uteri* were the *Vestigia*, or Tracts of former *Fætus's*. Before Dissection, I observed the Fore-parts of the Bitch to be well, but the Hinder were very much emaciated. This *Hair* was about an Inch, or an Inch and an half long; and although found in so many Places, yet not much in all. It somewhat resembled some of the *Hair* of the Skin. My

My next Observation, was in a young Gentlewoman I was at the Dissecting of, together with Dr. *Morton*, Dr. *Dan. Cox*, &c. in *Nov. 1679*. Where, besides several other Particulars we did observe that may more nearly relate to the Cause of her Death, and lingering Illness, we observed an unusual Tumour of the right *Testicle* or *Ovarium*, which was swelled into two Vesicles or Bags, almost as big as a Man's Head: One of these was much less than the other; both consisted of a thin Membrane, and had a free Communication on the Inside one with another; they were filled with a Liquor and Substance much resembling Curds and Whey; for in a thin pale *Lympha* or *Serum*, there did swim in several Lumps and Pieces a *steatomatous* or cruddy Matter, which to the Touch was soft and fatty, of a dilute yellowish Colour, and of no ill or remarkable Smell. Some of it being put into warm Water did, in part, dissolve. The Inside of these Bags was smooth, and without the Adhesion of this Matter, and in no Place, as we observed, discoloured. One of these Lumps or Pieces was half as big as a Man's Fist, and in it we found a great deal of *Hair*, as likewise in the other Pieces, but not in so great Plenty. This *Hair* was of a Silver Colour, very soft and fine, but strong; and some of it 2 Foot and 3 Inches long. It did not seem to grow, or to be fastened to any Part, but to lie entangled in this cruddy Matter. By keeping, this *Hair* is grown something browner, and by often handling, and by freeing it from that cruddy or fatty Substance, much of it broken shorter. But on the Outside of the larger Bladder or Bag, we met with the remaining Part of the *Ovarium* or *Testicle*, and in it we observed several Eggs, or, at least *Hydatides*, of this [o o] Bigness. But we were more surpris'd to find there a Bony Substance, which so exactly represented an Eye or Dog-tooth in its Shape, Hardness, Colour, and all things, that I cannot better liken it to any thing besides. It firmly adhered at its Basis, where it is broadest, to the Membranes of the *Ovarium*, and had of each Side of it (at small Distances) two other Bones or Teeth, but they were but small, and not of so regular a Figure.

This *Tooth* and *Hair* gave a Suspicion to some, that possibly they might be the Parts of a corrupted *Embryo*, but I rather think not; for if so, we should have met with Bones, or, at least, a purulent Matter: Besides, the *Tooth* was without the *Cystis* or Bag, in the *Ovarium*, the *Hair* within. I rather look upon it as a *Lusus Naturæ*, her endeavouring to form something, and being disappointed of an Animal, produced a Vegetable. Teeth and Bones, at first, are soft Membranes or Tendons hardening into Cartilages, and Cartilages into Bones. The Tendons of the Legs of Fowl, as of an old *Turkey*, become Bony; so have I seen the *Arteria Aorta*, Part of the *Emulgent* and *Iliac* Branches of a Woman at *Oxford*, that were *Osseous*. Dr. *Willis* mentions the like of the *Carotid Artery*, and I have seen it also in the great Artery near the Heart in a Horse, and it is often to be met with in the Hearts of Oxen and Deer. Once I observed the outward Membrane of the Liver in a human Body, that was part Schirrous, part Bony: Once I met with the same in the *Spleen*, and at another Time (in an antient Gentleman) on the outside of the *Lungs*. So that even here possibly, Part
of

of the *Ovarium* being as it were Callous or Schirrous, it might *Offise*, and some unknown Circumstances might determine and shape it into a Tooth.

As for the *Hair* in the Bag or *Cystis*, I am apt to think, that that fatty Substance, in which it was contained, might contribute much towards it; as the Threads of Silk-worms, the Cobwebs of Spiders, so Cotton, the Thrums of the *Gramen Tomentosum*, &c. are from particular Juices. But here they have their Strainers through which they shoot, or are as it were wyre-drawn. The *Hair* mentioned in the foregoing Observation, was most of it radicated in small Glands; but as for that of this, like as some Plants that thrive by sending their Roots into a Fluid Body, the Water, this *steatomatous* or fatty Substance might prove a sufficient Soil for propagating and producing them; which I am the more apt to believe, since in the following, and some other parallel Histories, where such *Hair* hath been found, likewise this pinguious or fatty Substance hath also been observed.

Therefore my third Observation is of a Gentlewoman, aged about 39 Years, who for a considerable Time had been troubled with various Symptoms of the Stone in the *Kidneys*, as bloody Urine, great Pains, Vomiting, &c. which in all Probability were the greatest Cause of her Death. Upon opening her Body, there was observed near the *Uterus* a *Cystis* or Bag about the Bigness of a large Turkey's Egg, and in it a like fatty Substance, as before expressed; as also a great Quantity of light soft *Hair*. Fastened to a fleshy Substance within the *Cystis* was a *Bone*, in some sort resembling a *Mandible*; for it had several Sockets, in which were seated three large *Dentes Molares*, or Grinders, in a Triangle, and a 4th not yet grown out. In one of the *Kidneys* was found a large Stone.

How subject this Part is to such *Hairy* Tumours, may further appear from the Histories of others; but they make no mention of *Teeth* found there; but I have been acquainted, that the Learned Dr. *Needham*, Dissecting a Woman here in Town some Years ago, in one of the *Ovariums*, which was very much swelled, found both a Tooth and Hair there.

An Observation
consonant
to it, upon the
Dissecting a
Morbid Body;
by Dr. Samp-
son. Ph. Col.
n. 2. p. 49.

4. In a Woman lately Dissected, who was the Day before her Death with great Difficulty delivered of a dead Child, there was found two great globose Tumours depending upon the Left *Testicle*, and may rather be called preternaturally grown Eggs, or Parts of the extended *Ovarium*: Both of them lay in the *Pelvis* under the Womb, and so hindred the Egress of the *Fetus* which was well grown and big. They were covered with a thick Membrane, which had its Veins and Arteries as conspicuous as those are in the Urinary Bladder. That nearest to the *Testicle* was the least, of the Bigness of a Coco-nut, which had in it a fatty Substance not fluid, of the Colour of the Yolk of an Egg, and in the midst of it a Lock of *Hair*, which when it was freed from the Grease, appeared of a flaxen Colour: The Fat itself crackled in the Fire, melted and took Flame like Lard, and in a Spoon over a Candle would boil and smoak, excepting some small grumose Parts. In the midst of the Membrane was a hard and knotty Substance, in which lay a small Bone of a strange Shape, with a *Periostium* upon it, which was

hard to separate from it. The Bone is hard, white, and somewhat bigger than the biggest of the Bones in the *Meatus Auditorius*.

The other Tumor was thrice as big as the former, and about 2 Inches distant from it, yet connected to it by a strong Membrane of the extended *Tunicle*. Opening it, there sprung out a more white and liquid Sort of Grease, but in the Middle was as thick as the former, and of the Colour and Constitution of Live-honey; for which Cause it may be called a *Meliceris*, though the Inflammability both of this and the other, makes them both *Steatomata*. In the midst of this lay enveloped, a large Lock or two of *Hair*, variously entangled like those the Country-men call *Elfs-locks*, which are a Species of the *Plica Polonica*. The Colour was of a blackish Brown, and the Quantity four times as much as the former. Some Part of this *Hair* was long, and evidently grew out of the inward Parts of the Membrane, in which it was radicated, and from whence it was plucked. This Fat was more inflammable than the other, neither did it crackle in burning as the former, and left fewer Spots in the Spoon. In the Duplicatures of this Membrane, also was a Lump which contained another misshapen Bone, very hard and hollow, covered with a Skin like a *Periosteum* without, and the *Dura Menynx* within: So that it is hard to say, whether Nature was forming a Tooth with part of the Jaw, or the whole *Cranium*.

XI. The *parenchymous* Parts of the Body are, by Anatomists, generally supposed to be in very many Places wholly void of Vessels, designed chiefly to fill up Cavities and Interstices between the Vessels, and to bolster up the same, and to convey them through the Parts.

The parenchymous Parts of the Body; by Sir Edm. King. n. 18.

But having many Years endeavoured to excarnate several Parts of the Body, *viz.* the *Liver, Lungs, Spleen, Kidneys, &c.* (not to name the *Placenta Uteri*, which seems to be *parenchymous* too) and being very desirous to make a Scheme of the Vessels of any of these, whatever they were, I fixed upon; I found, notwithstanding all my Care to preserve the Vessels, when I was freeing them as heedfully as I could from the supposed *Parenchyma*, that in every Breach I made either with my Fingers or otherwise, all my Endeavours were destructive to my Purpose: And that upon Examination of those Bits, much of which is called *Parenchyma*, I met in them more Vessels than I had preserved in the Parts whence they came: And though the Portion were never so small, yet my bare Eye could make this Discovery; much more could I, when assisted by a Microscope, perceive I had destroyed more Vessels than preserved, in despite of the exactest Care I was capable to use. Then reviewing what Mischiefs I had done in every Place, quite through the whole Tract of my Fingers, Knife, &c. I began to think with myself, That it was not impossible for these Parts to consist wholly of Vessels curiously wrought and interwoven (probably for more Uses than is yet known) and the Consideration, which came into my Mind, of a Piece of fine Cloth (which consists of so many several minute Hairs called Wool) was no Discouragement to this Opinion. I then reiterated Experiments over

p. 316.

and over; some of which proved so successful, to my Apprehension, that I was encouraged in the Year 1663 and 1664, to discourse of it to several very worthy Persons; as Mr. Boyle, Sir William Petty, Dr. Williams, Dr. Lenthall Dr. Jasper Needham, Dr. Samson (who afterwards sent me a Letter from France, intimating the Acquaintance he had made with the Learned Steno, who hath since published something of the same Discovery) Mr. Daniel Cox, and Dr. Samuel Parker, &c. who doubtless cannot but remember, that then I related to them, I found much Cause to believe, that that Substance, commonly called *Parenchyma*, was in most, if not in all its *parenchymous* Parts, full of Vessels: However, it had been imagined by all I could ever meet with, to consist in great Part of a Substance, in many Places void of Vessels, designed for such Uses as are above-mentioned. Against which I have now further to alledge, 1. That I observe in a Piece of Musculous Flesh (so called) either Raw, Roasted, or Boiled, &c. that if I so far extend it, as to make it to be seen through, I can (assisting my Eye) perceive it full of Vessels placed as thick as is possible to be imagined (the Fat, if there be any, being first removed) there appearing then nothing but Vessels, yet so as with a Microscope may be seen thorough, when they are extended. 2. That if any one, as he is at Dinner, take a Piece of Flesh, and begin either at the Head or Tail of a *Muscle*, he may divide it *in infinitum*, all along from Head to Tail, without breaking any thing of that called Flesh, only these transverse Fibres that seem to stitch them together, and (as I am apt to think) pass through the very Bodies of the smallest of them, and quite through the whole Muscle up to the cutaneous Porosities: So that there is not one of these small *Ducts*, that run *per longitudinem*, but it is furnished with a sufficient Number of Out-lets, when Need requires, though too minute to suffer any Alimentary Juice to pass transversely (in a living Body) or any other Liquor when the Body is dead and cold. But to wave their Use at present, and to return to what I was saying, compress between the Fingers this Bit of Flesh, and you shall find the Juice, especially if the Meat be hot, to go before your Fingers toward either End you please; but if you compress both Ends, you shall see it swell into the Middle; and again, if you press the Middle, it will run out at both Ends. But further, suppose a Piece of Flesh, called *Parenchyma*, as big or as little as you please, in any Part of the Body, and let me prick it with a Needle, where you shall appoint; if you feel it, I presume you will acknowledge, a Nerve, or a Fribilla related to it, is touched: If you feel it not, I am sure some Liquor, either sanguineous or other, will follow the Needle: And from whence can that come but out of Vessels? unless accidentally, as by a Contusion, &c. it be extravasated: In which Case my Argument will not be injured, because the Part is depraved, whereas I speak of the Parts as they are in their Natural State.

To confirm and illustrate all which, I desire, that the following familiar Observations may be considered:

1. If a Horse, fat and fair to look on, without a Hollow to be seen between his Muscles, be rid extream hard, and into a great Sweat, and then kept one Day without Water or moist Meat, you shall see him look so thin in

many

many Places, as in the Musculous Parts, that you will hardly believe it to be the same Horse, especially if he be (as the Phrase is amongst Horse-Masters) a *Nash* or *Wash* Horse: The Cause of which Thinness will easily be granted to be only an Exhaustion of Juice, expended out of the Blood, which did stuff out these Vessels. And whoever, that is used to ride hard, shall observe how thick this foul Horse breathes, and at what a rate he will Reek and Sweat, will not much wonder at the Alteration. But if the Horse be a hardy one, and use to be hard ridden, then you will see that one Day's Rest, and his Belly full of good Meat and Drink, will in one Day or two restore him to his former Plight, the Food being within that short Space of Time so distributed, that all the Vessels will be replenished again, as before. And the cleaner the Horse is, the sooner recruited, and the less sign of hard Riding will appear. This seems to shew the Facility with which the Juice, called Blood, passeth; which surely, if there were such a Thing as a *Parenchyma*, might by several Accidents (not difficult to mention) be so depraved in several Parts of it, that it might lose its receptive Faculty; than which it may be thought to have none of greater Use, being supposed to be without Vessels.

2. Discoursing sometimes with *Grafiers* in the Country, about the Pasture of Cattle, I have been informed by them, That if they buy any old Beasts, Oxen or Cows to feed, they choose rather those that are as poor as can be, so they be sound; because that, if they are pretty well in Flesh, what they then add to them by a good Pasture, though it make them both look and sell well, yet it will not make them eat so well, their Flesh proving hard and very tough: Which some may suppose to be the Age of *Parenchyma*; and so it is of that so called. But if those Beasts be old and extremely poor, then they feed very kindly, and will be not only very fat, but spend well, like young ones, and eat very tender. Of which I take the Reason (excluding a *Parenchyma* now) to be this: When an Ox or Cow is grown old, and in an indifferent Plight as to his Flesh (for so it is called) all these Vessels having been kept at that Size for the most Part, have contracted a Tenseness and Firmness, and their Fibres less extensive, not so fitted for the Reception of more unctuous Particles to relax them; and that additional unctuous Matter, which occasions Fatness, is forced to seek new Quarter, any where (often remote from Muscles) where it can be with least Difficulty received; sometimes to one Place, sometimes to another, as may be seen in Shambles. Whereas, if there were such a Thing as a *Parenchyma*, that certainly would, like a hungry Sponge, immediately swell up in several Parts (which without much Difficulty might be discovered in the Dissection) and more eminently where it should find the Pores most patent: And in the Dissection of such Muscles it would be very strange, not to find some, if not many Pieces of them in various Shapes, to the great Inconvenience of the Parts in which they are seated: Which yet I confess, I could never find in any Muscle, unless it were where there had been a Contusion, or an Imposthume, or the like. But according to my Opinion of the *parenchymous* Parts, the Reason why the Flesh of a very lean Ox or Cow, that hath got new Flesh in a good Pasture, eats tenderer, seems to be this: That in a very lean Beast, the Vessels designed for admitting and di-

tributing the nourishing Juice, are so near contracted, and lie so close together, that when once they are relaxed by fresh and unctuous Nourishment, they extend every way in all extensive Parts, until in a short Time the whole Creature is, as it were, created anew, having got new Flesh upon old Bones. And the Necessity of extream Extension makes all those Parts that are, as has been said, for the Admission of Nourishment, so thin and fine, that it will make the lean Beast, put into a rich Pasture, eat young and tender; whereas one of the same Age, that never was very poor, fed in the same Pasture, shall eat hard and tough.

3. It has been observed, that *corpulent* Persons, in some Diseases that seize on them do fall away to Wonder, not only in the Waist, but in the Arms, Legs, and Thighs; and the very Calves of the Legs have been observed so flaccid and loose, that one might wrap the Skin about the Bones. The Reason whereof, according to the Opinion delivered, may be easily rendered to be a great Consumption of the Stock of Liquors, that in Health kept the Vessels turgid; which Vessels I suppose to make up those Muscles. But when the Pores are obstructed, that the Nourishment is hindered (which then also uses to be but sparingly administred) and Sweats, either spontaneous, or forced, are large, there must needs be a great Expence of those Liquors, the Supply being but inconsiderable; which cannot but contract all these Ducts of all Sorts nearer together, and make them much less in themselves, meerly from Exhaustion: Or, if there should be no Sweats, the internal Heat spends the Spirits, and dries up the Liquors, the Consequence whereof may reasonably be presumed to be this Flaccidity of Parts, and great and sudden Change made in them; not that there is need of any *Parenchyma* to fill up these Muscles, considering what hath been said.

*A Child about
6 Years old,
who in Face
was as large
as a full
grown Wo-
man; by
Dr. Hen.
Sampson.
n. 217. p. 80.*

XII. One *Hannah Taylor* (born in *Crouched-Friers*, June 12. 1682.) was till 3 Years old very sickly, lean, and not able to go alone; but about *Bartholomew-tide*, 1685, she began to grow strong and fat, which increased till the Time of her Death: She was also a very forward Child of Understanding, had her *Pubes* grown thick and long, as also Hair under her Armpits, and a Downiness upon her Chin, unusual with those of her Sex, except in some aged Persons.

About half a Year before she died she began to complain of Pains, especially on her left Side, and voided Gravel often by Urine, and with Pain. Her Breath was streight, as is usual to fat People, especially when she went up a Pair of Stairs; yet on that very Evening before she died, she walked Abroad, was merry and lively, went to Bed, and slept as at other Times; but after Midnight awaked, cried out of a great Pain in her Side, and said, Mother, I want Breath, I shall die; and in less than a Quarter of an Hour was quite dead.

The Measures and Weight of her Body were as followeth: Round the Breast a Yard and 2 Inches; over the Hips at the Navel 1 Yard 5 Inches; over the Stomach 1 Yard; her Height 1 Yard wanting an Inch; round the Thigh 1 Foot 9 $\frac{1}{2}$ Inches; Calf of the Leg 13 Inches; upper Part of the

Arm

Arm 14 $\frac{1}{2}$ Inches ; the Wrist 7 Inches ; her Weight 95 lb. She had a Face as big and broad as any fat grown Woman of 20 Years. Her Chin and Breast were so thick laid with Fat, that she was forced to hold up her Head (or rather throw it backward) as she walked. These Measures were all taken before the Dissection. The Thickness of the Fat upon the Muscles of the *Abdomen* was 2 Inches, and not much less upon the *Sternum*. After the Fat was removed (which was as much as is usually in most fat and grown Persons) the *Abdomen* was yet very protuberant and round, and yet the Fat contained therein not extraordinary much, neither on the *Omentum* or *Mesentery*. Yet it was more than is usual in well fed Persons, and so much that with the Bigness of the other internal Parts (which were all of the largest Size) it made her have so big and protuberant a Belly. The Guts were all inflamed and thick, the Liver large, the left Kidney (where was the Seat of her Misery) exceeding large, and Double the Bigness of that on the right Side; upon the Dissection whereof there issued out a vast Quantity of Blood, both from all the Vessels of it, and out of its *Pelvis*; and after several times spunging of it, yet it came flowing in from the *emulgent Artery*: A certain Argument of a great Plenitude in the *descending Trunk*, which caused the Inflammation in the *Mesentery*, and the *Nephritis* in the Kidney. Here was also some small Gravel, which possibly had choaked up the *Ureter*; though that was not examined; but because there was no Blood in the Bladder, I justly make this Conjecture. The Uterine Parts had nothing bigger, or more remarkable than in others of her Age. The *Testicles* were large, but smooth and white, without Protuberances or Shew of Eggs. The Bladder had a purulent Matter in it. When the Breast was denuded of its Fat, it shewed no bigger than of another Child of her Age. The Cavity was totally filled with the *Lungs* and *Heart*. The *Heart* was well, and had very strong Fibres, and no *Polypus*. But the *Lungs*, besides that they were extended to fill up the whole Cavity, were annexed strongly to several Parts of the *Pleura*, and had several Protuberances as big as Nutmegs filled with a Pulp like an *Atheroma*, and were in divers Places rotten and corrupted. The evident Cause of her Death lay in the Inflammation of the lower Parts, but the Suddenness thereof must be from some Impression which that Inflammation made upon the Original of the Nerves moving the *Diaphragm*, *Bronchia*, and other Parts of *Respiration*; for her great and only Complaint was Want of Breath. Besides, her very Face and Head were miserably coloured with Redness of stagnant Blood. The Head was not opened.

XIII. Sir F. L. was swelled mightily in his Legs, *Abdomen*, *Stomach*, and to his very Throat, even to Suffocation, that he died. Mr. K——s was sent for to let out the supposed Waters; for his Physicians had treated him as in a *Dropfy*, with powerful *Diureticks*, &c. and 1 or 2 Pails were provided ready to receive the Matter; but upon opening him, there issued forth nothing but a Gush of Wind. He cut 6 Inches and a half deep of *Fat* on the *Peritoncum*, and died of a *Corpulentia nimia*, being one that fed prodigiously.

Corpulency
mistaken for a
Dropfy; com-
municated by
Mr. Green-
hill. n. 265.
p. 618.

XIV. *Accounts of Books omitted.*

- n. 167. p. 866. 1. **M**edicina Septentrionalis Collatitia, s. Rei Medicæ nuperis Annis à Medicis *Anglis, Germanis, & Danis* emissæ Sylloge & Syntaxis; Opera *Theophili Boneti*, M. D. *Genevæ* 1685. in Fol.
- n. 105. p. 113. 2. Anatomie Corporis Humani, conscripta ab *Isbrando de Diemerbroeck*, M. D. *Ultrajecti* 1671. in Quarto.
- n. 178. p. 1309. 3. *Godefridi Bidloo*, M. D. Anatomia Humani Corporis. *Amstel.* 1685. in Fol.
- n. 183. p. 4077. 4. The Chirurgical and Anatomical Works of *Paul Barbette*, M. D. Together with a Treatise of the Plague. *Englisched out of Low-Dutch.* *Lond.* 1672. in 8°.
- n. 40. p. 811. 5. *Franc. de le Boe Sylvij* Praxis Medicæ Idea nova. *Ludg. Batav.* 1667. n. 71. p. 2159. in 12°. and 1671.
- n. 88. p. 5105. 6. Thesaurus Medicinæ Practicæ; Studio & Operâ *Thomæ Burnet*, M. D. 1672. in 4°.
- n. 118. p. 435. 7. *Jacobi Barneri* Ph. & Med. D. Prodrumus *Sennerti* Novi, seu Delineatio novi Medicinæ Systematis, &c. *Augustæ Vindellicorum.* 1677. in 4°.
- n. 162. p. 704. 8. *Job. Dolæi*, M. D. Encyclopædia Medicinæ Theoretico-Practicæ, &c. *Francofurti ad Mænum.* 1684. in 4°.
- n. 174. p. 1140. 9. *Mich. Etmulleri* Opera omnia Theoretica & Practica, &c. *Lond.* 1683. in 4°.
- n. 41. p. 835. 10. A Discourse concerning Physick, and the many Abuses thereof by the *Apothecaries.* *Lond.* 1668. in 8°.
- n. 121. p. 513. 11. The *College of Physicians* Vindicated, and the true State of Physick in this Nation faithfully represented, &c. by *Cbar. Goodall*, M. D. *Lond.* 1676. in 8°.
- n. 99. p. 6175. 12. Apologema pro Urinis Humanis; Auth. *Antonio Eygel*, M. D. *Amstel.* 1772. in 8°.
- n. 154. p. 425. 13. De Urinis, Pulsibus; de Missione Sanguinis; de Febribus; de Morbis Capitis, & Pectoris. Opus *Laurentij Bellini.* *Bonomiæ,* 1683.
- n. 171. p. 1023. 14. *Dav. Abercrombij*, M. D. de Variatione ac Varietate Pulsus Observationes. Accessit ejusdem Authoris nova Medicinæ, tum Speculativæ tum Practicæ, Clavis, &c. *Lond.* 1685. in 8°.
- n. 76. p. 2289. 15. *Job. Bapt. Sylvatici* Institutio Medica de iis qui Morbum simulant deprehendendis. *Francofurti ad Mænum* 1671. in 12°.
- n. 107. p. 162. 16. *Tho. Bartholini* de Anatomie Practica ex Cadaveribus Morbosis adoranda Consilium. *Hafniæ,* 1674. in 4°.
- n. 50. p. 1018. 17. Observationes Medicæ *Mich. Leyseri, Henr. a Moinichen, Mart. Bogdani, Jac. Seidelij,* è Musæo *Tho. Bartholini.* *Hafniæ.* in 8°.
- n. 54. p. 1094. 18. *Theodori Kerckringij*, D. M. Spicilegium Anatomicum; continens Observationum Anatomicarum rariorum Centuriam unam, nec non Osteogeniam Fœtuum. *Amstel.* 1670. in 4°.
- n. 125. p. 621. 19. Two Treatises; the one, Medical, of the Gout, by *Herman Buschhof Senior,* of *Utrecht*; the other, partly Chirurgical, partly Medical, containing

taining some Observations and Practices relating to some extraordinary Cases of Diseases in both Sexes; by *Hen. Van Roonbuysse*; *Englisht* out of *Dutch*. *Lond.* 1676. in 8^o.

20. *Caroli Drelincurtij Experimenta Anatomica*; quibus adjecta sunt plurima Curiosa super Semine Virili, Fœmineis Ovis, Utero Uterique Tubis, atque Foetu. *Lugd. Bat.* 1684. in 12^o. n. 169. p. 945.

21. *Dr. Lister's Exercitationes Medicinales.* n. 222. p. 322,

22. *Medicina Statica*, or Rules of Health; originally written by *Sanctorius*; now *Englisht* by *J. D.* *Lond.* 1676. in 12^o. n. 136. p. 921.

23. *Trichiasis admödum Rara.* *Lond.* 1684. n. 170. p. 986.

C H A P. II.

The H E A D.

I. *S. Malpighi* pretends to have discovered, that the exterior and softer Part of the Brain, doth not cover only the *Corpus Callosum*, but is also inserted into it in many Places; That the *Corpus Callosum* is nothing but a Contexture of small Fibres, issuing from the *Medulla Spinalis*, and terminating in the said exterior Part of the Brain. And these Fibres, he saith, are very manifest in the Ventricles of the Brain of Fishes. He pretends, that as Half, or at least a Third, of the Blood of an Animal is conveyed into the Brain, where yet it cannot be consumed, the finest *Serum* of this Blood is filtrated through the exterior Part, and then entering into the Fibres of the Brain, is thence conveyed into the Nerves; which he affirms to be the Reason, that the Head is so often found full of Water, when the Brain hath received a Wound, or an Alteration by some Distemper.

Discoveries concerning the Brain; by S. Malpighi. n. 27. p. 491.

II. 1. Here was lately produced an Infant come to Maturity, having instead of a Head and Brains, a Mass of Flesh like any Liver, and was found to move. This Foetus occasioned a Question for the *Cartesians*, How the Motion could be performed, and yet the *Glandula Pinealis*, or *Conarium*, be wanting; nor any Nerves visible, which come from the Brain? The Marrow in the Spine was of the same Substance. It lived four Days, and then died.

Aliiving Birth without a Head, at Paris; by M— n. 26. p. 480.

2. In *November* 1673, I was called to a sick Woman, brought to Bed that very Day I went to see her. After I had prescribed the Physick I judged necessary for the Mother, I asked for the Child, which died, I heard, as soon as it was born. The Body of it appeared outwardly very well formed and very fat; but the Head was so deformed, that it frightened all that were present. It had no Front; the two Eyes were on the Top of the Face, very big, and almost without any Orbit to lodge them in. The upper and hind Part of the Head was red like coagulated Blood, and resembled

An odd Foetus without a Brain; by M. Denys. n. 99. p. 6157.

sembled the Bottom of a Calf's Head when cut and severed from the *Vertebrae* of the Neck. I had the Curiosity to examine this red Flesh, and I found under it a Bone, that was not a hollow Skull, but a solid Bone in the Form of a small Oyster. I had it opened every Way, but I found no Hollowness nor *Brains* in it. This Bone was only fastened before to the Bones of the Face, and not behind to the *Vertebrae* of the Neck; so that the Marrow of the Back-bone had no Communication with the Head. I pursued the Optick Nerves, and lost them in this Bone, which was in Lieu of the *Cranium*, and was not at all spongy, but very hard. It seems to me somewhat extraordinary, that a Child should be able to live nine Months without *Brains*; for I was informed, that it was very lively and brisk in the Mother's Belly, but died as soon as it came into the Air.

A Child born
alive without
a Brain; by
M. Le Duc.
n. 226. p. 457.

III. 1. April 3. 1695, I was called to a Woman aged about 28 Years, 6 Months and a Half gone in her third Child, who fell from a Stair about 8 Days before, and I happily delivered her of a male Child that lived half an Hour. He was big and strong, and all the Parts of the Body well proportioned, as they ought to be naturally, except the Head, the hinder Part whereof was flat, as if it had been taken off with the Stroke of some Weapon, even to the *Os Sphaenoides*; there was neither *Brain*, *Cerebellum*, nor *Medulla Oblongata*: The Cavity which ought to contain these was very superficial; I found in their Place a black and livid Substance, covered with a Membrane, which may be the *Dura* and *Pia Mater* joined together: This Substance had coloured the *Os Petrosum* and other Bones of a deep red Colour. I thrust a Stillet, or Probe, into the Cavity of the *Vertebres*, where ought to be placed the *Medulla Spinalis*, but found no Opposition; for in Effect, it was filled with a red stinking Liquor, contained in the Membranes of the *Medulla Spinalis*. The Visage of this Child was a little deformed, because of the want of the *Cranium*, which might have been communicated to the Bones, as yet tender, that sustained the Skin of the Face. The Eyes were in great Motion during the Time it lived, but we found nothing in the Place of Muscles and Nerves but Skins and Filaments very small, and not capable of Contraction, mixed in a rotten Humour; so that this great Motion might rather proceed from the Motion of the *Palpebrae*. There has passed under my Hands three Subjects like unto this, all Male, and who lived some Time.

By Dr. Ch.
Preston. *ibid.*
p. 439.

2. I was present when this extraordinary Child was dissected. We found the external Parts all well proportioned, except that it wanted the *Cranium*, *Cerebrum*, and *Cerebellum*; the Visage was a little deformed; it had Eyes and Ears like a Monkey, and all over the Body was more hairy than ordinary. In the Place of the *Brain* we could discover nothing but a Substance like congealed Blood, covered with a Membrane; and instead of the *Optick Nerves* we only found some small Filaments.

But this *Examen* not being satisfactory to me, I carried the Subject to M. Du Verney, Professor of Anatomy in the Royal Garden at Paris. He traced the 8th and 9th Pairs of Nerves and *Intercostal*; and having cut up the Canal of the *Vertebres*, discovered the *Medulla Spinalis* all along the Cavity, and traced all the *Vertebral Nerves* proceeding therefrom; as also the *Sciatick Nerve*

considerable enough. It is true, the *Medulla Spinalis* was not here of that Consistence as in adult Persons; but one could with some Pains observe all the four Tunicks, and the two Substances, as in the *Brain*, to wit the *Cortical* or Glandulous Substance, and the *Fibrous* or white, but with this Difference, that the brown Substance is exterior in the *Brain*, but interior in the *Medulla Spinalis*; for it is as it were a third *Brain* contained in the Canal of the *Vertebrae*, so framed for its Defence; for there are *Meninges* as in the *Brain*, Sinus's and Cavities, which may pass for *Ventricles*: In a Word, one can say all of it that they can of the *Brain*, and more, for it appears more sensible and necessary for the Life; for you can take the *Brain* or *Cerebellum* from an Animal, and yet the Animal shall live some Time thereafter; but a Wound or Compression of the *Medulla Spinalis* will cause sudden Death. This is confirmed by several Anatomical Experiments. 1. M. Du Verney 1673, took the *Brain* and *Cerebellum* from a Pigeon, and in Place thereof filled the *Cranium* with Flax, notwithstanding which it lived some Time, and searched for Aliment, did the ordinary Functions of Life, and had the Use of Sense. 2. M. Chirac, Professor of Anatomy at Montpelier, took the *Brain* from a Dog, yet he lived some Time, but when the *Cerebellum* was taken out, he died immediately; but he has observed, that by blowing into the *Lungs*, the Animal has lived an Hour, although wanting the *Cerebellum*. 3. He took from another Dog half of the *Cerebellum*, but he died immediately. 4. After he had taken half the *Brain* from a third Dog, the Dog continued to have the Motion of all the Parts, and could walk about; and even after he had taken away all the *Brain*, he had yet Sense and Respiration. 5. He separated the *Medulla Oblongata* of a fourth Dog from the *Medulla Spinalis*, by introducing a Pair of Scissars between the first *Vertebrae* and the *Os Occipitis*; the Dog had died immediately, but by blowing into the *Lungs*, the Motion of the *Heart* continued, and the Animal could move his Body. 6. He took the *Cerebellum* from a fifth Dog, but he lived 24 Hours, and his *Heart* beat well.

All these Experiments let us see, that an Animal may live some Time, tho' imperfectly, wanting the *Brain*, and even the *Cerebellum*; but there is no Experiment where ever they lived wanting all; therefore I humbly conceive, the *Medulla Spinalis* was not here wanting, for it has here supplied the Defect of the *Brain* and *Cerebellum*, and the Animal Spirits have been separated and distributed for continuing the Circulation of the Blood. For it is to be considered, that although the *Intercostal Nerve* and *Eighth Pair* have their Origin in the *Medulla Oblongata*, yet after their Entry into the Cavity of the Breast, they are united with Branches from almost all the *Vertebral Nerves*, and with them make up several *Plexus's*, and from those *Plexus's*, several Branches are emitted that go to the *Heart*, and other Parts, sufficient for the continuing the Circulation of the Blood, which has occasioned some to run into a Mistake, thinking the Circulation is to be explained some other way, than by the Influx of the Animal Spirits into the Nerves, which they endeavour to prove by an Experiment on a Dog, of tying the *Intercostal* and *Eighth Pair* of Nerves, before they enter the Cavity of the Breast, and yet the Dog shall live two or three Days thereafter. But except they can tie all the *Vertebral*

Nerves, or at least tie the *Nerves* at their Entrance into the Heart, their Experiment is not so convincing: And the Symptoms which ordinarily happen, even upon tying the *Intercostal* and *Eighth Pair*, is an evident Proof of the contrary, for the Animal is taken immediately with *Convulsions*.

I shall not pretend to determine after what Manner this want of the *Brain* was supplied, or whether the *Brain* and *Cerebellum* were carried off by the strong Force of Imagination, or by some Accident, or Corruption: But whatever of these obtain, I am apt to believe that all the Parts of this *Fœtus* were once entire, and perfectly framed. And the tracing of the 8th and 9th *Pair* of *Nerves* and *Intercostal*, which take all their Origin from the *Medulla Oblongata*, seems to be a Proof of it; and how far the Force of Imagination goes, and what Influence it has upon Children, we have several Instances. We have also several Observations of like Cases with this Infant, delivered to us by M. *Mauriceau*, and M. *Peu*, and other Authors.

An Infant
with the
Brain depressed
into the
Hollow of the
Vertebrae of
the Neck; by
Dr. Edw.
Tyson. n. 223.
p. 533.

4. Some Years ago, I was called to see a Birth which was very surprising. The Midwife informed me, that the Child was alive, but died in the Birth, or a little before. I found it well grown; all the Limbs and Body well proportioned, and plump; the Face well featured, only from the Eye-brows; the *Skull* was perfectly depressed down to the *Os Sphænoïdes*, or Basis of the *Calvaria*; so that it had no Forehead at all. I opened the *Cranium* in several Places, before I could find any *Brain* at all; but at length I observed, near the passing out of the *Medulla Oblongata* to the *Medulla Spinalis*, a small Quantity of the *Brain*; the whole might be included in a Walnut-shell; it was covered over with a bloody Matter. But thrusting down my little Finger through the *Foramen* where the *Medulla Spinalis* passes, I observed a very large Cavity in the Hollow of the *Vertebrae* of the Neck, so that I could turn my Finger round a good Compass there. This large Cavity I found to be filled with a Substance like the *Brain* or *Medulla Spinalis*, or both; but far larger than the *Medulla Spinalis* itself could be in so small an Infant. This easily made me to conclude, that the *Brain* must be pressed down hither, which I was the more induced to believe, because the Mother informed me, that when she was with Child, she received a considerable Bruise in her Belly.

How far the *Medulla Spinalis* may answer the Office of the *Brain*, especially in the Embryo's, where there is no Exercise of the Senses, nor the Imaginative Faculty, will be no great Difficulty to apprehend; since for the Functions of Life in them, the Spirits generated even in the *Medulla Spinalis* (for it has a Glandulous Substance too, but inwards) may suffice; especially in this Instance, where I do suppose a great Part of the *Brain* to be detrued (by the Bruise the Mother received) into the Hollow of the *Vertebrae*; and do quære, whether in those Instances that are given of Births of Infants without *Brains*, there might not be the like Accident of the *Brain*, or the principal Parts of it being depressed into the *Vertebrae*; which in Embryo's (before hardened into Bones) are Parts extendible.

A Child born
without a
Brain; by
Mr. Bussiere.
n. 251. p. 141.

5. In October 1698, a French Woman, living at *Dung-bil*, of a good Complexion, and in perfect Health during all the Time of her being with Child, was brought to Bed of a Boy: He was tall, well shaped, and very sound. And though it be uncertain whether he was born alive, yet the Mother as-
sured

fured me, that she felt him stirring an Hour before, and indeed the good Condition of his Body sufficiently proves that he was alive. The Skull was unequal, and the Skin thereof, though full of Hair, a little redder than the rest of the Body. The *Coronalis* Bone laid flat upon the *Sphenoïdes* Bone, which made the Eyes look as if they had been placed in the Top of the Forehead. The *Squamosa* Part of the *Temporal* Bones was wanting, there being but the *Os Petrosum* which was in its natural Place, and in which were the Organs of the Sense of Hearing in very good Order. There was no *Parietal* Bones, nor any thing equivalent. Of the *Occipital* Bone there was but the Basis which joineth to the *Sphenoïdes*, in the Middle whereof was the great Hole through which the *Medulla Oblongata* commonly passeth, all the upper Part of this Bone being wanting, without any Mark of having been corroded or gnawn, the Edges of which were very smooth. All the upper Part of the Bones of the Skull being wanting, the Skin had no other Support but its Basis, which was the Reason why the Top of the Head was very unequal and rough. No Brain at all was found, nor any Mark in the whole Extent of the Skull that there had been any, there being no Space left between the Basis of the Skull and the Skin to contain it; there was no *Dura Mater* neither, the Bones being covered only with a very thin Membrane. Neither the *Carotides*, nor the *Vertebral* Arteries did penetrate the Skull, but by small Twigs, spread in the thin Membrane. The Beginning of the *Medulla Spinalis* was under the 4th *Vertebra*, like a small Stump wrapped up in the *Dura Mater*; the *Medulla* was very sound, and of the usual Bigness; and all the *Nerves*, which parted from it, were in their natural Order. The Eyes were well shaped, and all the Parts belonging to them in their natural Situation: But all the *Nerves* did terminate themselves in the Holes of the Skull, through which they commonly pass; they did reach no further, nor had any Communication with any other. The Tongue was very fresh, and doubtless had performed the Deglutition to make the Child swallow the Colliquamentum, of which there was a good Quantity in the Stomach. The *Larynx*, and all the Parts of the Throat were, as the rest of the Body, in a good Condition.

6. Dec. 12. 1688, I was desired to be present at the Opening of Mr. A. One Hemisphere of the Brain sphacelated, with a Stone in it; by Dr. Edw. Tyson, n. 228. p. 535.

About 2 Months before, he had received, in a Quarrel, a great Bruise on his Head. After some time he took his Bed, and complained of a most violent Pain in his Head. He sometimes vomited; sometimes was in *Convulsions*; sometimes in the Day he would have a great *Stupor* upon him; and when he waked he would be delirious. His Swallowing was difficult, and he would grin his Teeth: His Eye-sight afterwards failed him, and he lost his Memory; and upon the least Motion of his Body, would faint away, and in the whole Course of his Distemper was Feverish. Upon opening his Head, I observed the Blood-Vessels of the *Meninges* very much extended, and the greatest Part of the left Hemisphere, or Side of the *Cerebrum* or Brain to be perfectly rotten or sphacelated, not having the least Consistency, but purulent and soft: Nor could I distinguish the *Medullary* Substance from the *Cinereous*; but all of a dark reddish Colour. In the *Ventricles* of the Brain I observed

observed a great deal of Water : And upon Dissecting the *Protuberantia Orbicularis*, called the *Testis*, on the left Side, which was as big as a Nutmeg, I found in a purulent Matter there a Chalky Stone, about the Bigness of a Cherry-stone, but flat, and not very thick; and in taking it out I found it friable.

An Hydrocephalus; by Mr. Friend. n. 256. p. 318.

III. The outward Dimensions of this Head, before it was opened, were as follows; *viz.* From the *Eye-brows* over the Crown to the Nape, 23 Inches; the Circumference from the Nape round the *Ossa Bregmatis*, 26; but round the *Os Frontis*, 24; from Ear to Ear, over the Crown, 19; from the *Eye-brows* to the Chin, 4; from one Extremity of the *Eye-brows* to the other, $4\frac{1}{2}$; from the Chin to the *Coronal Suture*, $7\frac{1}{4}$; Circumference from the Chin round the Crown, 30; from one Extremity of the Ear backward to the other, round the Nose, 12; and round the Nape, $6\frac{1}{2}$; from Temple to Temple over the Forehead, 11; Circumference of the Head round the *Os Frontis* and *Occipitis*, 29; Circumference of the Neck, $9\frac{2}{3}$; Length of the Neck, 2; Length of the Body, 33; Circumference of the Thorax, 18; Length of the Foot, $4\frac{1}{2}$; from the middle Finger's End to the *Acromion*, $12\frac{1}{2}$; Circumference of the Arm, 5; of the Calf, $5\frac{1}{2}$; of the Thigh, 8.

After the Integuments were removed, the Top of the *Cranium* appeared soft and membranous; the Extent of the Membrane from one Temple to the other was 8 Inches; between the *Parietal Bones*, $3\frac{1}{2}$; from the *Os Frontis* to the *Os Occipitis*, 12. In the Middle, just upon the Crown, lay a Bone (in some Places a little cartilaginous) 5 Inches long, and 1 broad, joined to the Membrane on every Side, of the same Thickness with the rest of the upper Part of the *Cranium* that was Bony, which was extremely thin every where, and the *Laminae* lay so close, that in many Places no *Diploe* could be discerned. The Membrane was as thin as the *Pericranium*, which yet was easily divided from it. None of the Sutures were entirely closed, those of the upper Jaw very loose. In the *Temporal* and *Lambdoidal* was an infinite Number of the *Triquetra Wormiana*, all which had so many distinct Sutures. Upon piercing the *Dura Mater*, a great Quantity of Water flowed out; it lay as well between the *Dura Mater* and the *Pia*, as in the *Ventricles* of the *Brain*. The Liquor was thin, pale, and insipid; there was taken out 5 Quarts of it. The *Dura Mater* was firm and entire, of its usual Thickness, and stuck very close, as well to the Membranous, as to the Bony Parts of the *Cranium*. All its Processes and Sinus's were singular, the 4th Sinus somewhat larger than ordinary. A very large Vein of the *Dura Mater* entered the *Longitudinal Sinus*, directly forwards towards the *Crista Galli*, contrary to the Course of the Blood. The *Pia Mater* was very much distended, and seemed to be stretched as much as it could bear. It lay smooth and equal upon the Surface of the *Brain*, there being neither any Circumvolutions in the *Brain* for it to go between, nor any Partition to the *Corpus Callosum*, though there was a large *Falx* in the *Dura Mater*. The *Lateral Ventricles* were very thin: Towards the *Cerebellum* their upper Part was quite wasted, so that nothing was left to cover the Cavity in that Place but the

Pia

Pia Mater. This was so thin, that in stooping down the Head to empty the Water, it broke, and hindred us from knowing exactly how much Water the Lateral *Ventricles* contained; but by their Cavity, which was very large, one might guess they held, at least, a Pint each. The 3d and 4th *Ventricle* had some little Water in them, but were scarce larger than usual. The *Brain* had all its Parts plain and entire, though its Substance in most Places was but very thin and loose: About the *Corpora Striata & Thalami Nervorum Opticorum* it was tolerably thick, and firm enough, though nothing to what it is in a natural State. The *Cerebrum* and *Cerebellum*, when laid out in their right Position, were 11 Inches long; the *Cerebrum*, cross the Lateral *Ventricles*, 9 broad. After all the Water was taken out, both of them weighed 1 $\frac{1}{2}$ lb. The *Corpora Striata* and *Thalami Nervorum Opticorum* were very small in all their Dimensions; withinside towards the *Ventricles* they were wrinkled, and lay in Folds, like those in the inner Coat of the Stomach. In the *Corpora Striata* there were no *Striae* discernable. The *Plexus Choroides* was very small; the *Glandula Pinealis* was somewhat bigger, but less compact than ordinary; the *Nates* were red and large, 2 Inches long, 1 broad, and 1 thick; the *Testes* were not distinguished from them by any Protuberance, they seemed rather to be a Production into which the *Nates* lessened by Degrees, like a Sugar-loaf. The *Cerebellum* was very firm every where, and did not much exceed its natural Bulk. The *Medullary Trunk*, which sends out those little Branches like Trees, was thicker and harder than usual; the Branches were not so much disposed like those of a Tree, but went rather in single oblique Lines, like so many Rays drawn from a Point. The *Nerves* were all regular and plain, only the *Olfactory* were very small; the *Optick* did not join before they entered the Orbits. The *Rete Mirabile* was very large, so was Dr. Ridley's *Circular Sinus*. On the Right-side were two *Carotid Arteries* (the *Intercostal Nerve* lay between them) they entered the Skull at the same Hole. The Trunk of the *Vertebral* (where those Arteries unite) was extremely big and full of Blood. The Veins were neither larger, nor more than usual. Upon the *Brain*, over the Lateral *Ventricles*, I could easily discern 3 or 4 *Lymphaticks*, but they were too small to be traced.

The Mother of this Child brought it to *Oxford* for a Sight. She said, she was 3 Weeks in Travail, and at last was forced to have the *Vagina* ript for its Passage. The Child was 2 Years and 6 Weeks old, it could speak a little, could not go, nor hold up its Head; it was always merry, never subject to Drowsiness, Pain in the Head, Want of Appetite, or Indigestion: Its Sight was somewhat dim, and its Smelling but dull. It never had any Illness, only 2 or 3 Days before it died it was very much troubled with the Gripes, and upon opening the *Abdomen*, the Guts were found extremely swelled with Wind. Every thing else was as it should be.

IV. The Lady N. had been troubled for several Years with Hypochondriack and Hysterick Symptoms (as they are commonly called) attended frequently with a profuse Hemorrhage from the Nose, some Years before

*The Dissection
of a Lady who
died of an Apoplexy; by Dr.
Will. Cole.*

her n. 173. p. 1068.

her Death. In order to remove those Complaints and prevent their bad Consequences, besides other Remedies, she had frequent recourse to Bleeding. The Day before she died, she was threatened with her usual Hemorrhage, which she endeavoured by all possible Means to prevent, having narrowly escaped with her Life not long before, from the immoderate Quantity of Blood which she lost that Way. The Remedies she used were but too successful in preventing the Bleeding, and as they answered that Intention, she thought herself out of all Danger the very Day of her Death, which was the tenth Day of *May* 1679. But the fatal Catastrophe was just at Hand. For after she was gone to Bed, she was suddenly seized with a violent Pain in her Head, to relieve which (her Speech beginning presently to fail her) she ordered a Surgeon to be called immediately to Bleed her. The Surgeon being at a Mile's Distance from the Lady's House, he did not get there till after her Death, which happened within half an Hour from the Time she was first seized.

I was desired to be present at the opening of her Body, together with *Mr. Tomkyns*. And here we had Occasion to observe, that her Liver, which for thirty Years had been pronounced Schirrous by almost all the most eminent Physicians, whom she consulted, (and they were of the same Opinion concerning the Spleen) had not the least Appearance of any Obstruction about it. It was indeed very large, and therefore, in a lean Person especially, by distending the Hypochondrium more than usual, might easily deceive those who, according to the old Doctrine, lay the Blame of all Hypochondriack Complaints upon Obstructions of the *Liver* and *Spleen*. We observed however, that there was no Bile to be found neither in the *Gall-bladder*, which was very much contracted, nor in the Biliary Vessels scattered up and down the *Liver*, (which offered themselves to View) nor were these even almost turgid with it. But in the Cavity of the *Gall-bladder* were found fourteen Stony Concretions, the greatest Number of which, were about the Bigness of a Pea, two or three of them a little larger of a flat round Figure, blackish externally, and smooth, resembling Bezoar, after they were exposed a little while to the Air, but at first Sight most like Pills of Aloes. Within they were yellowish, with a small Cavity in the Middle and very brittle. The *Spleen* appeared likewise very sound, and of the usual Size. The *Pancreas* too seemed free of any Obstruction. There were neither Stones nor Gravel to be observed about the Kidneys, though from the frequent Pains in the Loins, she imagined herself subject to that Disease. The Uterus too was every Way sound, though a good many of the Symptoms in such Patients are commonly enough ascribed to it.

Upon opening the *Thorax*, the *Lungs* of the Right-side adhered firmly to the *Pleura*, for the Space of four Inches, and in several Places, especially towards the Margine of the Lobes, they looked as black as if they were about to mortify. The *Heart* was quite sound, and perhaps it may be worth the while to take Notice, that the Basis of it was surrounded with a sufficient Quantity of Fat, though the rest of the Body was very much emaciated.

The *Cranium* being laid open, the Blood Vessels distributed to the Membranes of the Right Lobe of the *Brain* (especially those of the *Pia Mater*) were observed to be quite turgid with Blood. And having cut through the Membranes in that Part where her first Complaint was, a great Quantity of ferous Blood flowed out, which being evacuated, and the Substance of the Brain cut into with a Knife, there appeared a large Cake of clotted Blood, which had formed for itself a Cavity there, and when taken out, it weighed about an Ounce and a half. But there was no Blood extravasated in the *Ventricles*, nor any where else between the Membranes, nor were the Blood Vessels in the Left Lobe at all turgid. In this Dissection of the Brain, which we were obliged to perform by Candle-light, and were pretty much hurried besides, we could find nothing else amiss about that *Viscus*; although from the various Symptoms which she had been a long Time subject to (such as Palpitations, Anxieties, Contractions and Pains in the Joints and Muscles, and Convulsive Complaints) one might upon good Grounds suspect, that the Nervous Fluid was not a little vitiated. And here perhaps this Corollary may be deduced, that the Depravity of the Juices contained in the Body, is not always owing to a Fault in the containing Parts, or the Organs of Secretion, but sometimes (if not for the most Part) ought to be imputed to their own proper Degeneracy and Dyscrasy. The Brain, with the *Cerebellum*, taken out of the Skull, and washed free from the Blood, weighed two Pounds fourteen Ounces *Averdupois* Weight.

V. The incomparable *Malpighi*, who industriously applied himself to very serious Studies, was of a good Habit of Body, and had seen 66 Years; but he had frequent Sicknesses; sharp Vomiting did torment him for 20 Years; he was troubled with the Gravel, a Hæmorrhagia in the Kidneys, a Rheumatism Fluxious; which with their troublesome Consequences, augmented his Infirmities. Scarce had these Evils given him some Respite, when a cruel Palpitation of the Heart, with an unequal Pulse came upon him. Moreover, 4 Years before his Death a sharp and biting Sweat failed not, all the Summer, to trouble him every Night. Pope *Innocent XII.* having called him to *Rome* to make him his chief Physician, he began the first Year to lose his fresh Colour; in the second, he voided many Stones without much Pain; and in the third, which was the last of his Life, he found himself oppressed, during the Winter, with a Difficulty of Breathing.

His Health being thus insensibly undermined, and a Bilious Looseness returning ever and anon, he was at length seized with a *Vertigo*, a Loss of Speech, and a Contorsion of the Mouth (*Spasmus Cynicus*) and a Palsy of half the Right-side. And though there was Appearance that he was out of Danger by Bleedings, Purges, Diureticks, and Antapoplectick Medicines, yet one might see, by his melancholy Countenance, but especially his want of Memory, that there was lodged in his Brain some melancholy Humour. Therefore, perceiving his End drawing near, he signed with his Hand 3 Days before his Death, his Posthumous Works, which he had ordered to be delivered to his Collegues of the *R. Society* at *London*. Then having confessed him-

*The Death
and Dissection
of S. Malpighi;
by Jean Marie
Lancisi. n. 226.
p. 467.*

himself with great Humility, he attended generously, and with Faith in God, the Death which appeared to him certain, and not far off. And on the 28th of Nov. 1696, a terrible *Apoplexy* finished, in the Space of 4 Hours, this so precious Life.

This Learned Man foresaw that he should end his Days by an *Apoplexy*, and therefore forbad his Friends to open his Body till 30 Hours after his Death; for he knew well enough, that some who seemed dead on a sudden have revived some Hours after. When he was opened, we found the Bladder of Gall abounded with a black Gall; the left Kidney had nothing amiss; but the Right was twice as little, and had its *Pelvis* twice as big; which discovered the Cause of the easy Descent of the Stones. We found in the Bladder a little Stone that seemed to have fallen into it a few Days before. The Lungs appeared withered, with some Mark of Corruption on the back-side. The Heart was bigger than ordinary, and the Sides of the left *Ventricle* felt harder and thicker in some Places than others; yet there was no *Polypus* found in it.

The *Right Ventricle* of the *Brain* contained almost two Ounces of extravasated Blood, and the *Left Ventricle* was swelled with a thick and yellow sort of Phlegm, which weighed more than an Ounce. Moreover, the *Dura Mater* stuck closer to the *Skull* than is usual. This proves, that the *conglobated* Glands in the whole Body had thrown into the Mass of Blood an acid Lymph, and that the *conglomerated* Glands of the *Hypochondria*, especially those of the Liver, had thrown into it a melancholy Humour, and that these two Sorts of Humours being carried into the Vessels of the *Brain*, had disposed the Blood to coagulate there; and that having there corroded and broken the *Tunicles*, which served for a Stop to them, they had run into the Cavities, where they caused Death without a Remedy.

*The Dissection
of a Boy, who
died suddenly;
by Dr. Cha.
Preston.
n. 224. p. 362.*

VI. Being called to the Dissection of a Boy, about 9 Years old, who died suddenly, being taken ill with a Fit of Vomiting a little before his Death, we discovered the left *Testicle* out of its natural Place, drawn up above the *Aponeurose* (or Holes of the three Muscles of the *Abdomen*, which give Passage to the Spermatick Vessels in Men that go to the *Testicles*, and to the round Ligament of the Matrix in Women) the Bladder was extremely distended and full of Urine; in the Stomach we found a Worm of about 9 Inches in Length, and a Line and a half Broad, as also a kind of slimy Matter; the Liquor contained in the Stomach was Black; but perhaps it might have that Colour from some Remedies prescribed against his Vomiting. The Lungs were tied to the *Pleura* on the Right Side, but were free on the Left; in the Left there was an Inflammation of the *Pleura*, with some Matter; as also an Inflammation of the external *Tunick* of the Lungs. In the left *Ventricle* of the *Heart* we found a large *Polypus*, which filled the *Vena Pulmonaris*, and entered the left Auricle, about 8 Inches in Length, and two Fingers broad. In the right *Ventricle* there was also a *Polypus* of about an Inch in Length, which was so big that it almost stopped the Entrance of the Blood into the *Vena Cava Ascendens*. Lastly, In the
Brain

Brain we found also a considerable *Polypus* in the *Sinus Longitudinalis*. All other Things were according to Nature.

VII. I had a Gentlewoman my Patient, who was much troubled with the *Falling-sickness*: In her Water I saw a great Number of short Worms, full of Legs, and like *Millipedes*. I gave her two or three Purges, first with *Pil. Agaric.* and *Rhubarb*; but I still perceived in every Water was brought me, 8 or 10, or more of the Worms: They appeared lively and full of Motion; and the Fits continued daily. At last I gave her half an Ounce of *Oxymel Helleboratum* in Tansy-Water, which wrought well, and was successful; so that she had a compleat Cure.

The Falling-Sickness; by Dr. Turberville. n. 167. p. 839.

VIII. In *Aug.* 1687, I was desired by a poor Woman at *Astrop-Wells*, to look on her Daughter. They came from *Stow* in *Gloucestershire* (as they had often done before) for Work. The Daughter was about 21, of a sanguine Complexion, and as to private Matters well enough: She had been for several Days less active than usual; and after that, had (a Week before I saw her) lost her Speech, and the Use of her Legs; she had little or no Sense of Feeling in them, and the left Leg was drawn up as in a violent Cramp. Her ruddy sanguine Look directed Bleeding; but that did not relieve her. I then gave her Spirit of *Sal. Armon. Succinated*, Steel with Gentian, Amber, Castor, and other warm Cephalicks. A Blister was laid on her Neck. A Bath (of Wormwood, and other hot Herbs) prepared for her Legs; *Ung. Martiatum* used to anoint them after Bathing. By these Means she was, in the Space of three Days, able to speak again; and in a little Time, by the Help of Crutches, able to go. But then omitting the Medicines, though but one Day, she lost her Speech again; and returning to them (especially the Spirit) recovered it as soon. When not able to speak, she had a manifest Alteration in her Face; the Strength and Tonick Vigour of it abated; her Eyes grew dull, her Lips pale. I have, in this Juncture, given her thirty Drops of the Spirit: In the Space of two Hours the Change has been surprizing; her Eyes have quickened, a Colour came over her Face, her Speech returned.

A Periodical Palsy; by Dr. Will. Mufgrave. n. 242. p. 257.

In *July* 1688, her Mother brought her to me again, and told me, That after the Physick, I had (the Year before) prescribed her was all spent, her Speech, and the Use of her Legs left her first in *September*, on a *Tuesday* about Noon, and returned the *Saturday* following near the same Hour; and that from *Michaelmas* to the Time of our Discourse (which was *July* 18, following) her Speech and Strength of Legs observed the same Period (of going off on *Tuesdays* every Week, and returned on *Saturdays*) with only two Exceptions, *viz.* That once they returned on a *Friday*, another Time not before *Sunday*. She added, That her Daughter was, the preceding Winter very weak, and in Danger of Death; that her Appetite was much abated; that she sometimes chose to eat Bread, Water and Salt, boiled together; that now, as the Summer came on, she recovered some Degree of Strength;

that she had lost no Sense at any time, besides that of Feeling ; which was by the first Quantity of Medicines restored effectually, and without Relapse. That the *Menses* were regular as to Period, but as to Quantity unequal, and that when they were most she was worst. That before her Speech used to go off, she constantly lost, for an Hour's Space, the Use of her left Arm ; that when her Speech was leaving her, she would stammer out some few Words, and after this, on a sudden, became mute ; and that when not able to speak, she often moaned, and made a melancholy complaining Noise ; that her Speech did use to return (as it went off) all on a sudden, and at once. She always had, as her Speech ceased, and two Hours after it was gone, a Pain in her left Side, including Arm and Leg ; her left Foot was then drawn up, as before-mentioned : Her Face was high-coloured when she lost her Speech, pale when it returned ; no Part of her Body withered, but the whole generally cold. Some Time before she was at first struck Speechless her Hands used to tremble, but have been of late more steady ; nor was she now so dull and heavy as formerly ; but for the generality, more brisk and chearful than in her State of Health. When she has her Speech she goes best ; but is always forced to use a Stick, being never able to go steadily : She speaks by Intervals as distinctly as ever, and as loud ; can sing, when capable of speaking, but at no other Time.

I found, that the Mother sometimes had *Convulsive* Fits ; and though a poor labouring Woman, was extremely *Hysterical*. And I observed the Daughter to have a pale, sickly Look, a heavy Eye, and a low Pulse, and to be much wasted in Flesh. She continued in my Neighbourhood about two Months, and I saw her almost every Day for the whole Time ; I then repeated the former Course, furnishing her with large Quantities of her old Medicines, and so dismissed her, with Orders to let me hear again from her when the Physick should be all spent : Accordingly, in *Sept.* 1688, she came (with her Mother) from *Stow* to *Oxon* (that is almost 20 Miles) on Foot. I gave her a further Supply of Medicines, and by the 10th of *Nov.* following she was grown strong, and to all Appearance well as ever. For two Months, then last past, she did go, and spake every Day, but not at all Times of the Week ; for her Speech left her (as formerly) on *Tuesdays*, but (now) returned the next Day after Noon. Thus she continued to the Summer following ; not speaking (in more than 20 Months) on any one *Wednesday* Morning.

In the Summer, 1689, hoping to compleat the Cure, I procured for her a large Stock of Medicines for the Winter following ; but from that Summer to this of 1698, I have heard nothing of her.

There was some of Opinion, that this young Woman counterfeited ; but upon strict Examination, I could never find any Reason for that Suspicion ; and I beg leave to say, I think it was not in her Power so to do.

An odd Convulsion in the
Check ; by Dr.
Dawbeny
Turberville.

n. 164 p. 737.

IX. A Man came to me, who had a long Time been troubled with a great Pain and *Convulsions* in his Cheek ; you might cover the Place where the Pain was, with a Penny ; the *Convulsions* pulled his Mouth, Face, and Eye
aside.

side. I applied a Cupping-glass to the Place; then I scarified and cupped him again; after which I put on a Plaister of *Diapalma*, and he was perfectly cured.

X. The Subject of the following History was a lively, sensible Woman, handsome, of a good Habit of Body, and constantly employed in domestick Affairs, whereby she enjoyed for many Years a perfect State of Health, though she had bore several Children. About ten Years ago, towards the Middle of her Pregnancy, she was taken with *Hystericks*, (I don't know from what Accident) which, though they yielded to proper Remedies at that Time, returned now and then afterwards, though not very frequently. At last, about the Time of her Lying-in, having fatigued herself too much, (which Necessity, it seems, obliged her to) the Day following she was taken with Labour-pains, (which the Fatigue very probably brought sooner upon her) attended with violent Flooding. But the Child did not appear yet, and she was so much exhausted with the Loss of Blood that her Life was despaired of. At last recovering Life, as it were, (after being delivered of a dead Child) she was soon after seized with convulsive Paroxysms, which troubled her extremely at Times, in spite of all that could be done for her, several Months. At last she grew a little better, though the Symptoms did not quite disappear. On the contrary, they were very soon afterwards exasperated, and then they did not return irregularly as before, but at stated Periods; at first every third Day, if I remember right, then every fourth, and soon after every fifth Day, that is, reckoning four whole Days between the Paroxysms. And they returned as punctually as the Clock strikes the Hour. They began first with Yawning, a gentle Rigor, and a copious Discharge of limpid Urine. Presently after the Convulsions came on, and the By-standers were obliged to hold her Hands, to keep her from tearing her Cloaths and Face. She endeavoured all she could to bite the Hands of those who held her, for she was quite Light-headed, and Speechless all the while. After she had remained for an Hour or two in this convulsive State, she had again a plentiful Discharge of limpid Urine, after which the Symptoms went gradually off, and she fell into a Sleep which continued several Hours. As soon as she waked, she found her Senses quite restored, but remembered nothing that passed during the Time of the Paroxysm. On the intermediate Days, though she was free from all the above Symptoms, yet she was so weak and enervated, that she could hardly get out of Bed, rise from her Chair, or walk about the Room, without a Servant to support her.

Being called in to visit her, I began the Cure with Testaceous Medicines and the Spirit of Hartshorn; taking the Indication from the profuse Discharge of Urine, and the great Disorder of the Nerves, which plainly discovered a remarkable Sharpness both in the Blood and the nervous Fluid. But the Paroxysms continuing as violent as ever, notwithstanding these Remedies, and returning at regular Periods as before, it came into my Head, that these convulsive Paroxysms ought to be managed the same Way as those of an Intermitting Fever. For although they were not attended with so much Heat as is usual in common Intermitting Fevers, yet as they returned

*A Periodical
Convulsion:
by Dr. Will.
Cole. n. 174.
p. 1113.*

periodically in the same Manner as these Fevers do ; and as all Intermitting Fevers, properly so called, don't excite the same Degree of Heat, yet they are all cured with the same Medicine, viz. the *Peruvian Bark*, I determined to try the Force of that famous Specifick against this Disease. In the mean Time, as I had a strong Suspicion of an acid Acrimony in the Fluids, I ordered the above-mentioned Medicines to be continued at proper Intervals. The Success of this Method answered entirely to my Wish ; for after taking two or three Doses of the Bark before so many Paroxysms, (which was my usual Way of prescribing it at that Time) the Symptoms began sensibly to become more mild, and at last by continuing the Use of it, intirely disappeared ; nor have they ever returned since, as far as I have heard.

*A Periodical
Disease of the
Convulsive
Kind ; by Dr.
Will. Cole.
n. 174. p. 1115.*

XI. *Dorothy Cook*, a Widow of sixty, who keeps a Coffee-house at *Worcester*, began to be troubled with an *Epilepsy*, without any sensible Cause, when she was about thirty-six Years old, and three Days after she was married. At first the Paroxysms returned very frequently, but not at regular Periods, and they came upon her so suddenly, that when she seemed to be every Way in perfect good Health, she would fall down in a Moment, senseless upon the Ground, and thus would remain for some Minutes, like a Person half dead, without any Convulsions, and by and by her Senses would return to her again. After some Months, about the Change of the Moon and the Full Moon, the Paroxysms would return several Times a Day, for two or three Days running, while at other Times she had her Health very well. A few Months after that, the Paroxysms, which before had returned only once a Fortnight, began to come upon her twice a Week, but at equal Distances, viz. on *Thursdays* and *Saturdays*. Soon after she was married, she fell with Child, which she bore at the full Time ; but it soon died of the *Epilepsy*. The second Child she had, died of the same Disease. But though she bore several Children afterwards, both Boys and Girls, there is not one of them, even to this Day, that ever has had the least Symptom of that Disorder.

The Paroxysms returned in the Order above-mentioned, for about three Years, till by the Use of a celebrated Medicine given her by a certain Quack, they disappeared for some Months. But upon Occasion of a Fright, they returned upon her again, having rather, it would seem, been palliated for a Time than cured. She had recourse again to the same Remedy, but without the least Success. However by the Assistance of Dr. *Johnstone*, who practised many Years with great Reputation at *Worcester*, and is but lately dead, she got well a second Time, and continued very well till the famous *Battle of Worcester* in the Year 1651, when that Town was taken by *Cromwell*, and Death and Terror being spread all round, she (like the rest of the Inhabitants) was put into such a Fright, that the Paroxysms returned upon her, irregularly at first and very frequently, but afterwards they returned gradually to their former Periods. After this she had a great many Remedies, both of Dr. *Johnstone's* prescribing and others, but to no manner of Purpose. After they had returned in this manner for about two Years, at last upon a second Fright, they changed their Time of coming, and first they

they came twice a Week, afterwards only once, *viz.* on a *Sunday* (she happening to receive the Fright on that Day) and so have continued ever since. The Progress of the Periods and Symptoms for those Years by-past have been as follows.

Every *Thursday* towards the Evening, a Pain begins in the Crown of her Head, and at the same Time a kind of Throbbing about the *Os Sacrum*, which mounts up gradually *next Day* to the middle of her Back. On the *Saturday* it still increases, attended with great Thirst, and a few Hours after she is gone to Bed, it rises up to her Shoulders, becoming gradually more violent. As soon as it has got there, though before she was able to go about her household Affairs, she dares hardly venture to move herself in the least in Bed. And unless she is extremely cautious in avoiding all Motion, the Paroxysm (which otherwise would not have seized her for some Hours) immediately comes upon her, and with much greater Violence than it would otherwise have done. That Night she sleeps little for the excessive Pain, which still grows worse, and chiefly her Head. Next Morning, the Pain abates, and she falls into Slumbering, but very restless, which obliges her to lie in Bed all *Sunday*. She sleeps a little, but frequently awakes, calls for something to drink, and as soon as she has taken it, composes herself to Rest. About Twelve o'Clock, if she does not awake of her own Accord, she is called by somebody about her, and prevailed upon to eat something, still remaining sensible of every Thing that has passed about her. Immediately after this, she falls again into a Sleep (unless you would rather chuse to call it an Apoplectick Fit; for she can neither be awaked now, nor does she remember any Thing that passes at this Time) with frequent tossing of her Body in Bed, and thus she continues till Six a-Clock in the Evening, when she is taken with Convulsions which come upon her in Fits for the Space of five Hours. They are gentle in the Beginning, but at last about eleven at Night they become very violent. Between the Paroxysms she drinks Ale greedily; for when she is in her Senses, she forbids them to give any smaller Liquor to drink at those Times, because she finds it hurt her Stomach. From this Hour her Senses, which had been so long stupified, are perfectly restored to her; but she passes the rest of the Night very restless, and void of Sleep. On *Monday* about Nine in the Morning, not being able to lie in Bed any longer, she gets up, but complains of Pain all over her Body, and though that Day she walks about the House pretty stoutly, and serves her Guests with Coffee herself, yet she feels her Joints stiff and unfit for Motion, till refreshed with next Night's Sleep, which is always very sound. After this, she has two or three Days Truce to recruit in, till the Disease having gathered a fresh *Fomes*, the same Symptoms are repeated, and in the same Time and Manner. But there is no actual Evacuation to be observed, neither by Sweat nor Urine, nor any other Way, which makes me imagine, that the Morbifick Matter sent from the Brain is received into the Mass of Blood, to be prepared into a new Ferment for renewing the Paroxysms. For a great many Years by-past, she has refused taking any kind of Medicine, being long ago tired out with taking Drugs to no Purpose. There is one Thing how-

however very singular about her, which would make one suspect her to be whimsical, if it was not very well known that, when the nervous System is affected, the Mind is apt to receive very odd Impressions. It is this: She has perswaded herself of a long Time, that if she was to go out of Doors, she should immediately be seized with a Paroxysm, upon which account she has kept constantly at home for some Time. About twenty Years ago, she was prevailed upon by the Importunity of a Neighbour to go to sup Abroad, and she was no sooner got into the House, than she was seized with a Paroxysm, as she had foretold, before the usual Time of its coming, and more violent than ordinary, so that she was obliged to be carried home immediately; after that she never ventured Abroad, till about eighteen Years ago, that she removed to another House, and then (though she was carried in a Chair) she was presently taken with a Paroxysm before the Time, and it returned twice a Day for ten Days successively, after which it came back at its usual Periods. But what is most singular is, that she dares venture to move one Foot, nay her whole Body over the Threshold, and frequently does it, but then she must always keep the Tip of one Great-toe within the Threshold, and she dares not, nor will not upon any Consideration, move herself intirely even an Inch beyond it. When that famous *Toucher, Greatarack*, was at *Worcester*, he was carried to him to try what Effect his Hand would have in so singular a Disease. But she no sooner heard that he was come with that Design, than, though she had not yet seen him, she was taken with a violent Paroxysm, which did not leave her for seven Days. In the mean Time, though she has suffered this Complaint for such a Number of Years, yet her Senses and animal Functions are no wise impaired. She is in a good Habit of Body, inclining rather to Fat, of a florid Complexion, and, considering her Age, manages her Household Affairs with as great Address, as if she did not labour under any Disease, especially of the Head.

*Discoveries in
the Optick
Nerve; by
S. Malpighi.
n. 27. p. 491.*

XII. *S. Malpighi* having dissected the Head of a *Xiphias*, or *Sword-Fish*, which hath a very big Eye, observed that the Middle of the Optick Nerve is nothing else but a large Membrane, folded according to its Length in many Doubles almost like a Fan, and invested by the *Dura Mater*. This Structure of the *Optick Nerve* is only to be found in the Eye of Fishes. For that of an Ox, Pig, and other such Animals, is nothing but a Heap of many small Fibres of the same Substance with the Brain, wrapped about with the *Dura Mater*, and accompanied with many little Vessels with Blood. Hence it appears that there must be many Cavities in this *Nerve*; for as much as the small Filaments, of which it is composed, cannot be so closely joined, that there should not be some void Space betwixt them.

*A Man who
becomes blind
after Sun-set;
by Dr. Pet.
Parham.
n. 159. p. 559*

XIII. 1. I was lately in *Suffolk* where I met with a young Man, about 20 Years of Age, who all the Day hath a good Sight, and distinguisheth Objects at all Distances as well as any Body, and with as much Vigour and Unweariedness; but when Twilight once comes he is quite blind, and sees nothing at all; so that he cannot without great Difficulty direct himself abroad, or even at Home by the Lights of the Fire or Candle. I

I viewed the Youth both by Day and Night: But there is no Disease in the Organ that can be observed; no *Vertigo* or Distemper in the Head to interrupt, or any way intercept the Spirits in their Motions; but to all Appearance, the Fabrick of the Organ is very true and exactly well, and never disturbed with Fluxes any way. I tried him with Spectacles for Variety of Sight, but they did him no Service either by the Lights of Fire or Candle. He tells me, That he was thus from the first Time he was able to take Notice of Things, and it came without Distempers; That this Cloudiness comes gradually upon him like a Mist, as Day-light declines; That he is always alike in all *Aspects* of the *Moon*; he feels no Pain by Fire or Candle-light; he finds himself no worse in Winter than Summer, and observes no Mischief upon taking Cold; he sweats much at Work, but finds no Difference as to his Sight in those Days when he works hard or not.

2. The Case now mentioned (though indeed in a different Sense from that of *Hippocrates*) is called by many Writers *Nyctalopia*, or *Nocturna Cacitas*, and is accordingly described by them with the Remedies for it. *Cornelius Celsus* mentions it under the Title of *Imbecillitas Oculorum*.

3. Every Body knows, that in the Day-time a great many Vapours rarified by the Heat of the Sun, ascend, which fall down again after Sun-set, being condensed by the Cold, and therefore the Air especially near the Earth, must be thicker. Perhaps the Humours of the Eyes of the young Man above-mentioned may be affected in such a Manner, as in the Evening to become thicker and more turbid by those Vapours; the same Way as Urine by being exposed to Heat or Cold, becomes clear or turbid. So that while the Sun acts above the Horizon, the Vapours being dissipated by the Force of his Heat, the Humours of the Eye become clear; but as soon as he gets below the Horizon (from the contrary Cause) the Humours are disturbed, or grow turbid, and hence that Disposition of the Eyes which is requisite to distinct Vision, is altered. For from that Thickness of the Humours, the Rays of Light are so refracted, as scarce to be able to reach the Retina, or if they do reach it, they act with too weak an Impulse.

All the Phænomena above-mentioned agree very well with this Hypothesis. For in the first Place, he has been subject to this Complaint always from his Infancy without any Defluxion, or any other sensible Disease of the Eyes; the Cause of which is that peculiar innate Disposition of the Humours, which are affected in the same Manner as the Air near the Earth by the Vapours after Sun-set, as has been explained above. In the second Place, this Blindness creeps gradually upon him, from the Vapours gradually descending after Sun-set. Thirdly, the Changes of the Moon seem to have no Effect upon them, because the Rising and Falling of the Vapours do not depend upon that Planet. Fourthly, I suspect the numerous Humours (*viz.* the Crystalline and Vitreous) to be so viscid, that (though the Watery Humour and Tunica Cornea became clear) they cannot be dissipated. Fifthly, This Blindness remains the same both in Summer and Winter; and the Reason seems to be, that although the above-mentioned Vapours do not always descend in the same Quantity, yet they fall always in a sufficient Quantity

*A Solution of
this extraordinary
Case; by
Dr. Will.
Briggs. n. 166.
p. 804.*

Quantity to produce that Effect. In the same Manner as I have seen certain acid Waters in my Neighbourhood, put on a Purple Colour upon having the Leaves of Oak bruised and steeped in them, but upon making a stronger Infusion the Colour was not heightened; so in the Evening there descends always enough of Vapours to produce that Blindness, and if the Quantity be increased it has no observable Effect.

Another Person is of Opinion, that as there is no Cloud or Dimness to be observed in the Eyes of the young Man, the Cause of this Phænomenon is probably owing to the Disposition of the Optick Nerve, whose little Tubes, while they are filled with the Solar Rays, easily admit visible Forms, as they are called; but being deprived of them, they grow flaccid, and unfit for Vision.

A Duplicity of Vision, and a Gutta Serena, after great Pains in the Head, and convulsive Fits; by Dr. Briggs. n. 159. p. 563.

XIV. One *Daniel Wright*, aged about 19 Years, and of a Sanguine and Plethorick Constitution, about the End of the Year 1683, was seized with a Dizziness and Pain in the upper Part of the Head, which he told me, he could impute to nothing but the excessive cold Weather, which then raged with us to Extremity. Hereupon, having the Misfortune to apply himself to an ignorant Pretender to Physick here, a Plaister for his Head was only ordered at that time without any Evacuations. The Patient upon this grows much worse, the Pains of his Head more fixed and girding (I suppose from some Spasms or constrictive Motions of the *Meninges*) to which succeeded Convulsive Fits (which were accompanied afterwards with a Tremor upon his Arms and Legs) and upon this, all Objects appeared Double to him, from the Fibres of the *Optick Nerves* being thus distorted from their wonted Parallelism. After he had been thus tormented about 3 Months, he was taken into *St. Thomas's Hospital*. Upon his Admission I examined his Case, and judged that the *Optick Nerves* were affected, and that it was gone so far that it would probably end in a *Gutta Serena*. However, we endeavoured by all the Ways we could to relieve him. Accordingly we ordered the *Cephalic Pills*, and an *Electuary* (which we use in the Hospital in *Epileptic Cases*) which he received much Benefit by; he was also (by Intervals) bled in the *Jugulars*, and in the *Hæmorrhoids*, and by Leeches, which also gave him good Relief; his Head was shaved, Blisters applied to his Neck, and a Seton made some time after, &c. we endeavouring by all manner of Revulsions to drive the Humour another Way, if it were possible. But it was too much fixed; so that about two Months after he had been under our Care, a *Gutta Serena* seized on his Right Eye, that he could not see at all on that Side; but then the Duplicity ceased, and he saw all Objects single again as before.

Whilst we were solicitous about preserving the Left Eye, which was still in Danger, a severe Fit seized him, soon after which he died. I missed the Opportunity of Opening the Body; but I was told, that in the upper Part of the Head, Neck and Shoulders, a great Blackness appeared, not long after he was dead, from the Settling of the Blood, I suppose, in those Parts.

XV. 1. The Disease which I call *Bursa Oculi*, or the Pouch of the Eye, is a Bag without Matter in it (like an empty Purse) on the White of the Eye, under the Upper-Lid; it hung flag about the Length of a Thumb-nail.

2. Another Person had no visible Disease in his Eyes, but could not see at all unless he squeezed his Nose with his Fingers, or saddled it with narrow Spectacles; and then he saw very well.

3. A Maid about 23 Years old, came to me from *Banbury*, who could see very well, but no Colour beside Black and White. She had such Scintillations by Night (with the Appearances of Bulls, Bears, &c.) as terrified her very much; she could see to read sometimes in the greatest Darkneſs for almost a Quarter of an Hour.

Several remarkable Cases relating to the Eyes; by Dr. Dawbeny Turberville. n. 164. p. 736.

ib. p. 137.

4. A Sadler's Daughter of *Burford* had an Impostume which broke in the Corner of one of her Eyes; out of it there came about 30 Stones as big as a Pearl, and splendid; after which she had a *Fistula*, which I cured.

5. Here was one in *Salisbury* who had a Piece of Iron, or Steel, struck in the *Iris* of the Eye; the Person was in very great Pain, and came to me; I endeavoured to push the Iron out with a small *Spatula*, but could not; I then applied a Load-stone to it, and immediately it jumped out.

6. I was consulted by a Maid who had a Pustle broke in her Eye, out of which there came fine small Sand, like Chalk, for many Weeks together; made use of Purging, Fumigation, and some Topicks, by which she recovered her Sight in a very great Measure.

ibid. p. 738.

7. About 6 or 7 Years ago, I had one Mr. *Oyliff* in Cure of his Eye. It was as big as my Fist, black, fleshy, and of bluish Bladders; this I judged to be a Cancer. After Purging and Bleeding, I cut out the Ball, and ulcerated Flesh, by many Cuts, which were all insensible to him, till I came to the *Optick Nerve*: At the last Cut he complained, and bled a little; the Wound was healed in about a Fortnight.

It n. 167. p. 830.

8. A young Man, my Patient, had an Eye as big as an Hen's Egg, very fair, without Blemish, Rheum, or Redness; and his Sight was pretty tolerable; I judged these Symptoms to proceed from thin Humours fallen on the Eye, and extending its Coats: I cured this Distemper by applying drying Medicines to the Head and Eyes, and making an Issue in *Nucha*. *Appello Morbum Oculum Bovinum, sive Oculi Hydropem.*

An easy Help to a decayed Sight; by— n. 37. p. 727.

XVI. When I was not above 60 Years of Age, my Sight was so much decayed, that I seemed always to have a kind of thick Smoak or Mist about me, and some little black Balls to dance in the Air before my Eyes; I could not distinguish the Faces of my Acquaintance, nor Men from Women, nor keep the plain trodden Paths, except I was led. I received no Benefit by any Glasses, but was in the Case of those whose Decay by Age was greater than can be helped by Spectacles. The fairest Prints seemed through Spectacles like blind Prints, little Black remaining. But I found great Help by the following Expedient: I took Spectacles that had the largest Circles; close to the Semi-circles, on the over-part, on both Sides, I cut the Bone; then, taking out the Glasses, I put black *Spanish Leather*

taper-wise into the emptied Circles, which widened enough (together with the encreasing Wideness of the Leather) took in my whole Eye at the wider End; and presently through the smaller End I could read the smallest Prints that are, as if they had been a large and fair Character. I made these empty Tubes of different Lengths, and the smaller Ends of different Bignesses: I can only put the very End of my little Finger into the Orifice of the lesser, but the same Finger somewhat deeper, yet not quite up to the first Joint, I can insert into the Orifice of the wider.

The Tubes may be of Paper only coloured black, and pasted on, and with the inner Folds, to be drawn out from one Inch to three; some of the Folds to be taken out, that the Orifice may be wider or narrower, as best fits to every Degree of Defect.

Probably, these Tubes may be proper for some that are Squint-eyed, whose Eyes do interfere; but certainly it will ease them that cannot well bear the Light, and perchance they will preserve the Sight for longer Durance.

After I had used these Tubes little more than a Week, I could use them without much Trouble all the Day long; and my Sight was so much amended, that I could see the Greenness of the Garden, and Pastures in a florid Verdure; whereas before the Use of them, all dark Colours had the same Hue to my Eye.

n. 39. p. 765. I have sometimes put Convex-Glasses (for a Trial) into my Tubes; but I found the Prints, though something larger, yet not so clear, so distinct, nor so pleasing to the Eye, as when I used the empty Tapers. I find myself best at Ease with those Leathern Tubes that are made without any fastening to the Bone of the Spectacles; for as they hang in that slight Manner, I can with a Touch of my Finger raise them up, or bow them down, divide or unite them, to take in the same Object.

n. 40. p. 802. I found at first a great Discouragement in the Difficulty of using them, so that I could not endure the Trouble above 2 Hours at a Time: But by the Practice of a Week or a Fortnight, I found them an Ease and Pleasure to me, for 12 at least of each 24 Hours. And by all the Trials which I have yet made upon others, whether *Pore-blind*, or of faint Sight decayed by Age, or however weakned, it proves a very great Aid. For the *Pore-blind* they must be made shorter: For the decayed by Age they may be longer.

An Experi-
ment concern-
ing Deafness;
by Dr. W.
Holder, n. 36.
p. 665.

XVII. A young Gentleman, who was born *deaf*, and continued dumb till his Age of 10 or 11 Years, was committed to my Care. His Mother, when she was great with him, received a sudden Fright; by Occasion whereof the Child's Head and Face were a little distorted, the whole right Side (as I remember) being somewhat elevated, and the left depressed; so that the Passage of his Left-Ear was quite shut up, and that of the Right-Ear proportionally distended, and too open. I found, upon Examination, that the *Auditory Nerve* of this Right-Ear was not perished; and I supposed the Defect to lie in the Want of due Tension of the *Tympanum* of his Ear; whose Use I took to preserve the *Auditory Nerve*, and Brain, and inward
Parts

Parts of the Ear, from outward Injury by Cold, Duft, &c. For it is requisite that the *Tympanum* be tense, and hard stretched; otherwise the Laxness of that Membrane will certainly dead and damp the Sound. The Tension of this Part is the principal Office of the three *Ossicles*, viz. the *Malleus*, *Incus*, and *Stapes*; whereof the *Stapes* is fixed to the inner Bone, and Part of the *Malleus* to the *Tympanum*, and the *Incus* between them joined on one Part to the *Malleus*, and on the other to the *Stapes* by *Ginglymoide* Joints; and by the Help of a Muscle drawing the *Incus*, these three Bones are brought to a curved or arched Posture, and the *Stapes* being fixed unmoveable, the *Malleus* yields, to bring the Terms of that Line nearer, in Proportion as it is curved, and draws the Center of the *Tympanum*, stretching the Surface of it from a plain to a conoide Figure, within the same Circumference. And I conceive the Action of this Muscle does ordinarily and constantly draw the *Tympanum* to a moderate Tension; but when we have Occasion to listen, and give a more particular Attention to some Sound, the Action of that Muscle is then more intense, and the *Tympanum* is drawn to a more than ordinary Tension, so to facilitate the Passage of the Sound.

Upon these Considerations I advised his Mother to consult with Physicians, if by some astringent Fumes or otherwise it might be restored to a due Tension. In the mean Time I thought of a temporary Way by the Impulse of any vehement Sound; as of a Drum beating near him; which Sound, during its Continuance, must needs give the *Tympanum* a Tension, by driving and swelling it inwards, as a fresh Gale of Wind fills the Sails of a Ship; and the Experiment succeeded according to my Expectation. For so long as I beat a Drum fast and loud by him, he could hear those that stood behind him, calling him gently by his Name (which he understood, having learned to speak and pronounce it among other Words) and when the Drum ceased, he did not hear the same Persons, when they again very loud called him by his Name. And this we tried several Times, by beating the Drum again, and ceasing it; and he still heard them when the Drum beat, and heard them not when it stopped.

Having mentioned this Experiment to a Gentleman about *Oxfordshire* in a great Degree of Deafness, he called to Mind, that he never heard so well and easily, as when he was discoursing with Company in a Coach, whilst it went fast, and made a great rumbling Noise in *London* Streets; by which he was induced to believe, that the Impediment of his Hearing was of the like Nature with the other.

XVIII. In the internal Structure of the *Organ of Hearing*, I observed first, a very fine thin Membrane within the Cavity of the *Tympanum*, which from its Situation I call the internal Membrane of the *Tympanum*, to distinguish it from that which blocks up the Extremity of the *Meatus Auditorius*, and which therefore I call the external Membrane of the *Tympanum*. The internal Membrane, when considered attentively, appears in each Ear furnished with an infinite Number of fine capillary Vessels, which are sent to it

The Organ of Hearing; by Dr. Raymund Vieussens, n. 258. p. 270.

from the *Carotida Artery* and the *Jugular Vein* of each Side. Hence it is that, when these Vessels are much distended with Blood, this Membrane appears almost quite red, especially if you view it in the Sun with the Help of a Microscope. These Vessels hinder the Membranes which line the lateral and upper Parts of the Cavity, from falling in with one another, and so being complicated together, which they certainly would do if they were not thus suspended; seeing of themselves they don't immediately adhere to the internal Surface of this Cavity.

This same Membrane, which is a Production of that which lines the *Aqueduct* internally, shuts up the Orifice which leads to the Cavities in the Mamillary Process of the temporal Bone, and hinders the Air contained in these Cavities from communicating, at least freely, with the Air in the *Tympanum*. Besides one very thin Production of it shuts up that Orifice to which the *Stapes* is connected, and another shuts up that called the *Foramen Rotundum*, and is extended further all over the internal Surface of that small Cavity which leads from the *Foramen Rotundum* to the Extremity of the *Semi oval Duët* of the *Spiral Cochlea*, and even to the little *Fissure* or *Chink* at the Basis of the *Concha*. So that the internal Membrane of the *Tympanum*, by this intermediate Production, whereby it shuts up externally the Extremity of the *Semi oval Duët* of the *Spiral Cochlea*, and the *Chink* in the Basis of the *Concha*, communicates with that Portion of the nervous Membrane which lines the *Parietes* of the *Concha* internally, and shuts up the *Chink* in the Basis of the *Concha* within, and with the Extremity of the *Spiral* nervous *Lamella* which is contained within the *Semi oval Duët* of the *Spiral Cochlea*. Besides, this same Membrane, below that Part which respects the internal Membrane of the *Tympanum*, leaves a remarkable Cavity, which admits the Air from without brought to it by the *Aqueduct*, and here it is so constructed, as to form three Cavities. The first is that which includes the internal *Apophyse* of the *Incus*, and leads to the *Cells* in the *Mamillary Process*, as I said before. The second, which lies in the Middle between the other two, and is the least of the three, is situated precisely below the Basis of the *Concha*, and receives into it the Head of the *Malleus*, and almost all the Body of the *Incus*. The third is the largest of all, placed towards the internal Orifice of the *Aqueduct*, and contains in it a Part of the Belly of the first Muscle of the internal Ear, a Portion of the *Incus* with its two *Apophyses*, the *Stapes*, *Os Lenticulare*, the Tendon of the second Muscle of the internal Ear, and the Neck together with the Handle of the *Malleus*.

At last, this same Membrane, though not in every Subject, sends off a very fine *Lamella*, which divides the third Cavity into two, like a kind of Partition. This *Lamella*, which has never yet been described by any Anatomist, as far as I know, is for the most part wanting, and, when it is found, it is connected above to the Basis of the *Concha*, and below to the internal Membrane of the *Tympanum*, and seems to divide it into two equal Parts even to the Extremity of the Handle of the *Malleus*, and a little farther. So that this *Lamella*, together with the Extremity of the Handle of the *Malleus*, draws the Middle Part of the *Membrana Tympani* inwards towards the Cavity,

Cavity, and inclines it in such a Manner, as to render it a little concave towards the *Meatus Auditorius*, and a little convex towards the Cavity of the *Tympanum*. This *Lamella*, when it is found, will serve to hinder the external *Membrana Tympani* from being too much stretched, when the *Monogastrick Muscle* of the internal Ear is violently contracted, or from being tore by the Extremity of the Handle of the *Malleus*, when that Muscle is convulsed, or spasmodically affected. So that it seems to supply the Place, as it were, of an Antagonist Muscle to the above-mentioned *Monogastrick*, if you consider it as acting with a long slender Tendon, as will by and by appear.

If any one chuses to satisfy his Curiosity with a beautiful View of those Parts, let him separate the *Os Petrosum* from the rest of the Skull of a Person that has been strangled, or dead of a *Phrensy* or *Apoplexy*, if he can come at such a one. This Bone, after it is separated from the rest, must be kept in a dry Place for two Days, that the *Membrane* which I am now describing may be gently dried, and by this Means so contracted, as to separate sufficiently from the internal Surface of the Cavity in which it is contained, so that it may not be lacerated by the Hand of the Anatomist who is to examine its Texture. Afterwards, the thin Bone which constitutes the upper Part of the *Tympanum*, is to be cut away by little and little, as dextrously as possible with the Help of a Knife. As soon as the upper Part of the *Tympanum* is removed, the *Membrane* I now speak of, which before lay concealed within the Cavity of the *Tympanum*, becomes conspicuous to the Sight, and being extremely vascular, and, all its Vessels distended with Blood, it represents a Kind of *Rete Mirabile*.

This *Membrane* has various surprising Uses, which are next to be described. In the first Place, by its thin Production which covers the *Entry* into the *Labyrinth*, it hinders that innate pure subtile Air which is confined within the Cavities and Meanders of the *Labyrinth*, from communicating, at least freely, with the gross Air derived to the *Tympanum* by the Cavity of the *Aqueduct*. Secondly, the *Membrane*, by the mild Heat of the Blood in its Vessels, gently warms the bony Basis of the whole *Labyrinth*, and at the same Time enlivens and preserves the Motion of the Air contained in the two *Vestibula*, through their Windings, and of that pure Lymph impregnated with animal Spirits which moistens all the Fibres of the *soft Portion*, as it is called, of the *Auditory Nerve*, to be described below. Thirdly, this same *Membrane* contains within its Cavities an Air very much rarified by the gentle Heat of the Blood moving through its Vessels, and being thus rarified, and consequently very subtile, and impregnated with a great Quantity of *Æther*, it is rendered very fit for receiving easily the Impressions of all sonorous Bodies, and transmitting them quickly to the Air, and to all the Productions of the soft Portion of the *Auditory Nerve* within the *Labyrinth*, as also the *Centrum Ovale* of the Brain.

From what has been already said, it plainly follows, that the *Membrane* which we are now upon, conduces surprisingly to *Hearing*. For being of a very fine delicate Texture, it allows a free Ingress and Egress to the Impressions of sonorous Objects to and from its Cavities, which Impressions, being

being first communicated to the Air surrounding the Head, are transmitted to this Membrane by the Motion of the *Æther*, with which the Air is impregnated, and by innumerable insensible *Foramina* in the external Membrane of the *Tympanum*, as also by Means of the *Aqueduct*. And indeed, if I am not mistaken, the Impressions of sonorous Objects, communicated to the Air within the Cavities of this Membrane, or to that which surrounds it externally, being strongly impregnated with *Æther*, are transmitted in a Moment through the *Labyrinth* by its proper Orifices, and from thence, by the Intervention of the animal Spirits there, instantaneously communicated to the *Centrum Ovale* of the Brain. And there according to the different Impressions of sonorous Objects, different *Ideas* are produced in the *Soul*, which determine the different Species of Sound, which again are expressed by different Names. The Truth of what I have now advanced is confirmed by Experience. For whenever this Membrane is corroded or destroyed, by Pus formed either within the *Mamillary Apophyse*, or the Cavity of the *Tympanum*, the Hearing is thereby either rendered very dull, or entirely lost.

From what has been said may clearly be understood, how a tumultuous Motion, producing a preternatural Sound, must necessarily be occasioned in the *Tympanum*, when either from immediate Eating or Drinking, Obstructions of the lower Belly, tedious and fatiguing Exercises of the Mind, or from any other Cause, there is too great a Quantity of too rarified Blood sent to the Vessels of the above Membrane. For that Blood by its too great Quantity and too great Rarefaction, dilates and pulsates too much in the small Arteries, and by this Dilatation and Pulsation, together with the Motion of the Vapours which exhale from the Blood here, this Membrane is shaken in such a Manner, as to produce a confused Kind of Noise in the Cavity of the *Tympanum*: Especially if those Vapours cannot easily transpire, either upon Account of an Obstruction in the *Aqueduct*, or of too compact a Texture of the external Membrane of the *Tympanum*, being transmitted to the *Centrum Ovale* of the Brain, produces that *Idea* of Sound in the Mind which is commonly called a *Murmur*. Of this *Murmur* there are three Species, which are known to every Body, but hitherto distinctly explained by none as far as I know. They are these, *Humming*, *Hissing*, and *Tinkling*. When this Vapour which raises a *Murmur* in the Ear, is so moist as to approach pretty near to the Nature of Water, it relaxes the inner Membrane of the *Tympanum* which is very moveable, at the same Time moving and bending it different Ways. By this Means the Air contained within the Cavity of this Membrane, is agitated so, as to receive gentle, successive, undulating Vibrations, the same as it receives from Water flowing into Waves, after falling from some Eminence, or from a Swarm of Bees moving all at once in various Directions. These Vibrations, by Means of the animal Spirits in the *Medullary Portion* of the *Auditory Nerve*, are communicated to the *Centrum Ovale* of the Brain, and raise the *Idea* of that dull confused Noise which we commonly call *Humming* or *Buzzing*. When this Vapour is so devoid of watery Particles, as to approach more to the Nature of a dry Exhalation, and is therefore flatulent, then by acting upon this Membrane, it will in some Measure dry,

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distend and expand it. This *Membrane* then being thus dried, distended, and expanded, by a Motion communicated to it, will so shake the surrounding Air, as well as that within the Cavities of the *Membrane*, as to excite strong *Vibrations*, successive indeed, but quick, and following one another almost in streight Lines. So that the *Vibrations* will be near the same, as if this *Membrane* was strongly shaken with meer Air, and being transmitted to the *Centrum Ovale* in the Manner above described, will excite the *Idea* of a confused *Acute Sound*, which is called a *Hissing* or *Singing* in the Ear. Lastly, if the same internal *Membrane* of the *Tympanum*, or only a Part of it, is shaken by the strong and frequent Pulsation of the Blood, in some Measure obstructed in its small Arteries, then (if at the same Time it is so distended with a dry warm Vapour, as strongly to reflect the *Vibrations* communicated to it) it will so agitate both the surrounding and contained Air as to give it the same Kind of *Vibrations*, as those occasioned by quick, repeated Strokes of a Silver Hammer upon a small Anvil either of Silver or any other sonorous Metals. Whence it is no Wonder, that those *Vibrations*, when they get to the *Centrum Ovale* of the Brain, excite that *Idea* of Sound which we call a *Tinkling* in the Ear.

I have likewise several Years ago frequently examined the *Muscles* of the internal Ear, and have always observed it provided with only two Pair. These *Muscles* are provided with Nerves from the Fifth Pair, by almost insensible Twigs, and with extream small Blood Vessels, from the internal *Carotide Artery* and *Jugalar Vein*. The first of them, which is thicker and longer than the other, has two Heads and two Tendons, but only one Belly, and therefore I call it the *Monogastrick Muscle*. The first Head, which is covered with a Membranous Sheath, arises from a small bony *Sinus*, dug out above the upper Part of the *Aqueduct*; and the second, which appears intirely fleshy, takes its Origin not far from the external Side of the small bony *Sinus* just now mentioned. The fleshy Fibres which compose the two Heads of the Muscle, I am now speaking of, are united firmly together, a little before they enter the Cavity of the *Tympanum*, and then end in one common Belly every where inclosed in a strong membranous Sheath. Further, these same fleshy Fibres, soon after they have got into the Cavity of the *Tympanum*, separate from one another, and end in two Tendons, which are likewise inclosed in a strong membranous Sheath. The first of those Tendons, which is longer and slenderer than the other, after running a little upwards, is fastened, by the Means of a small membranous Pulley, to that Part of the *Os Petrosum*, to which is inserted the Beginning of the *Aqueduct* of *Fallopian*, or the small bony Canal which admits the *Portio dura* of the *Auditory Nerve*; and by this membranous Pulley all its Motions are rendered free. After this the Tendon, turning perpendicularly downwards over the slender *Apophyse* of the *Malleus*, is connected to this *Apophyse*, expanding itself at its Insertion, whereby its Connexion is continued as far as the Neck of the *Malleus*. The second Tendon of the Muscle which I now describe, is shorter and thicker than the first, and strongly inclosed in the membranous Sheath. It runs almost in a streight Course to the Cavity
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of the *Tympanum*, and is connected to the Middle of the Head of the *Malleus*, where it expands itself so as its Infertion is continued as far as the Body of the *Incus*, and therefore it helps to connect these two Bones together. This Tendon is connected to the subjacent Bone, by the Means of the above-mentioned Membranous Sheath. The second Muscle of the internal Ear rises from a small bony Canal in the lower Part of the *Os Petrosum*, between the Entry into the *Labyrinth* and its *Fenestra*. This Muscle is much smaller and shorter, than the one above described, *viz.* the *Monogastrick*; and hence I call it the *lesser Muscle* of the internal Ear. Its fleshy Belly is pretty large, and it is inferted by a very slender Tendon into the Head of the *Stapes*.

When the *Monogastrick Muscle* of the Ear is contracted, its longer Tendon pulls the Head of the *Malleus* and the Body of the *Incus* a little upwards. I say, it only pulls it a little upwards, because the short Tendon of the same Muscle being connected to the Extremity of the Head of the *Malleus*, as the longer one is connected to its slender *Apophyse*, and to its Neck, it will when contracted, resist the Action of the longer one. For, as I observed before, this short Tendon is connected to the subjacent Bone by means of its strong membranous Sheath, and therefore it cannot be pulled much upwards; but consequently, it must resist in some Measure the Action of the longer Head when contracted, and so hinder it from pulling the Head of the *Malleus* together with the *Incus* much upwards. But when the Head of the *Malleus* is pulled up, the Extremity of its Handle must necessarily incline downwards, and therefore will push outwards the middle Part of the external *Membrana Tympani*, to which it is connected by Means of the contiguous internal Membrane, and therefore will stretch it, and render its Surface almost plain. While these Offices are performed by the Action of the *Monogastrick Muscle*, and the *Malleus*, the fine Membrane above described, which we said, seems to divide into two equal Parts the *Membrana Tympani*, must at the same Time be distended, when it is not wanting. So that this fine Membrane seems in some Measure to supply the Place of an Antagonist to the *Monogastrick Muscle* of the Ear; because by its Elasticity it recovers its natural Tone, and by the same Effort which it makes to recover itself, it helps to restore the external Membrane of the *Tympanum* to its former Tone and Figure, as soon as it ceases to be pressed by the Extremity of the Handle of the *Malleus*. But as by pulling up the Head of the *Malleus*, the Extremity of its Handle is inclined a little downwards, so by raising up the Head of the *Incus*, the Extremity of its internal *Apophyse* is gently inclined downwards. I say, that by raising the Body of the *Incus*, the Extremity of its internal *Apophyse* is only gently inclined, because the *Incus* is so situated in a small Cavity, dug out in the Bone which forms the internal Margin of the Basis of the Cavity of the *Tympanum*, that its Body cannot be raised, but the Extremity of its external *Apophyse* must rest upon the subjacent Bone; to which it is almost contiguous. Hence it happens, that the *Monogastrick Muscle* of the Ear by its longest Tendons, can raise the Body of the *Incus* but very little upwards. From what has been said it clearly

ly appears, that, upon account of two, for the most Part, and sometimes of three Mechanical Causes, the *Monogastrick Muscle* of the Ear by its longer Tendon, can raise the *Incus* and the Head of the *Malleus* only a little upwards, and therefore can only incline the internal *Apophyse* of the *Incus* and the Extremity of the Handle of the *Malleus* a very little downwards.

When the Body of the *Incus* is raised a little up, its internal *Apophyse* is inclined gently downwards, as has just now been said, and at the same Time draws along with it the Head of the *Stapes*, connected to it by the intervening *Lenticular Bone*, and therefore depresses it a little likewise. But while the Head of the *Stapes* is inclined a little downwards, the upper Part of its Basis must necessarily be removed a little from the upper Part of the *Fenestra*, or the Orifice of the *Labyrinth* upon which it stands, and therefore it must open it a little, and in a Manner pulsate it, if I may be allowed the Expression. From what I have just now said, it may be easily understood, how the long Tendon of the *Monogastrick Muscle* of the Ear conduces two Ways to make the Sense of Hearing more easy and distinct. For, First, as by Means of the Extremity of the Handle of the *Malleus*, it stretches the internal Membrane of the *Tympanum*, and renders its Surface almost plain in the Manner above described, it thereby dilates the Pores of this Membrane, whence the *Æther* which approaches it, laden with sonorous Impressions easily enters the Cavity of the *Tympanum*; as soon as it has got there, it communicates these Impressions to the Air contained in that Cavity, whence they are transmitted into the *Labyrinth* by its proper Orifices, and no sooner they arrive there, than they are mixed with the animal Spirits in the Fibrils of the *Portio Mollis* of the *Auditory Nerve*, which are likewise replete with *Æther*, and these animal Spirits transmit them pure to the *Centrum Ovale* of the Brain, where they excite that *Idea* in the Mind which *God* has ordained them. Secondly, the long Tendon of the *Monogastrick Muscle* of the Ear helps to render Hearing more easy and perfect, by gently opening the upper Part of the *Fenestra* of the *Labyrinth* in the Manner above explained; because at this Time one Portion of the *Æther*, full of sonorous Impressions, more easily enters the second Orifice into the *Labyrinth*, whilst another Portion of it enters the first.

When the same *Monogastrick Muscle* of the Ear is contracted, it pulls a little obliquely towards itself by its shorter Tendon, the Head of the *Malleus* together with the *Incus*. And hence the Extremity of the Handle of the *Malleus*, and the Tip of the internal *Apophyse* of the *Incus* are inclined outwards towards the Membrane of the *Tympanum*. But the Extremity of the Handle of the *Malleus* being thus inclined outwards towards the *Meatus Auditorius*, it necessarily depresses the convex Part of the external *Membrana Tympani* to which it is connected, and therefore greatly conduces to increase its natural Tension, as also to make plain both its Surfaces. Again, when the sharp Point of the internal *Apophyse* of the *Incus* is inclined outwards towards the *Membrana Tympani*, as was just now said, it must necessarily pull along with it the Head of the *Stapes* by Means of the *Lenticular Bone* which is connected to it, and therefore it will remove a little the internal lateral Part of the Basis of this small Bone from the internal lateral Part of the

Fenestra of the Labyrinth. By this Means there will be a Chink made between the internal lateral Margin of the Basis of the *Stapes*, and the internal lateral Margin of the *Fenestra* of the *Labyrinth*, which will afford a Passage, though very narrow, into the *Concha*, to the *Æther* impregnated with sonorous Impressions, going to enter the *Labyrinth*. From what has been now said, it plainly appears, that the two Tendons of the *Monogastrick Muscle* of the Ear serve the same Purposes, though their Motions, as acting upon different Parts, are different, nay, even contrary to one another. And indeed each of them tends in a Manner peculiar to itself to stretch and make plain the external Membrane of the *Tympanum*, and therefore renders easier the Passage for the *Æther* full of sonorous Impressions into the Cavity of the *Tympanum*; for while the longer Tendon opens a little the upper Part of the *Fenestra* of the *Labyrinth*, the shorter one opens the lateral internal Part of the same *Fenestra*, whereby a Chink being there made, a certain Portion of that *Æther* is allowed to enter the *Concha*.

The *lesser Muscle* of the internal Ear, if you consider its Origin and Insertion, cannot be contracted, but it must pull the Head of the *Stapes*, to which it is inserted, from without inwards, and therefore must open a little the external lateral Part of the *Fenestra* of the *Labyrinth*, and so allow a Passage for the *Æther* into the *Concha*. From hence it clearly appears, that the *lesser Muscle* of the Ear, of which we are now speaking, by its Contraction opens the *Fenestra* of the *Labyrinth*, just in an opposite Manner to that of the short Tendon of the *Monogastrick Muscle*. Hence, doubtless, it must happen that, upon Account of the opposite Motions of these two Muscles, just now explained, the *Fenestra* of the *Labyrinth* can never be much opened, and can only be opened on its external Side by the lesser Muscle acting, and on its upper and internal Side by the *Monogastrick Muscle*, as has been already clearly and fully explained.

There is no Body can doubt, that the Parts above described, with which the Cavity of the *Tympanum* is furnished, naturally serve the different Offices which I have assigned them, because whenever their natural Functions are disturbed, the Hearing suffers. But at the same Time I would not have any Body to think, that these Parts are absolutely necessary to Hearing. For I have frequently, in human Subjects which I have dissected, observed both the external and internal *Membrane* of the *Tympanum* to be wanting, and even the greatest Portion of the *Muscles* above described, these Parts being almost intirely consumed by the acrid Pus of Abscesses, produced sometimes in the *Cells* of the *Mamillary Apophyse*, and sometimes in the Cavity of the *Tympanum* itself; and yet in all those People, who had a purulent *Abscess* either in the one Ear or the other, the Hearing was not quite lost in the Ear affected, as I was told by themselves while they were alive.

I come next now to consider, whether the two Muscles of the internal Ear act voluntarily or not. And after considering the Affair as attentively as possible, I cannot help being of Opinion, that, as the Motion of these Muscles is determined partly by the Will, and partly by the Impressions of
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sonorous Objects without the Consciousness, nay, sometimes even contrary to the Consent of the Will, their Action must be partly voluntary, and partly involuntary. And indeed it is very likely, that the same Action of the Will which determines us to hear a Thing easily and distinctly, at the same Time determines the animal Spirits to flow towards and promote the Action of those Muscles, which assist us in preceiving Sounds quickly and distinctly. But at the same Time the Motion of these Muscles can never be called intirely voluntary, because every Body must be perswaded from his own Experience, that they frequently act without the Consent of the Will, as I have just now said. And as this is the Case, there can be no other extrinsick Cause to determine those Muscles of the internal Ear to act, than the *Æther* filled with the Impressions of sonorous Objects; and the Manner in which these Causes act upon those Muscles, seems to me to be thus. When the *Æther* by its repeated *Vibrations*, which are sometimes quicker and sometimes slower, approaches the external Membrane of the *Tympanum*, it is almost all determined towards its concave Part, and then both by its Approach and by penetrating the Pores of the Membrane, it shakes it, and at the same Time protrudes it inwards. But the common Part of the *Membrane* of the *Tympanum* being thus shaken and protruded inwards, it pushes the Extremity of the Handle of the *Malleus* which is connected to it from the *Meatus Auditorius* to the Cavity of the *Tympanum*, raises it up, and at the same Time makes the *Head* of the *Malleus*, and the *Incus* which is joined to it, incline downwards. The *Head* of the *Malleus* and the *Incus* being thus inclined downwards, they pull towards them the two Tendons of the *Monogastrick Muscle* of the internal Ear, stretch this whole Muscle, and by this Means make it acquire that elastick Force which is requisite for its Contraction. But as the *Vibrations* of the Air impregnated with *Æther*, however quickly they succeed one another, are always plainly distinguished from one another by intermediate Spaces of Time intervening, it appears very certain to me that, in that intermediate Space of Time which intervenes between the first and second *Vibration*, for Example, the above said Muscle, by that elastick Force which it acquired by being stretched, and by its own gentle Distension, is determined to contract itself, and solicit towards it the animal Spirits, and that it really does contract, by the Assistance of these Spirits, which have just entered the Pores of its Muscular Fibres. The *Monogastrick Muscle* of the Ear being contracted, pushes the *Stapes* from the inner Cavity of the *Tympanum* inwards, and so stretches the lesser Muscle of the internal Ear, and disposes it to acquire an elastick Force fit for its Contraction, whereby it is determined to contract itself, and does contract by the Influence of the animal Spirits, as soon as the *Monogastrick Muscle* is again stretched in the Manner above explained.

We come now to examine another Part of the internal Ear, *viz.* the *Labyrinth*, externally and internally: But I must first observe, that the Bone, of which the inner Partitions of its Cavities are composed, is hard, and very compact. And this seems to be so ordained by Nature on Purpose,

that the sonorous Rays striking against those Partitions, may lose nothing, or at least very little of their Motion, and therefore communicate the same Sound, or almost the same, which they receive from sonorous Objects, to the animal Spirits contained within the Expansions of the *soft Portion* of the *Auditory Nerve*, which are variously distributed in the Cavities of the *Labyrinth*.

In the *Labyrinth*, which Nature has dug out in the *Os Petrosum*, and the Structure of which we can never sufficiently admire, there are only three Things remarkable to be observed externally; *viz.* the bony Partition in its upper Part, dividing the three *Semicircular Canals* from one another, and two *Apertures* situated pretty nigh one another, which afford a Passage for the *Æther*, from the Cavity of the *Tympanum* into the *Labyrinth*. This bony Partition is something singular in this, that internally it is full of very small Cavities, within which is spread an infinite Number of Capillary Blood Vessels, and indeed the Blood which these Vessels carry, by its gentle Heat nourishes and keeps up the natural Motion of the animal Spirits in the Pores of the nervous Membranes, which line the *Semicircular Canals* of the *Labyrinth*, and so hinder them from being too much condensed, and so becoming unfit for the Office of this Organ. There are two *Apertures* dug out in this Part of the *Os Petrosum*, which makes the Basis of the *Labyrinth*. The first has an Oval Figure, and is situated a little higher than the other; and as it opens into the *Concha*, and consequently into the inner Parts of the *Labyrinth*, ought in my Opinion to be called the *Fenestra* or *Window* of the *Labyrinth*. I have said, not unjustly, that this *Aperture* opens into the inner Parts of the *Labyrinth*, because it is cut out of the Portion of the *Concha*, which is that Part of it, by Means of which there is a Communication between these inner Parts, as will be explained below. To this *Window* the Basis of the *Stapes* is applied, and shuts it, as long as the Muscles of the internal Ear are at Rest; and on the contrary, it opens it a little when either of these Muscles is contracted, as we have already shewn. The other *Aperture*, which is almost round, I call the *Gate* of the *Labyrinth*; because it affords an Entry into a little round Cavity, which is the Passage into the *Labyrinth*. For this small Cavity communicates with the Extremity of the *Semi-oval Spiral Duët* of the *Cochlea*, and with the *Concha*, by a *Chink* cut out in its Basis, and therefore with the *Semicircular Canals* to be afterwards described, as will by and by be explained. These Things being considered, every Body must see, that I have called this last *Aperture* very justly the *Gate* of the *Labyrinth*. This *Gate* is covered with a very fine Membrane, which from its delicate Texture, will allow an easy Passage to the *Æther* carrying along with it the Impressions of sonorous Objects into the *Labyrinth*.

The *small Cavity* behind the *Gate* of the *Labyrinth*, I think, may be called its first *Porch*; because this leads into the *Cochlea*, and the *Concha*, which is called by the famous *Du Verney*, the *Porch* of the *Labyrinth*. So that the *three Semicircular Canals* of the *Labyrinth*, and the *Cochlea* are, as it were, two different Apartments in it, separated from one another by Means of the *Concha*, and at the same Time communicating together by its Means; wherefore I call it the second *Porch* of the *Labyrinth*. This very fine Membrane, which shuts up the *Gate* of the *Labyrinth*, as I said above, is produced

duced into its first *Porch*, and lines it quite internally. It likewise shuts up the little *Chink* in the Basis of the *Concha*, and the Extremity of the *Cocblea*, so that it adheres to the fine nervous Membranes which line the Cavities of the *Concha* and *Cocblea*, and by their Means communicates with the *soft Branch* of the *Auditory Nerve*. The second *Porch*, which is the same with the *Concha* of all the old Anatomists, is larger than the first, and its Cavity, which is almost round, is about two Lines in Diameter, so that in Adults it can contain almost two Grains of Wheat divided into three or four little Portions, as I have frequently tried. In it there are nine *Apertures* to be observed; *viz.* two very small, and almost insensible *Foramina*, which afford a Passage into it for two slender Twigs of the *soft Portion* of the *Auditory Nerve*, to be described below; a pretty long *Chink* in its Basis somewhat crooked; an oval Orifice in that Side of it which is towards the Cavity of the *Tympanum*, called by the old Anatomists *Fenestra Ovalis*; and the Mouths of the three *Semicircular Canals*, which are no more than five; because the upper Canal, in its back Part, communicates in such a Manner with the lower, as that they open with one common Orifice into the Cavity of the *Concha*. Hence, with the later Anatomists, I call this Orifice the *common Gate*. Each of the Orifices of the *Semicircular Canals* resembles pretty much in its Figure the Mouth of a Trumpet; and indeed, if you examine carefully the Cavities of these Canals, you will see with the naked Eye, that they become gradually larger and larger from the Middle towards the Extremities, and therefore they must end in the same Figure as a Trumpet. These Orifices we are now speaking of are so disposed, as that two of them open above, and two of them below, into the Cavity of the *Concha*, while the fifth is situated pretty nigh the *Chink* on the Basis of this Cavity.

In the outer Part of the second *Porch* of the *Labyrinth*, are situated three small round *Canals*, which I call *Semicircular* upon Account of their being bended into that Figure; and this Name they have had from all the later Anatomists. But to distinguish them from one another, I shall give them distinct Names from their different Situations. The first I shall call *Upper*, because it surrounds the *upper Arch* of the *Concha*; the second, *Lower*, because it surrounds the *lower Arch*; and the third I shall call the *Middle one*, because it is situated between the other two. The *upper Semicircular Canal*, as soon as it rises from the *Vestibulum*, turns bending upwards, and after it has described a little more than Half a Circle, and has got as far as the Middle of the back Part of the *Os Petrosum*, it is joined to the lower Canal, as will presently appear. The *lower* again rises from the Bottom of the *Concha*, and after it has described a little more than Half a Circle, it is joined to the *upper* one, as has just now been said. Therefore these two Canals are plainly united into one, which running obliquely, ends in a common Orifice in the *Concha*. The *middle Semicircular Canal* has two separate Orifices, and describes no more than Half a Circle. The internal Surface of these Canals is very smooth; they are for the most Part round within, and sometimes inclined to an oval Figure.

In that Side of the second *Porch* of the *Labyrinth*, which is opposite to the *three Semicircular Canals*, and is the most internal, is situated the
other

other Apartment of the *Labyrinth*, called the *Cochlea*. I divide the *Cochlea* into two Parts, the first of which retains the Name of *Cochlea*, and has a Cavity which can easily admit a pretty large Lentil; and the other Part is called the *Semi-oval Spiral Canal*. That Portion of the *soft Auditory Nerve*, which is distributed through the *Cochlea*, being removed, you may observe a bony Substance connected to the Middle of its Basis, of about a Line long, of a *Spiral Figure*, and something pyramidal, and therefore is called the *Pyramidal Nucleus* of the *Cochlea*. This *Nucleus* of the *Cochlea* about its Middle lateral Part, and inwards with regard to the Head, rests upon a thin pellucid bony Plate, which partly makes the Margin of the Orifice of the *Semi-oval Spiral Canal*, and partly makes the inner Side of the second Turn of the *Spiral Lamella*, which winds about the *Pyramidal Nucleus* just now mentioned; so that the second Turn of this *Spiral Lamella* is partly bony, and partly nervous. In the Middle of the Structure of the *pyramidal Nucleus*, there is dug out a *Foramen*, which is very observable. In Adults, not far from the Top of this *Nucleus*, may be observed a very slender bony Prominence, somewhat round, and about a Quarter of a Line broad, adhering to the internal Surfaces of the *Cochlea*, which therefore I call the *orbicular Apophyse* of the *Cochlea*. There is a small Cavity dug out in the Middle of the Bone, which forms the Extremity of the *Cochlea*. The whole internal Surface of the *Cochlea* is very smooth, and when examined with a Microscope, it appears perforated with a great many small *Foramina*, especially in that Part which surrounds the Basis of the *Pyramidal Nucleus*. The second Part of the *Cochlea* is the *Semi-oval Spiral Canal*, as we observed above, which is stretched from the Basis of the *Cochlea*, where it has its Beginning, to the upper Part of the first *Porch* of the *Labyrinth*, and to the *Chink* which is formed in the Basis of the second. It has a *Semi-oval Spiral Cavity*, a little broader towards its Extremity than at its Beginning. The *soft Medullary Portion* of the *Auditory Nerve*, which is spread within the *Cochlea*, being removed, you may observe a very thin bony Process, which reaches from the internal Side of the Basis of the *Pyramidal Nucleus* of the *Cochlea*, as far as the Extremity of the same *Nucleus*. This bony Process, as it is very thin and narrow, I call the *bony Line* of the *Semi-oval Spiral Canal* of the *Cochlea*. All the internal Surface of this Canal is perforated with a great many *Foramina* and extremely smooth, as I said before, if you except that Part of it, where the bony Line, just now described, is prominent.

The *soft Portion* of the *seventh Pair of Nerves* is larger than the *Portio Dura* or *hard Portion*, as it is called, though it receives much fewer *Medullary Fibres* than the other from the *Articular Process* of the *Brain*. As soon as it has entered the Cavity of the Ear, it divides into three Branches, *viz.* the *upper*, *lower*, and *middle*. The *upper Branch* enters the Cavity of the *Concha*, by a *Foramen* peculiar to it in the upper Part of the *Concha*, and there it is spread out into a very fine, thin, soft Membrane, which lines all its Surface. But there is one Fibril of it which retains the Figure of a very small Nerve, and adheres to this small, sharp, bony *Apophyse*, at the Margin of the above-mentioned *Foramen*, which upon Account of its unequal Sur-

face, and being covered with the white nervous Membrane already described, somewhat resembles a small white Crest. That soft, delicate, little Nerve, which is accompanied with a small Artery and Vein running contiguous to it, as soon as it leaves the bony *Apophyse* to which it is connected, is stretched tense like a Rope through the Middle of the *Concha*, till it gets as far as the united Orifice of the *upper* and *lower Semicircular Canals*, to which it adheres, and then entering that Orifice, it is immediately spread out into two very fine Membranes, one of which lines the whole Inside of the *upper Semicircular Canal*, and the other that of the lower. The lowest and least Branch of the *soft Portion* of the seventh Pair of Nerves, after sending off one or two very small insensible Fibrils, which are distributed to that Part of the *Os Petrosum* where the *Semicircular Canals* lie, enters by a small *Foramen* into the lower Part of the *Concha*, and there being spread out, it spends itself in forming that thin Membrane which lines the inner Surface of the *Concha*, as was said above, excepting only a very small Portion of it, which enters the Middle *Semicircular Canal*, by a *Foramen* a little below this common Orifice above-mentioned, and there is expanded into a very fine Membrane, lining all the internal Surface of this Canal. Those delicate, thin Membranes, which line internally the *Semicircular Canals* of the *Labyrinth*, are provided with a great many very small Blood Vessels, for the most Part not to be discovered by the Eye, seeing they contain only a very small Quantity of Blood within their slender Cavities. These subtle Membrane, being moistened with a limpid attenuated spirituous Fluid, especially in young Children, are so very soft, that it is scarce possible to touch them with any Instrument, though ever so slightly, without tearing them. Besides, if you expose them to the Heat of the Sun Beams, they dry immediately, and become so brittle, that if you disturb their Situation, they divide into little Bits, crumble, and fly away in a very fine Powder. That limpid spirituous Fluid too, with which these Membranes I said were perpetually moistened, and which seems to be nothing else than the animal Spirits somewhat condensed here by the natural Coldness of the Part, flies off in a Moment, upon opening the *Semicircular Canals* of the *Labyrinth*, which I have found full of it in new-born Infants. But this could not happen, if the five Orifices of the *Semicircular Canals* of the *Labyrinth*, which open into the *Concha*, were not naturally shut up by this nervous Membrane above described. And I make no Doubt but this Fluid enters insensibly the Pores of the nervous Membrane of the *Concha*, and hinders it from becoming too dry, thereby preserving it in a proper Tone for exciting Sound. From what has been said it is plain, that the *Chink* in the Basis of the *Concha*, the *Fenestra Ovalis* and the five Orifices of the three *Semicircular Canals* of the *Labyrinth*, are all shut up by that thin nervous Membrane which lines the Cavity of the *Concha*, as I said above.

The *Middle Branch* of the *soft Portion* of the seventh Pair of Nerves, near that Part of the *Os Petrosum*, which is the Basis of the *Pyramidal Nucleus* of the *Cochlea*, sends off a Number of Fibrils, which as soon as they enter the *Cochlea*, accompanied with very small Arteries and Veins, change their

their Form, and are disposed and distributed in the following Manner. In the first Place, that thin Coat which they had from the *Pia Mater*, is so unfolded, as to end in a very fine Membrane, well stored with Blood Vessels, which first covers the Surface of the Basis of the *Pyramidal Nucleus* of the *Cochlea*, and every Thing contained in it, as far as the *second Turning* of the *Spiral Lamella* of the same *Nucleus*. After this it is continued into the *Semi-oval Spiral Canal* of the *Cochlea*, and expanded so as to shut up its Extremity, and line not only its whole internal Surface, but likewise both Sides of the *Spiral Lamella*, just now mentioned. But this Membrane, being of an extreme thin Texture, does not hinder the *Æther* from passing constantly and quickly from the *Tympanum* into the *Labyrinth* and all its Recesses, although it shuts up the Extremity of the *Semi-oval Spiral Canal* of the *Cochlea*, as has just been observed. Hence I said before, that it went to the *Labyrinth* in the Cavity situated behind the *Gate*. As to the *Medullary Substance* of the nervous Fibrils of which we are now treating, one *Portion* of it goes to form the *second Turn* of the *Spiral Lamella*, which winds about the *Pyramidal Nucleus* of the *Cochlea*, the inner Side of which *Turn* is intirely bony, as I already hinted. The *other Portion* again goes first to form the Beginning of the *Spiral Lamella*, which does not become quite nervous till towards the *Middle* of that *Turn*, and being continued on to the *Semi-oval Spiral Canal* of the *Cochlea*, it ends in a *nervous Spiral, Semi-oval Lamella*, which is placed there, and adheres by its thicker Edge to the bony Line within this *Canal*. So that the Beginning of the *Spiral Lamella* of the *Pyramidal Nucleus* of the *Cochlea*, is likewise the Beginning of the *Semi-oval Spiral Lamella*, just now described. But this *Spiral Semi-oval Lamella*, being continued to the further End of the *Canal* in which it is contained, adheres by its Extremity which is become a little sharpened, to the Middle Part of the *Chink* in the Basis of the *Concha*, and therefore it divides that *Canal* into two Parts, which have no sensible Communication with one another. These two Parts of the *Spiral Semi-oval Canal* of the *Cochlea*, are so disposed, as that the first, which is placed inwards, has a Communication with the first and second *Porches* of the *Labyrinth*; and the second, which is placed towards the *Tympanum*, and consequently outwards, communicates only with the *Concha*. The Middle Branch of the *soft Portion* of the *seventh Pair of Nerves*, having sent off the slender Fibrils already described, enters a small *Foramen* in the Middle Substance of the *Pyramidal Nucleus* of the *Cochlea*, accompanied with a small Artery and Vein, and as soon as it has got out there, its Coat from the *Pia Mater* is spread out so as to line whatever is contained from the *second Turning* of the *Spiral Lamella* of the *Pyramidal Nucleus* of the *Cochlea*, which, as I said above, is partly bony and partly nervous, as far as the Extremity of the same *Cochlea*. Its *Medullary Substance* again ends in the *third Turning* of the *Spiral Lamella*, just now mentioned, which rests upon its Circumference, and adheres to the *Orbicular Apophyse* of the *Cochlea*. The last Part of it is expanded into a fine Membrane, which being gathered in on all Sides, as it were, is applied and adheres to a small *Fovea* dug out in the Middle of the Extremity of the *Cochlea*, and so forms a small Cavity resembling

resembling a blind Pouch, in which nothing but innate Air is included.

From what has been said it appears, that the *Spiral Lamella* within the Cavity of the *Cochlea*, consists only of two whole Turnings and a Half, which are distinguished from one another by small Cavities filled with innate Air, and do not sensibly communicate together. Here it must be observed, that the *Spiral Lamella* which winds about the *Pyramidal Nucleus* of the *Cochlea*, and the *semi-oval Spiral Lamella* confined within the *Semi-oval Spiral Cavity* of the same *Cochlea*, as also the three very fine nervous Membranes lining the internal Surface of the *Semicircular Canals*, are all moistened with a very limpid spirituous Fluid, especially in new-born Infants, which is visible upon first opening the *Cochlea*, but immediately dissipates. But the *inner Medullary* and true nervous Substance of the above *Lamella*, dries very soon, and becomes very brittle, if exposed a little while to a warm Air, as before observed.

What I have just now said concerning the *soft Branch* of the seventh Pair of Nerves, makes it to me seem very clear, that the *two Spiral nervous Lamelle* above described, together with the slender nervous Membranes lining the *Concha* and the *three Semicircular Canals*, constitute the immediate compleat Organ of Hearing; so that according to the different Motions excited in the animal Spirits contained within the Pores of these Membranes by the Objects of Sound, and communicated to the *Sensorium Commune*, there will be produced different Ideas of Sound in the Mind.

XIX. 1. M. Du Verney hath observed that the Cavities of the Nose are filled with many cartilaginous Laminæ, distinct one from another; every Laminæ being divided into many others, all folded almost into a Spiral Line: And that the *Os Cribrosum* is made up of the Extremities of these Laminæ, which butt upon the Root of the Nose, the Holes wherewith it is pierced, being the Intervals between the Laminæ. They are designed to uphold the inner Tunick of the Nose; which Tunick, being a principal Organ of Smelling, hath received from Nature a very great Expansion, being folded round about together with these Laminæ, that by this industrious Mechanism she may employ all its Length in a very little Room. This Tunick is filled with an innumerable Company of small Rays, so many Branches of Arteries and Veins, and especially Nerves, by which it hath a most exquisite Sense: By its great Expansion, a greater Number of the subtle Particles of odoriferous Bodies strike it at the same Time, and so render their Impression more strong; and by the Labyrinth, made by the Windings of the *Lamelle*, they are arrested, and make a longer Stay before they pass off from thence into the Breast. For the same Reason Nature has furnished the said Tunick of the Nose with a great many small Glands, which open thereinto, and so moisten it with a thick and slimy Exudation, the better to intangle the dry odoriferous Particles.

This Tunick being compared in several Animals shews much of the Reason of the Delicacy of Smelling in some, above what it is in others.

For look how much a finer Nose it is that Animals have, they have likewise so much a greater Number of these *Lamellæ*, wherewith the same Tunick is rolled up in so many more Folds. So the Nose of a Hound is better furnished with them than that of any other Animal. The Hare, Fox, Cat, wild Boar, have a considerable Number of them. Those Animals that chew the Cud have fewer. And Man is less provided for than any of the rest.

By ———
Ib. p. 977.

2. Not only the Number, but the Length also of the *Lamellæ*, is of great Use for the Strength of Smelling: For which Purpose most Quadrupeds, which either Hunt, as *Carnivorous*, or distinguish their Food by the Smell, as the *Graminivorous*, have their Nose not placed in the Middle of the Face, as in Man; but prolonged to the very End.

The Original
of a Polypus;
by M. Giles,
n. 226. p. 472.

XX. 1. In June, 1684, I was called to a Patient who had a *Polypus* in the right Nostril. I drew it out without Pain, or any bad Accident: But after this Extraction, she still felt some Trouble in her Nose, and Moisture did pass with Difficulty from the Nose to the Throat. This engaged me, seeing no more in the Nostrils, to look into the Mouth, where I perceived behind the *Uvula*, a strange Body of the Bigness of half a Nut, which I judged to be a Portion of the same *Polypus*; and being encouraged by the Advice of M. *Fede* and M. *Vary*, I pulled it out in their Presence. We found it of an extraordinary Shape, the Piece by which I laid hold of it was hard, and of a dark Brown; it was fastened by two Branches, which seemed to have taken their Shape in the Nose, being each of them as big as a sweet Almond, but their Substance was softer and whiter; it had also a little Stalk, something red, of the Bigness of a Cherry-Stalk. There was not a Drop of Blood spilt, and the Patient felt no Pain in the Operation; all Trouble was removed, and the Liquor passed easily.

By ———
Ib. p. 473.

At the End of two Years the Patient died of a Malignant Fever; and forasmuch as some Time before her Death, she complained of a new Trouble in her Nose, we obtained Leave to open this Organ. After we had broken the Bone, we found nothing in all the Nose but a little Piece of Flesh very soft, which came out of a Cleft of the *Processus Pterygoides*: We followed it exactly, which brought us into the Sinus of the upper Jaw: We broke this Bone also, and perceived in this Sinus a rosy and clear Humour; in the Middle of which there was a Body like in Figure, Consistence and Colour, to a greater one, which we had before taken out: We took Notice also of a little red Speck, which seemed to be the Root of this *Polypus*.

2. The *Polypus's* are spongy Excrecencies, which, according to Authors, are formed upon the Membrane that covers the Nose within, by some Alteration made there: Some are formed also in other Parts, as in the Cavities of the great Veins. But this Membrane is more disposed to the Production of them than others, because it is the most spongy of the whole Body, and most full of Blood-Vessels. When these Excrecencies appear very red and full of Blood, the Extirpation of them is dangerous, for fear of an *Hemorrhagie*, which is not easily stopped; therefore some do use Causticks of several Sorts with good Success.

XXI. 1. *S. Malpighi* hath discovered in the Tongue many little Eminencies, which he calls *Papillary*, and believes to be the principal Organ of Taste. *The Organ of Taste; by S. Malpighi. n. 27. p. 492.*

2. *S. Fracassati* observes, that as the Tongue hath towards its Point many Eminencies, by the Means whereof it goes, as it were, to meet Objects of Taste, so on the contrary, it hath many Cavities towards its Root, wherein it receives them. All which Cavities terminate in Nerves, and seem to serve for Funnel's to convey the Aliment into them: Which maketh the Author think it very probable, that the finest Part of the Aliment passeth immediately from the Tongue into the Nerves; whence it comes to pass that Wine, being only taken into the Mouth, restoreth Vigour presently.

By S. Fracassati, ib.

XXII. All the Glands which furnish Saliva to the Cavity of the Mouth, and all their Excretory Vessels which open distinct into the Mouth, are accurately described by *Steno* in his Anatomical Observations of the Glands of the Mouth. Some of these Glands have only one Excretory Vessel, and some of them have more. Those Vessels which are more numerous, but small, are proper to the Glands which are scattered up and down upon the Cheeks, under the Tongue, in the Palate, and Tonsils. But the larger Vessels, which go out single from the Conglomerate Glands, hitherto at least are only observed to be two, the upper of which rises from the Parotid Gland, and was first found and described by *Steno*; the lower again, which was first delineated by *Wharton*, takes its Origin from the *Maxillary* Gland of the Lower-Jaw. But to these two just now mentioned ought to be added a third, of the same Kind, which I first discovered the thirteenth of *March* 1682. and which likewise deserves to be called inferior, seeing it rises from the Sublingual Gland, accompanies *Wharton's* Duct, and opens under the Tongue in the Place with *Wharton's*, and with an Orifice as conspicuous. For as I was searching in a Calf's Head, with the End of my Probe, for *Wharton's* Duct, designing to prosecute it to its Origin, in the lower *Maxillary* Gland, by Chance the Probe went into another Duct, and discovered something before unknown to me. I imagined that this Duct would lead me to *Wharton's* Gland, but about the Middle of the Tongue, considering it lengthwise, on its lower Part laterally, where *Wharton* says his Duct is covered with the Skin and a glandular Kind of Fat, there this Duct I now describe directed its Course towards another Gland of the Conglomerate Kind, next to those Glands from which the several Ducts, which *Steno* calls sublingual, take their Origin. For that Gland (which in some Animals is placed higher the inferior *Maxillary*, and is pretty large, while in others it is less, and situated more towards the Extremity of the Lower-Jaw) as it is of the same Structure with *Wharton's* lower *Maxillary* Gland, so it has likewise an Excretory Vessel very conspicuous, whose lateral Ducts rising from all the Folliculi of the Glands, terminate in one common pretty large Trunk, which accompanies in a streight Course the Duct described by

A new Salival Duct discovered by Casp. Bartholine, n. 164. p. 749.

Wharton, and opens into the Mouth within the Gums at the Extremity of the Lower-Jaw, between some flat rigid *Papillæ*, adhering strongly to the *Maxilla*.

Such appeared to me first at that Time this Duct with its Gland in the Head of a Calf, and this Observation was afterwards frequently confirmed in other Animals. In a Sheep, the Extremity of this Duct terminates in the *Papillæ* themselves which are under the Tongue in the Lower-Jaw, and near it in the same *Papilla* the Orifice of *Wharton's* Duct appears. In a Bear, each Duct opens in its proper *Papilla*, protuberating near the *Frenum* of the Tongue. In a Lioness, which his Majesty was so good as to indulge us with lately in the Anatomical Theatre, the Orifices of these Ducts terminate at the *Frenum*, but so as each of them has a Kind of small *Frenum* peculiar to itself, which is forced by the internal Membrane of the Mouth. But the Gland from which this Duct which I have discovered rises, in the Lion, is large and of an oblong Figure, one Part of it reaching as far as *Wharton's* Gland; and as it is composed of different Bundles of little Glands, so the different Ramifications coming from them are sent to the common Duct, which is composed of other smaller ones joined together without the Gland, and proceeds in a streight Course to the Termination of *Wharton's* Duct. I observed lately in a Wolf a like Distribution and Termination of the same Vessels, and the Situation and Shape of the Glands almost the same. But to make every Thing plainer about it, I have added two Figures, taken from the Anatomy of a Lioness, shewing the Course as well as the Termination of this Duct.

Explication of
the Figures.
Fig. 6.

Figure first, shews the lower *Maxillary Gland* A, with *Wharton's* Salivary Duct B B, as also the neighbouring sublingual Gland C, with its Salivary Duct D, now first described by me, the various Ramifications of which are seen dispersed through the whole Gland.

Fig. 7.

The other Figure, shews the Orifices of the inferior Salivary Ducts, two of each Side, *viz.* *Wharton's* and *mine*, the Situation of which under the Tongue is marked by the Extremities of the Probes, a a a a, going out by the said Orifices under the Tongue b, which here is pulled up a little from the Lower-Jaw c, that the other Parts may be the better seen.

XXIII. Accounts of Books and Additions omitted.

- n. 22. p. 397. **A** Natome Medullæ Spinalis, & Nervorum inde provenientium; *Gerardi Blasii*. M. D.
- n. 29. p. 553. 2. *Tetras Anatomicarum Epistolarum, Marcelli Malpighii & Caroli Fracassati*, de Lingua & Cerebro; *Bononiæ*.
- n. 64. p. 2081. 3. *Franc. Jos. Burrbi* Epistolæ duæ ad *Thomam Bartholinum*. Hafniæ. 1669. in 4^o.
- n. 174. p. 1144. 4. *Raymundi Vieussens*, M. D. *Monspeliensis*, Neurographia Universalis. Ludg. 1685. in Fol.

5. The Anatomy of the Brain, containing its Mechanism and Phyfiology, together with some new Discoveries and Corrections of antient and modern Authors upon that Subject : To which is annexed, a particular Account of Animal Functions and Muscular Motion ; by *Henry Ridly*, M. D. n. 215. p. 32.

6. Pathologiæ Cerebri & Nervosi Generis Specimen ; in quo agitur de Morbis Convulsivis & Scorbuto ; Studio *Thomæ Willis*. M. D. n. 31. p. 600.

7. *Antonii Molinetti* Dissertationes Anatomicæ & Pathologicæ de Sensibus & eorum Organis ; *Patavii*. 1669. in 4^o. n. 67. p. 2059.

8. Ophthalmographia, sive Oculi ejusque partium Descriptio Anatomica ; cui accessit Nova Visionis Theoria, *Regiæ Societati Lond.* proposita per *Guil. Briggs*, M. D. Editio altera. 1685. in 8^o. *The Theory of Vision, and the Continuation of that Discourse, were at first inserted in these Papers in English : But the Author, a few Years after, translated them into Latin, and annexed them to his Ophthalmograpia (in this Second Edition) to which they properly belong.* n. 129. p. 746. n. 175. p. 1126. Ph. Col. n. 6. p. 167. n. 147. p. 171.

9. 1. A new Discovery touching Vision ; in an Epistle of the Discoverer *M. L'Abbé Mariotte* of Lyons to *M. Pecquet*, and the Answer to it. *The Substance of both is here inserted in English.* n. 35. p. 668.

2. The Answer of *M. Mariotte* to *M. Pecquet*, about the Opinion that the *Chorooides* is the principal Organ of Sight ; *Englisbed and inserted here.* n. 59. p. 1023.

3. *M. Mariotte* of Vision.

4. Two Letters of *M. Perault*, and *M. Mariotte*, concerning Vision. *Paris*, 1682. n. 74. p. 2217. n. 149. p. 265.

10. *Traité de l'Organe de l'Ouie* par *M. du Verney*. *Paris*, in 8^o.

11. *Gustus Organum*, per *Laurentium Bellini*, novissimè deprehensum. *ib. p. 259.* n. 20. p. 366.

12. *Ant. Nuck* de Ductu Salivali novo, Saliva, Ductibus Aquosis, & Humore Aqueo. *Lugd. Bat.* 1686. n. 177. p. 1244.

C H A P. III.

The N E C K. *The* T H O R A X.

I. **S**itting in some Company, and having been but a little before Musical, I chanced to take Notice that in ordinary Discourse, Words were spoken in perfect Notes, and that some of the Company used Eighths, some Fifths, some Thirds ; and that his Discourse which was most pleasing, his Words, as to their Tone, consisted most of Concords ; and where of Discords, of such as made up Harmony. The same Person was the most affable, pleasant, and the best natured in the Company. This suggests a Reason,

A Conjecture at Dispositions from the Modulations of the Voice ; by ————
n. 140. p. 1011.

son, why many Discourses which one hears with much Pleasure, when they come to be read scarce seem the same Things.

From this Difference of Musick in Speech, we may conjecture that of Tempers. We know the *Dorick Mood* sounds Gravity and Sobriety; the *Lydian*, Buxomness, and Freedom; the *Æolique*, sweet Stillness, and quiet Composure; the *Phrygian*, Jollity and youthful Levity; the *Ionique* is a stiller of Storms and Disturbances arising from Passion. And why may we not reasonably suppose, that those whose Speech naturally runs into the Notes peculiar to any of these *Moods*, are likewise in Nature hereunto congenerous? So also from the *Cliff*; as he that speaks in *Gamut*, to be Manly; *C Fa ut*, may shew one to be of an ordinary Capacity, though good Disposition; *G Sol Re ut*, to be peevish and effeminate, and of a weak and timorous Spirit; *Sharps*, an effeminate, *Flats*, a manly, or melancholick Sadness. He who hath a Voice which will, in some Measure, agree with all *Cliffs*, to be of good Parts, and fit for Variety of Employments, yet somewhat of an inconstant Nature. Likewise from the *Times*; so *Semibriefs* may speak a Temper dull and flegmatick; *Minums*, grave and serious; *Crotchets*, a prompt Wit; *Quavers*, Vehemency of Passion, and Scolds use them; *Semi-brief-Rest* may denote one either stupid, or fuller of Thoughts than he can utter; *Minum-Rest*, one that deliberates; *Crochet-Rest*, one in a Passion: So that from the natural Use of *Mood*, *Note* and *Time*, we may collect Dispositions.

An Argument
for the Use of
Laryngoto-
my: by Dr.
William Mus-
grave. n. 258.
p. 398.

II. *Laryngotomy* is highly to be valued, for that in the greatest Extremity, when a Man is in most imminent Danger of Suffocation, and to all Appearance within a very few Minutes of his last, by opening a new Passage for Breath, it gives speedy and certain Relief, and this when all other Methods fail, and without any considerable Injury from the Instrument. The Patient in a Minute or two is brought from the Struggles of Death to a State of Complacency, Ease and Security. In the large Field of Practical Physick, perhaps, there is not any one Method that works so great a Change, for the better, in so short a Time. But we find this Operation very seldom practised, because that Gap which appears on the Cutting a Throat (the divided Parts being then drawn to their other more fixed Ends) together with the great Efflux of Blood, when the Jugulars and Carotid Arteries are also wounded, create in most Men a Dread of this butcherly Operation, and make those, especially, who are unacquainted with Anatomy, suspect all Wounds of the *Trachea* as mortal, and oppose *Laryngotomy* under all the most urgent Circumstances.

But to wipe off this Prejudice, it may be affirmed that *Laryngotomy* is allowable, and ought to be put in Practice in violent *Quinsies*, and other Dangers of Suffocation from Causes of a like Nature with them. For that the Wound is curable (notwithstanding the Authority of the *Encyclopædia Chirurgica* to the contrary) will appear by the following Relation sent by Mr. *J. Keen* of *Roche* in *Cornwall*, the Chirurgian who performed the Cure.

Nicholas

Nicholas Hobb of *St. Endor* in *Cornwall*, aged 63, or thereabout, was sometime in *March* 1696, at a Distance from any House, set on by *Ruffians*, who first, by a Blow on the *Occiput*, knocked him to the Ground; then transected the *Trachea* somewhat beneath the *Pomum Adami*, together with several of the adjacent *Muscles*, and some large *Blood-Vessels*; from which he lost a very great Quantity of *Blood*, seen afterwards lying on the Ground. The *Ruffians* having robbed him, and thinking him either dead, or past all Recovery, left him. After some Time the wounded Man recovers so much Sense and Strength as to thrust his Neckcloth into the large and gaping Wound, and by Degrees to crawl home to his own House. When I had examined the Wound, and considering the great Flux of *Blood*, I was much surprized that the Patient was alive. *Lipotymies* came frequently upon him, especially upon every little Motion of his Body: These were after some Time succeeded by *Convulsions*. The Parts of the *Trachea* were at a vast Distance from each other, the lower Part being on every Turn of Inspiration sunk deep into the Neck, as low as the *Clavicula*, and just appeared upon every Expiration.

There seemed to be no manner of Hopes of his Recovery: However, in order to attempt it, I directed a lusty strong Fellow to hold the Legs of the Patient over his Shoulders, and by this Means raise them, together with the *Abdomen*, above the *Thorax*, *Collum*, &c. in which Posture the divided Parts came so near to each other, that with strong waxed Thread I sewed together several of them; but as to the Divisions of the *Trachea*, I secured them together by passing large Needles deep into the Flesh on each Side; and twisting strong waxed Thread about them, as in *Labio Fisso*. Over all, for greater Security, I applied a Restrictive (*ex Pulv. restrin. Clowes*) covering the greatest Part of the Neck with a Defensative *ex Bolo cum Albumine Ovor.* advising the Patient to lie as quiet as he could. The Patient now begins again to speak, and as well as the Cough, Difficulty of Breath, and his Weakness would allow, softly, and with a low Voice, gives an Account of the Occasion as above.

An *Arteriac* was then made up for him (to smooth the *Trachea*, and promote Expectoration) *è Troch. Pectoral. Batean. (in Aq. Stephan. ℥ss Solut.) ℥iij. Syr. Tussilag. ℥j.℞. Balsamic. ℥j. Pulv. Anis. Glycyr. ana ℥j. Balsam. Sulphur. Terebintib. ℥ss. Peruv. Gut. vi. cum Mellis opt. despumat. q. s. fiat Linētus per Bacillum Glycyr. sæpius adhibend.* From the Use of which his Cough abated, and he discharged by Expectoration much grumous Blood and other Matter. As to the *Convulsions* and *Lipotymies*, I applied to his Nostrils *Spir. C. C. Succin. &c.* and embrocated the back Part of his Neck with a Liniment *ex Ol. Lil. Alb. ℥j. Tereb. Succin. ana ℥i. N. M. ℥ss Ung. Nervin. ℥vj. Mis.*

The next Day I found the *Convulsions* had left him; nor had he from that Time any Return of them, or of the *Syncope*. But on the 4th Day the Stitches were torn open, the Wound appeared large enough to admit a middle siz'd Hand; a great Part of the *Oesophagus* appeared in View much inflamed and scratched by the Instrument. The *Epiglottis* did not, as usual, cover the *Rima* of the *Larynx*, so that I could easily see up into the Mouth,

Part of the *Annular Cartilage* was cut obliquely, and hung only by a little Fibre to the upper Part of the *Larynx*, &c. Indeed I met with frequent Ruptures, the waxed Thread and Needles often fretting through the Flesh they held; but I as often repeated the Stitches in the same Manner and Method as before. About the 10th Day, the largest Blood-Vessels appeared conglutinated and covered with new Flesh; the *Gula* of good Aspect, the Inflammation of that and all the neighbouring Parts gone. I now dressed with *Liniment. Arcei*. On the 11th Day, the Symptomack Fever was in a Manner gone, and the Wound under the Circumstances of good Digestion. In the mean Time the Diet, when he could swallow, was of Mutton-Broth, Ale-Meat, Poach'd Eggs. The Cough continuing a long Time very severe, was at length overcome by duly adhering to the *Linctus* aforesaid, with repeated Boles of *Balsam. Lucatel. Conf. Rosar. Rub. Horâ Somni*, with a Draught of a Pectoral Decoction, used also instead of common Drink. To mitigate the Violence of it, and procure him Sleep, the following *Haustus* was frequently used, and never failed our Expectation. *R. Ol. Amygdal. Dul. rec. Express. ʒʒ. Syr. de Mecon. ʒvi. Laud. Lond. (Aq. Step. ʒij. Solus.) gr. ij. fiat Haustus Horâ Somni Sumendus.*

About the 11th and 12th Days, we plainly discovered little Portions of new Flesh arising, not only from the carneous Membrane incumbent on the Gullet, but also out of the Substance of the Cartilages themselves, both on the upper and lower Parts of the divided *Trachea*. The external, containing Parts of the Neck, began now to unite by Incarnation; new Flesh arising, and apparently lessening the Dimensions of the Wound, every Time there was a Laceration of the Stitches, insomuch that two Needles were now sufficient, whereas I used in the Beginning not less than six. And those carneous Portions, both of the *Trachea* and exterior Parts, gradually joining and intermixing, became one solid *Cicatrix* from each End of the Wound almost to the Middle of the Wind-pipe, where the Air continued in some Degree to have an Exit. About the 15th Day I removed several Pieces of Bones which had contracted a *Caries* in the *Cartilage* (which in this old Man, as in many others, was grown *Osseous*) and were thrust out by the new Flesh. He now swallows with little Trouble, eats sufficiently, and nourishes in Proportion. The Aperture about the 26th Day was almost closed up, and in 4 or 5 Days more the Sides of the Wound were perfectly joined and *cicatrised*, the *Trachea* performing its Part in Respiration, as at other Times, without any considerable Inconvenience. He speaks indifferent well, but is forced to take Care in swallowing, the *Rimula* not being exactly shut as before the Wound, which makes Liquor of any Sort more apt to fall into the *Canal*, and so cause a Cough, Hoarseness, &c. He does not swallow dry Meats as well as formerly, but in all other Respects is as well as ever.

*The Structure
of the Lungs;
by M. J.
Templer.
n. 86. p. 5031.*

III. Having blown into the *Aspera Arteria* of Fowls, I observed Continuation of many Vesicles, extended from the *Bronchie* through the *Abdomen* to the *Anus* (which I conceive to be the Cause of the constant Motion of the *Anus* in Fowls, the Air having Ingress and Egress there) I thence conjectured

conjectured the Substance of the *Lungs* to be a Complication of a Multitude of Vesicles with the sanguineous Vessels. And in this Opinion I thought myself confirmed, by blowing into the *Aspera Arteria* of Quadrupeds, when I had cut off Part of the exterior Membrane of one *Lobe* of the *Lungs*, and found the *Lungs* to rise with unequal Protuberances, not unlike Bladders. But the following Experiment hath much shaken that Conjecture.

Mar. 2. 167 $\frac{1}{2}$, I made a Ligature about a Dog's Neck, and opening both the jugular Veins with a pretty large Orifice, I let him bleed to Death, to prevent being overcharged with coagulated Blood. Immediately I opened the *Thorax*, and tying the *Vena Cava*, with all the Passages from the left Ventricle of the Heart, or its *Auricula*, I cut the *Lungs* with the Heart and *Aspera Arteria* entirely out. To the *Aspera Arteria* I fitted a Syphon, and fastened it with a strong Binding of Packthread. This done, I blew up the *Lungs*, and fitting a Cork to the End of the Syphon, I hung them in a Chimney to dry. In a quarter of an Hour they subsided about a sixth Part; whereupon I ordered a Person to watch them, and to blow them up as oft as they subsided: Which Course continued, they would not the next Morning subside a fourth Part in three Hours. And (excepting 3 Quarters of an Inch Distance from the Circumference of the *Lobes*, where the Thinness of the Substance of the *Lungs* gave the external Heat the Advantage of a sudden Passage, and quick Dispatch of drying those Parts least furnished with Moisture) I did not perceive, making a proportionable Allowance for the drying of the whole Substance of the *Lungs*, any considerable subsiding in two Days more. But upon the blowing in at the Syphon (whose Ligature I was now forced to renew) I could easily feel the Air to pass through the external Membranes, both on the convex and concave Sides, towards the Extremity of the Circumference of the *Lobes*; but most abundantly on the concave Side.

Mar. 5. I carefully cut off one of the *Lobes*, and the inward Structure seemed like a Cane or dried Flag when transversely cut; and upon blowing in at the Syphon, I fancied the Air to come equally out of all the Pores I had exposed to View. Whereupon I fixed Spittle in several Places, and upon fresh blowing found Multitudes of Bubbles made in the denudated Parts of the *Lobe*. Immediately I made a deep transverse Incision into that *Lobe*, and blowing in at the Syphon, I found the Air to come so freely out at the larger Ramifications of the *Bronchiæ*, that I could not give the *Lobe* a considerable Rise with a strong Blast: Yet upon stopping with my Fingers the larger Passages of the *Bronchiæ*, which I had cut, I found that *Lobe*, upon a fresh Blast, considerably to arise with unequal Protuberances (where the Incision was made) giving no small Suspicion of some latent Vesicles. Hereupon I tied that *Lobe* above the Incision, and taking off Part of the external Membrane of another *Lobe* (having first tied up all the rest of the *Lobes*) I poured Water into the Syphon, and applied a strong Blast, in hopes to have the Water come forth in Streams at all the Pores; but that did not satisfactorily succeed, it coming out in a confused Irroration of the external Surface, without any Ebullition, unless at the larger Ramification

of the *Bronchiæ*. Then I tied up this second *Lobe*, and untied a third, pouring in an Ounce of the *Oil of Turpentine*; at the *Syphon* I gave a small Blast, and corked it up. Two Hours after I took off the small Membrane of that *Lobe*, and upon a gentle Blast at the *Syphon* found an Ebullition of infinite little Bubbles.

March 10. (having continued it to the Chimney) I cut all their *Lobes* in Pieces by different and various irregular Incisions; whence I could easily observe the several Ramifications of the aerial and sanguineous Vessels, with their Continuation to the Circumference of the *Lobes*, and a proportionable Diminution as they were at a further Distance from their Original.

Shall I hence conclude the Structure of the *Lungs* to be a Complication of a Multitude of the Ramifications of the *Bronchiæ* and sanguineous Vessels? And that the seeming Vesicles were occasioned only by the Violence of the Blast, and the Driness of the extreme and smallest Passages of the aerial Vessels; whereupon, those nearest to the *Bronchiæ* (being moister) were, more than their ordinary Proportion, extended, upon Hindrance of a free and usual Passage to the Air in the lesser Vessels or their Extremities?

An Experiment concerning the Manner of Respiration; by Dr. Richard Lower, n. 29. p. 554.

IV. Pierce the Side of a Dog between the 6th and 7th Rib in the Middle of the *Tborax*, just over against the Region of the *Heart*, with a small Incision Knife, passing the Knife but just into the Cavity of the Breast (which you may justly know by finding no Resistance to the Point of it) then take it out, and put in a Director, or a small Quill made like it, and thrust it in about an Inch, directing the End of it toward the *Sternum*, close to the Inside of the Breast. Then cut upon it about an Inch on the *Intercostal* Muscles; by which you may be secured from touching the *Lungs* with the Point or Edge of your Knife. This done, put in your Finger, and with your Nail separate the *Nerve* which passeth along the Side of the *Pericardium* toward the *Diaphragme*. Then put in a Probe, a little inverted at the End like a Hook, and apprehend the *Nerve*, and pull it to the Orifice of the Breast, and cut it off, and sew the Hole up very close. Do the same on the other Side, and presently let the Dog loose, and you will plainly see him draw his Breath exactly like a Wind-broken Horse.

The most obvious Observations from this Experiment are, 1. That the whole Manner of Respiration is quite altered. For as in a sound Animal, in Inspiration, the Belly swells by the lifting up the Bowels by the Contraction of the *Diaphragme*; and in Expiration the Belly falls by the relaxing of the same: In a Wind-broken Dog, or Horse, 'tis quite contrary; for in them it is to be seen plainly, that when they draw their Breath their Belly is drawn in very lank and small, and when they breath out, their Belly is relaxed, and swells again. 2. The *Lungs* not moving of themselves at all, but all Inspiration being made by the Dilatation of the *Tborax*, and that Dilatation being caused partly by the *Intercostal* Muscles drawing up the Ribs, and partly at the same Time the *Diaphragme*, by its Contraction, drawing downward the lower small Ribs to which it is joined, and also lifting up the *Viscera* of the lower Belly, by which they do jointly

make

make all the Space they can for the Air to come in and distend the *Lungs*, it must hence necessarily follow, that where one ceaseth from its Work, the other, for the Exigence of Nature, must take more Pains to supply the other's Defect. So that the *Diaphragme* being made useles, by loosing its *Nerves*, the *Intercostal* Muscles do dilate the Ribs much more than formerly, even to the utmost Distance they can, when there is need for it; as when you make the Dog run a little after he is cut, or when you gallop a Wind-broken Horse, doth manifestly appear. 3. The Manner of Respiration being the same in a Dog, whose *Diaphragme Nerves* are cut, and in a Wind-broken Horse, 'tis more than probable, that the Cause may be as nearly the same as the Signs are, and that (for the most Part, if not always) they have their Occasion from the Relaxation or Rupture of the *Nerves* of the *Diaphragme* at first.

V. I formerly tried an Experiment of keeping a Dog alive, after his *Thorax* was all displayed by the cutting away of the Ribs and *Diaphragme*; and after the *Pericardium* of the Heart also was taken off. But divers Persons seeming to doubt of the Certainty of the Experiment, I caused it to be repeated at a Meeting of the *Royal Society* with the same Success, the Dog being kept alive by the reciprocal blowing up of his *Lungs* with Bellows, and then suffered to subside for the Space of an Hour or more, after his *Thorax* had been so displayed, and his *Aspera Arteria* cut off just below the *Epiglottis*, and bound on upon the Nose of the Bellows.

The Dog having been thus kept alive above an Hour (in which Time the Trial was often repeated, in suffering the Dog to fall into convulsive Motions, by ceasing to blow the Bellows, and permitting the *Lungs* to subside and lie still, and of a sudden reviving him again by renewing the Blast, and consequently the Motion of the *Lungs*) I caused another Pair of Bellows to be immediately joined to the first, by a Contrivance I had prepared, and pricking all the outer Coat of the *Lungs* with the slender Point of a very sharp Pen-knife, this second Pair of Bellows was moved very quick, whereby the first Pair was always kept full, and always blowing into the *Lungs*; by which means the *Lungs* also were always kept very full, and without any Motion, there being a continual Blast of Air forced into the *Lungs* by the first Pair of Bellows, supplying it as fast as it could find its Way quite through the Coat of the *Lungs*, by the small Holes pricked in it, as was said before. This being continued for a pretty while, the Dog, as I expected, lay still, as before, his Eyes being all the Time very quick, and his *Heart* beating very regularly: But upon ceasing this Blast, and suffering the *Lungs* to fall and lie still, the Dog would immediately fall into dying convulsive Fits; but he as soon revived again by the renewing the Fullness of his *Lungs* with the constant Blast of fresh Air. Towards the latter End of this Experiment a Piece of the *Lungs* was cut quite off; where it was observable, that the Blood did freely circulate, and pass through the *Lungs*, not only when the *Lungs* were kept thus constantly extended, but also when they were suffered to subside and lie still. Which seem to be

*A Supply of
fresh Air ne-
cessary to Life;
by Dr. R.
Hook, n. 28.
p. 539.*

Arguments, that as the bare Motion of the *Lungs*, without fresh Air, contributes nothing to the Life of the Animal, he being found to survive as well when they were not moved as when they were; so it was not the Subsiding or Movelessness of the *Lungs* that was the immediate Cause of Death, or the Stopping of the Circulation of the Blood through the *Lungs*, but the Want of a sufficient Supply of fresh Air.

The chief
Use of Respiration;
by Dr. Will. Mufgrave. n. 240.
p. 178.

VI. Dr. *Thruston* asserts the chief Use of *Respiration* to consist in maintaining a due Motion of the Blood; but the Arguments he produces to make out his Assertion seeming to me insufficient, I pitched upon the following Experiment, which I hope will be decisive of that Matter.

I took a large, middle-aged, healthy Dog, and, having freed the *Trachea* from the adjacent Parts, cut it off just beneath the *Pomum Adami*, and turned the loose End outward. After some Time allowed him to recover the present Concern, with a Cork, got ready on Purpose, I stopped up the *Trachea*, binding it close to the Stopple. Some few, but violent Struggles succeeded, in which the *Sternum* was raised, as in the deepest Inspiration; and thus he died. From the Stoppage of his Breath, to the last Motion I could discern in any Part of his Body, was, from a Watch, observed to be the Space of two Minutes. I then immediately threw open the *Thorax*; where I saw the Blood stagnating in the *Lungs*; the *Arteria Pulmonaris*, the right *Ventricle* of the *Heart*, with its appending *Auricle*, and the two great Trunks of the *Cava*, distended with Blood, to a Degree excessive; the *Vena Pulmonaris*, left *Auricle* and *Ventricle* of the *Heart*, in a Manner empty; not containing (as near as I can guess) more than one Spoonful of Blood.

This Experiment proves, That *Respiration* promotes the Passage of the Blood through the *Lungs*; and in Bodies full of vigorous Blood, it is, on this Account, of perpetual Necessity. This Acceleration of the Blood in that Passage, seems to be the principal Use of *Respiration*; no other is of such Consequence to Life, or stands in Competition with it.

A Polypus of
the *Lungs*; by
Mr. Robert
Clark.
n. 235. p. 779.
Fig. 8.

VII. A poor Man (a Taylor by Trade) has been ill by Times these 4 Years, but for 3 Years last past, has frequently coughed up something of the Similitude expressed in the *Figure*. He coughs them up after a continued Coughing of almost half a Day or Night, and knows when they come, at the first feeling great Pains round his Chest; he has voided Hundreds of them, and all alike, though some are a great deal bigger, and many less than the Description. They do not seem, he saith, to have Life; but he has pressed a Sliminess out of the Body, and so through that Part which seems to be the Head. This had a great many more Fibrils, towards the latter End than I expressed, and seemed to be very Nervous. He is now very Meager, and complains of great Pains about his Chest and back Part answerable to it.

By Dr. Ly-
ster. *ib.*
p. 780.

2. These are figured in the remoter and deeper Branches of the *Aspera Arteria*; and therefore so difficult to get up. They are nothing else but the viscous Excretions of the small Glands, hard baked in those Molds, whose Form they receive; and may, if we strain a Metaphor, be called *Polypus's* of the *Lungs*.

3. A Boy of 5 Years old died at *Kensington* of a *Consumption*. A Year before he died he was troubled with a dry Cough, which continued ever since, spitting now and then a little Quantity of Blood; 10 or 12 Days before he died, his Nurse took Notice of some thick Skin, as she said, he spit out. His Physician having examined one of them, found it had the Consistence and Shape of a Vessel, which made him think it might perhaps be some Vessel of the *Lungs*. The Child being dead, I opened the Body, and found the *Omentum* quite destitute of Fat; so were likewise all the Parts of the Body; the Glandules of the *Mesenterium* were hardened and blackish. In the left Side of the *Lungs* I found a little purulent *Sanies*: The Inside of the *Trachea Arteria* was incrustated with a slimy Membrane, which I took off from the *Trachea* and the Branches in the *Lungs*, insomuch that that *Pellicula* made a perfect Vessel from the *Larynx* to the very Extremities of the *Bronchies*, of which it came off very easily without breaking either the Trunk or the Branches, just as you see it in the *Figure*. It adhered to the inward Coat of the *Trachea* only by some small Filaments, which were so tender that they broke off easily, which made me think the Production of that extraordinary Vessel was nothing but the mucilaginous Humour, which is continually discharged by the Glandules of the *Trachea*, which being grown more clammy by the Distemper, was reduced to a Kind of Jelly by the Driness of the Air, which Driness not permitting the Spitting it out, incrustated the Inside of the *Trachea* and *Bronchies*, and growing thicker, was at last shaven off, by the violent Fit of Coughing the Child was sometimes taken with, and then was renewed again by the succeeding *Mucus*. This new Vessel would not dissolve in hot Water: The Vessels of the *Lungs*, that is, the *Trachea* and *Bronchies*, the *Pulmonary* Arteries and Veins were as whole as could be.

A Polypus of the Lungs; by M. Bussiere. n. 263. p. 545.

Fig. 9.

This I hope will undeceive those who believe that some Men sometimes spit out the *Blood-Vessels* of their *Lungs*.

VIII. I cut out the Hearts of two *Urchines*, and found the *Systole* and *Diastole* to continue full two Hours, while the Hearts lay upon a glazed, earthen white Plate in a cold Window. The Distance of their *Diastoles* was unequal in Time, but very large for half an Hour, and then sensibly diminishing until they ceased at the two Hours Distance; and would not then be reinforced by a Needle's Point, which for the Half Hour preceding they would answer at any Time. After they had ceased above $\frac{1}{4}$ of an Hour, so as a Needle pricking them caused no Motion; yet upon setting the Plate upon the Hearth in the Chimney, in about two Minutes of Time they began to beat, though but weakly; and upon eight Minutes Continuance they beat freely; and when removed into the Window again, continued their Pulsation, without pricking, above an Hour, and might have done longer, could I have spared my Servant to attend them longer. Peradventure we may hence conjecture at the Cause of *Life* and *Death*: But when shall we say any Animal or Insect is *dead*, if it hath Motion?

The Motion of the Heart; by M. Templer. n. 93. p. 616.

A strange Pericardium; by M. deMortel. n. 58. p. 1184.

A Glandulose Substance found between the Heart and Pericardium of an Ox; by ——— n. 67. p. 860.

IX. 1. We lately met with a Body, which being opened, the Liquor which is contained in the *Pericardium*, or the Bag of the Heart, was found congealed into a Consistence fit to be cut with a Knife, and two square Fingers thick about the Heart.

2. In Octob. 1684, a preternatural Lump of *Flesh* was taken out of an Ox at Oxford. The Weight of the whole Substance, cleared from the little Fat, &c. adjoining to it, amounted to $19 \frac{3}{4}$ lb. It very much resembled a *Heart*; but it was something flatter, and each of the flat Sides made an equilateral Triangle. The *Basis* of this *Cone* of *Flesh* was 2 Foot 7 Inches in Circumference, and a Thread drawn round it Length-ways from the *Basis* to the *Vertex*, came to 2 Foot 9 Inches.

When we had divided it, cutting from the *Vertex* to the *Basis* of the *Cone*, and passing through both the *Ventricles*, and *Mucro* of the *Heart*, we found the *Heart* not to exceed the natural Size: That which was extraordinary about it, being a large *Glandulose Substance* compassing the *Heart* (unless where the Vessels had their Passage) and stretching the *Pericardium* to the Excess before-mentioned. We saw no Liquor in the *Pericardium*, nor indeed was there Room for any; this *Glandulose Substance* taking up all the Space between the *Heart* and *Pericardium*, to both which it grew very fast. It was thickest about the *Basis* of the *Heart*, where it covered the *Auriculæ*, and was $3 \frac{1}{2}$ Inches thick: It grew thinner on both Sides gradually toward the *Mucro*, where it was $1 \frac{1}{2}$ Inch thick. In the *Septum Cordis* a gritty *Sabulose Substance* was found, half as big again as a Walnut. In the Lungs were several *Cystides*, containing Matter more or less fluid: One very large *Cystis* held some Ounces of a Matter not unlike that of a *Steatoma*.

The Butcher who killed this Ox says, the Lungs grew fast to the *Pleura* on both Sides; which he affirms not to have found once in 40 Times in the Cattle killed by him. He says also, that the Ox, though not overburthened with Fat, complained much in Travelling; which is easy to account for, there being not Room for the *Heart* to be distended, as it ought, in its *Diastole*.

A Polypus in the Heart; by Mr. W. Gould. n. 157. p. 537.

X. A poor labouring Man died suddenly at Oxford in the Street. The Vulgar, which alone conversed with him in his Illness, give this Account of him: That he was of a swarthy lurid Complexion: He was afflicted with Fits of the Falling-sickness: An obstinate Quartan Ague of above a Year's Continuance: A deep Jaundice, even to that Degree, which is called the Black, with its constant Consequent, an universal settled ill Habit of Body: A Sense of a hard Load and Pressure at his Stomach (meaning perhaps his Breast, or the upper Part of the Region of the Liver.) He complained much of a very great Shortness of Breath, being almost constantly apprehensive of Choaking; far fetched involuntary Sighings, and prodigious Palpitations of his Heart continually afflicted him: He used to swoon very often; and at length died, according to the Judgment of the By-standers, in the shivering Fit of his Ague, with the Convulsions of an *Epilepsy*, not without Foaming and Frothing at his Mouth. When

When we opened him, the *Liver* upon deep Incisions appeared Bloodless, stuffed throughout like a Bag of Sand with a yellow, gritty Substance: The *Gall-bladder* also was furnished with the like, but of a darker Hue: The *Spleen* was very large, and of too soft and loose a Texture, not much discoloured: The *Omentum* rotten and wasted: The *Membrane* of the *Stomach* extremely flaccid and very thin, appearing black and mortified, and upon taking it out within 24 Hours after Death (though tied at both Ends very close) sent forth such an intolerable sour, rancid Scent, that the strongest double *Aqua fortis* (to which it might be best compared) could not prove so troublesome and offensive to the Smell: The *Lungs* were distended to the uttermost with a purulent Froth: The *Heart* much stretched beyond its natural Magnitude, and of a very flat Figure: The *Veins* of the whole Body were of an unusual and extraordinary Bigness, especially the internal *Jugulars* were strained to above $\frac{1}{2}$ Inch Diameter; *Polypus Concretions* also were found in the larger *Veins* of the Arms, Legs, and other Parts, but that was most remarkable which we found in the right *Ventricle* of the *Heart*, and towards its Apex or Tip firmly radicated, so that no small Strefs was required for the Separation. The Part A, by which it was fixed, was nigh an Inch and half Diameter when fresh taken out, irregularly rough at the Bottom, insinuating many Roots into the *Lacune* or little Cavities of the *Ventricle*, which again by lesier Fibres were fastened to the inner Membrane of the *Heart*. The great Branch B, which ran out into the right *Auricle* was nigh two Inches Diameter at the largest Extreme, and reached no farther than the Infertion of the *Vena Cava*. As for those Branches marked G G, tending to the Arms, how far they grew I cannot assert, not knowing whether they were broke off or no, but the Branches H H H H, &c. tending towards the Head (I well remember) could not be drawn out without some Force, and it is very likely they were broke off at the *Diverticula*, or two round *Sinus's* where the *Jugulars* enter the *Scull*; for the like Concretions were found in the Vessels of the *Brain* to which probably these might be adjoined. The Substance of the whole was plainly Fibrous, resembling a Nerve, and tough while moist (though upon drying, brittle) the Colour white, and was cloathed with a thin Coat, including (in that Part which filled the right *Jugular Vein*) two little black Specks *bb*, of Blood (as we suppose) a long while there coagulated.

Fig. 10.

It is a Question much debated by Physicians, Whether a *Polypus* is produced some considerable Time before, or always immediately after Death?

The Cause and Nature of a Polypus.

Those that contend for their sudden Generation after Death, among other Reasons of less Moment, insist much on the Argument drawn from the tough Skin spreading itself in a short Time, on Blood let out for the Cure of *Pleurisies*, *Peripneumonies*, *Rheumatisms*, violent *Head-achs*, and in Cases of any inward Inflammations; and it seems a good Consequence that the same Coldness and Want of Motion after Death may as easily make the same Product in the Vessels; and it is to be confessed, that such like Concretions have been discovered in *pleuritical* Bodies dissected. But on the other Side it may be urged, that this Appearance is not constant in all Dissections

of

of Bodies so affected, and that very frequently nothing like it has occurred; from whence we have Reason to conjecture, the outward Contact of the Air pressing the Surface of the emitted Blood, or some other external Cause, may have an Interest in forming that Skin; for else why should not the like Concretion proceed constantly in the Blood-Vessels, whence Air is excluded, as well as when the Blood is exposed in a Porringer. Besides, we find that these *pituitous* Bodies scarce ever offer themselves in Dissection of *pleuritical* Persons, but where the *Pleurisy* was complicated with some other long settled Indisposition; so that the Time of their Growth cannot be certainly collected from such Instances: Besides, when they do chance to appear in a single *Pleurisy*, they float loose in the Mass of Blood without fixing to any Part, are of a very lax Texture, without any distinguishable Fibres, and like what covers *pleuritical* Blood in a Porringer, do rather resemble a stiffer Sort of Jelly, or Size almost dried, than any thing of a tough and fibrous Consistence, such as is observed in a *Polypus*.

Anat. Obs. 73. *Kerkringius* asserts it in his own Power to make such Concretions at Pleasure by the known Experiment of injecting Spirit of Vitriol into a Dog's Veins, and observing the quick Coagulation so made, infers that some peccant Acid in the Blood, occasioned by a Disease, may as suddenly produce the same when Life is gone. To this it may be answered, that this artificial *Polypus* is only a kind of grumous and strongly concreted Blood, wholly different as to Colour, Texture and Firmness, from that Substance we here discourse of. But however, if *Kerkringius* was so lucky as to produce one exactly like a true *Polypus* in all Circumstances, though it gives indeed some Light into the Nature of their Cause, yet it does not follow that this Cause must always work its Effect in an Instant, but a longer or shorter Time will be required as the Cause is more or less active. In the mean Time I do not deny, that strange Coagulations have suddenly happened, and Anatomy has often made such Discoveries in Cases of sudden Death; yet even these generally are not to be looked on as Products after Death, but rather the quick inevitable Messengers and immediate Forerunners of it: Such are those Concretions that, upon Dissection, have been found in the Heart and Blood-Vessels of Persons killed by sudden Frights; as also in those that have been quickly dispatched by an unexpected Fit of an *Apoplexy*, a *Cardiacal Syncope*, or a suffocating *Catarrh*, where the coagulative Spirit, like Lightning, strikes through the whole Mass of Blood, and either fixes it and makes it unapt for the Generation of fresh Spirits, or else (if a gross Similitude may illustrate so abstruse a Matter) like what happens to the invisible Steams of Spirit of *Salt Armoniac*, (which will be condensed, grow turbid and visible, at the Approach of the Vapour of Spirit of *Salt* or *Nitre*) the animal Spirits themselves are clouded, altered from their Natures, extinguished, and quite destroyed, by a Mixture of the foreign preternatural *Halitus*. 'Tis not improbable, that by one or both of these Methods the pestilential Effluvia of an infected Air, the *Arsenical* Exhalation of a Damp, and the *Nitro-julphureous* Steam (much like the Scent of Spirit of *Nitre*) arising from burning Charcoal, do often act such sudden and fatal Tragedies:

Tragedies:

Tragedies : For if we reflect on the membranous Substance of the *Lungs*, the infinite Number of Vesicles they are composed of, how that in every assignable Point these Vesicles are adorned with Capillary Blood-Vessels, so that the Point of a Needle every where draws Blood ; if we calculate the inward concave Superficies of the *Lungs*, supposed unfolded and spread out into a Plain, which must needs exceed the outward apparent Convex above an hundred times, and consequently consider the vast Surface of Blood each Moment exposed to the Air : Lastly, if we allow the Ingress of the Air into the Blood upon Breathing, which scarce any now deny ; I say, if we reflect on these Things, it is easy to imagine how suddenly mischievous any coagulated poisonous Steam may prove, since, together with the Air, it will be diffused through all the Blood contained in the *Lungs* at the very Instant of Inspiration, and (whether it be austere or acid, or both, or what other Name Physicians may please to give it) joins itself *per minima* with almost each Particle of Blood, and presently destroys all Fluidity, stuffs the *Lungs* and *Heart* with an immoveable, and almost mortified Mass ; puts a final Stop to the Circulation, and so in a Moment breaks off the Series and Thread of Life. The Concretions that have such surprising Events, we must allow to be suddenly produced, and we may ascribe all, perhaps, to the exceeding Briskness and Activity of the Acid, or what other Quality gave their Origin ; but nevertheless in the Case of lingering Diseases, I think it will be no hard Matter to prove (not to contend that they differ from those already mentioned) that at least they make a slower Progress in their Growth, as proceeding from a less active Cause, and considering the Nature and Consistence of the Bodies themselves, the Diseases and Symptoms that usually accompany them, and the Circumstances of those Dissections that have discovered them, they must needs appear a Work of Time, and by a daily Apposition of new Parts, swell into that strange Bulk and Shape they sometimes obtain.

What Consistence these Bodies sometimes acquire, this above described is a very instructive Instance. The close fibrous Texture, the tough Membrane that covered it, and the two black hard Specks therein included, its strong Adhesion to the *Heart* by little capillary Roots, and other larger Protuberances adapted to all the little Cavities of the *Ventricle*, are Arguments that it was no small Time in growing : And if it happened after Death, how came it to pass that the large Branch *B*, should stop within the *Auricle*, and that nothing of the like Substance should be continued farther into the *Vena Cava*, since the Blood there must needs be as much disposed to such a sudden Coagulation as in the *Heart* ? Lastly, if to these Remarks, we add the Instance *Malpighius* gives of a *Polypus* made hollow by the Current of the Blood, like another new Blood Vessel framed within the natural one : If also we add another round one *Borellus* speaks of, bigger than a Man's Fist, found in the *Aorta* near the *Heart*, consisting of a great many Membranes lying unconnect one upon another, like the Leaves of a Cabbage (a Product, without doubt, of no small Time) we need go no further than the bare Accidents of these odd Bodies themselves to prove their long

Continuance before Death. And the present Subject so demonstrates the Thing, as to leave no place for Doubt: For here we have the *Jugular Veins* (whose Coat could not have been much stretched on a sudden, even by the Wind of a Smith's Bellows) in Tract of Time, enlarged only by the gentle assiduous Pressings of the Blood, to thrice their former Diameter, that is, nine times their natural Cavity. Here we have a *Heart* (the strongest and firmest Muscle of the Body) by Degrees formed into a Shape quite different from the natural; the right *Auricle* and *Ventricle*, notwithstanding the Strength of the Fibres of the latter, and their Indisposedness to stretch easily, so prodigiously distended, that no outward Force whatever, without breaking it, could effect the like: Such hard Shift did Nature make to continue the vital Stream, and avoid the fatal Stop, each Moment threatned by the *Polypus*, that with double Force she was obliged to maintain a Pulse; which (because it could not break or expel the unnatural Load) did by little and little stretch the Sides of the *Ventricle*, for the more easy Passage of the Blood, and by terrible Palpitations for a long Time protract a miserable Life, till the monstrous Body growing too big, the weakened Fibres could stretch no more, nor yet regularly contract themselves any longer; so that the *Heart* at last, just ready to sink under the Burden, is forced to collect its little remaining Strength into one brisk Effort, and assisted by all the Spirits of the Body, caused the poor Wretch to expire in an universal *Convulsion*.

The Diseases wherein almost always *Polypi* may be expected, are the *Apoplexy*, *Phrensy*, *Falling-Sickness*, *Convulsions*, *Asthma* (or difficult Breathing) *Consumption*, ill-cured *Pleurisies*, ill-cured and lingering *Fevers*, *Plague*, *Venerereal Diseases*, *Pleurisies*, *Peripneumonies*, *Green-Sickness*, *Varices* of the *Veins*, and inveterate *Head-achs*, &c. The Part most usually affected is the right *Ventricle* of the *Heart*, and the *Genus Venosum*, where the Blood returning from the Habit of the Body, slow in Motion, impoverished and dispirited, more easily admits such a Concretion; yet the left *Ventricle*, and the *Genus Arteriosum*, frequently breed the like: Such was that *Tulpius* mentions branching out into the *Aorta* and *Vena Pulmonaris*, in a Person who died of a grievous *Apoplexy*; and such *Wepfer* makes one great Cause of *Apoplexies*. The *Sinus's* of the *Brain* also often harbour them, as we have found in one that had an obstinate *Head-ach*, and at last died *mad*; and not long since in another, who once had some Fits of a *Frenzy*, and at length died *epileptical*; in both which Cases the *Sinus Longitudinalis* was full of a *Polypus*, which emitted very tough Branches into all the little lateral Vessels; and *Blasius* gives the like Account in a *Mad-man's Brain*, who at last died *convulsed*. Upon the Stress of these, and many other Observations of this Nature, it is reasonable to assert, that a *Polypus* is so far from being a Product at the Period of a Disease, that it seems rather a stated settled Cause, as well as an immediate Occasion of the fatal Symptoms which attend the most incurable Distempers: Thus if in the *Heart* it grows so large as to force a *Diastole* beyond the due Tension of the Fibres, it produces a mortal *Syncope*; if smaller, and not exceeding the Confines of the *Ventricles*, a strong and irregular Pulse succeeds, and there must be a *Palpitation* of the *Heart* to maintain
Life.

Life. If it sends Branches into the larger *pulmonary* Vessels, the Motion of the Blood is retarded, and the *Breast* and *Lungs* labour under their Load in an *Asthma*: Or if it reaches the Capillaries, a *Peripneumony*, an *Ulcer*, and at last a *Consumption* is at Hand. If the Concretion begins in the small Vessels of the *Pleura*, then a *Pleurisy* follows; if it grows and fixes in the larger Vessels of the Arms, Legs, or the like, painful *Varices* appear; and probably *Rheumatisms* owe much of their Pain to some such Concretions begun in the capillary Vessels of the Habit of the Body. Again, when these Bodies are in the *Sinus* of the *Brain*, if small, the Vessels will only be a little distended, and so a Pain in the Head may suffice; but if larger, the Obstruction increases, the Blood and Spirits are cast into a Hurry, the *Brain* is inflamed, the Senses presently are disordered in the Apprehension of their Objects and so a *Frenzy* seizes the Man; if they chance to be yet bigger, and fill the *Sinus* more, the Blood pent up moves more furiously, and so destroys Sense and all voluntary Functions; then the Tumult extends beyond the Limits of the *Brain* through the whole System of the Spirits; and whereas in a *Frenzy*, Sense, though mistaken, did direct their Paths, now they run *qua data Porta*, ungoverned and impetuous through the Nerves and Muscles, causing the involuntary Motions and *Convulsions* of an *Epilepsy*, which continue till the Spirits are spent, the Blood quiet, and the Blood-vessels, by the very Agony, enlarged equal to their Burden; and indeed, in *Epilepsies*, Dissections seldom miss of a *Polypus*, neither can we deny this *convulsive* Power of a Concretion in the *Brain*, since the great *Lower's* Experiment tells us, That a Dog died in terrible *Convulsions* by injected Milk coagulated only in his *Heart*: But lastly, if the *Sinus* prove almost totally obstructed, the Blood instantly overflows the *Brain*, and without much previous Notice (except perhaps of Giddiness, Loss of Sight, or the like) an *Apoplexy* invades; which Disease will also more dangerously happen, when some Particles of a *Polypus* in the left *Ventricle* of the *Heart*, broken off by the violent Stream of Blood, shall be impacted into the *carotid Arteries* at their Insertion into the *Brain*, whence all Intercourse of Spirits will irrecoverably be stopt. Now though in some of these Cases a *Polypus* does only by Fits disquiet the Man it possesses, yet it is in Being when it does not produce such sensible Effects; for Exercise, Passions, Diet, and other external Causes, will so affect the Quantity and Motion of the Blood, that the Obstruction may be more insupportable than when the Stream was calm: And it is as easy to imagine the Disorders thus caused in an Animal Body, as that a large swift River, dammed up from quietly pursuing its own Channel, must needs impetuously overflow all the Country about.

And thus we have considered those Symptoms of which a *Polypus* may be rationally thought (at least occasionally) the next and immediate Cause: As for others before-mentioned, namely the *Plague*, *Venereal Diseases*, *Lingering Fevers*, and the like, they are not the Effects of a *Polypus*, but Causes, that dispose the Blood of some Persons to such *pituitous* Concretions.

But to discover their Cause more nicely, we may observe with *Wepfer*, that Persons thus afflicted are never well, breath hardly, have frequent *Pal-*

pitations of the *Heart*, unequal Pulses, are dull to all Action, stupid, luxurious and slothful; of a livid, leaden, or fallow Complexion, or a saturated Red in Hands and Face, because there is either very little Blood in the Capillaries of their Skin, or at best a slow Circulation: Their Blood has usually a Thickness, and peculiar *Lentor* in it, or abundance of *Serum*; the latter for want of volatile Salt to digest the *Chyle* into a laudable Red, and the former happens, either because the *Heart*, destitute of Spirits for its Pulse, cannot duly agitate the Mass, or (as Experiments on Blood emitted seem to prove) by reason of the Mixture of a preternatural Acid; whence may infer this conjunct Cause of a *Polypus*, that the Fibres of the Blood, not being sufficiently sustained and kept asunder by a due Motion of the intercepted fluid Parts, may either barely upon the Account of Rest cling together, or else may be by Degrees connected by an austere astringent Acid (always to be found in *cachectical* Bodies) for the same Reason as (an analogous Liquor) Milk is curdled, only with this Difference, that in this, the Coagulation is brittle, because the Fibres are weak and short, whereas it may be very tough in Blood, because its Fibres are strong, and of a greater Length.

Upon the whole we may conclude, That whatever maintains the Fluidity, Motion, Spirit, and Texture of the Blood, promises a Cure, though not of a confirmed *Polypus*, yet of the first Rudiments of it. All these Indications are answered by Medicines of volatile, brisk, active Parts, which destroy Acids, exalt and ferment the Blood, and not only hinder, but also dissolve the first Beginnings of Coagulation; and probably, it is by affecting the Blood, and not immediately the *Nerves*, that they do such Feats in Diseases before-mentioned. Lastly, The Effects of Bleeding in some Cases can never enough be admired: Thus *Riverius* tells us of a Girl, 12 Years old, being bled plentifully for a *Pleurisy*, was cured of her *Falling-Sickness*, a Disease never without the Suspicion of a *Polypus*.

Explication
of the Figure.
Fig. 10.

Figure 10, represents the *Polypus*, as it appeared when fresh expanded on a Board. *A*, That Part which was firmly rooted in the right *Ventricle* of the *Heart*; *B*, the Branch terminated in the right *Auricle*; *C D D D*, the Part tending towards the *Lungs*; *E E*, the Branch running out of the *Ventricle* into the *pulmonary Artery*; *e e e e e*, the several lesser Ramifications distributed according to the several Divisions of the *pulmonary Artery*; *F F F*, the Branch belonging to the descending *Vena Cava*; *G G*, the Branches begun in the *Axillary Veins*; *H H H H H*, the two Branches that run up the *internal Jugulars* even to their Entrance into the *Skull*; *b b*, two little black Specks of concreted Blood contained within the Coat of the *Polypus*.

A great
Quantity of
Liquor found
in the Tho-
rax; by Dr.
Natt. Fair-
fax. n. 29.
p. 546.

XI. A Maid of *Rumborough* in *Suffolk*, when she was about 13 Years of Age, took *Chalybeats* for the *Green-sickness*, and found some Relief by it, but was after, much spent in her Wind. From 16 to 22, she much afflicted herself with Grief, during which Time she had every Year an acute Disease or two. At 18 she was very weakly, clogged in her Chest, and melancholy. If she

went out in a windy Day, the Wind, she said, was ready to choak her. She was a very slow Walker, going up Hill or up Stairs with much Difficulty. She was now observed to be very thirsty, usually drinking at Bed-time, and in the Night too sometimes, else she said she should be choaked with Drought. Between 21 and 22 Years of her Age, going down Stairs, she heard a frightful *Jolking* in her Breast. She took several things of Dr. *Brown*, and others at *Norwich*, for about 6 Months Time, without finding Relief. Half a Year after, towards *Michaelmas*, upon taking a slight Cold, she was so stopped up that she could only whisper; nor could she lie flat, but was reared up with Pillows. I presently caused a *Vein* to be opened, and within less than an Hour she got Breath, and soon after grew as well as she was before. She affirmed, she never Sweat in her Life, nor could it be procured by ordinary *Sudorificks*. Being desirous to add an emperical Remedy, I gave her 3 of *Matthews's* Pills, which did sweat her lightly, but beyond whatever she remembred. Several daily Doses of *Lockyer's* Pills, 4 *per Dose*, removed the *Jolking*, as she said, lower to the *Midriff*; when she, fearing an *Hyper-catharsis*, laid them by for 2 or 3 Days, and then taking them up again, could find no further Alteration by them. She could never lie on her left Side. In the 23d Year of her Age, in Winter, she had a dangerous *Fever*, with a *Diarrhœa*, but came off. In her 24th, in Winter again, she got Cold, was quite stopped up, after 5 or 6 Days fell into a *Convulsion* before she was bled. By Bleeding, though too late, she had present Ease, and cheared up in the Evening, but died the next Morning.

When I had laid open the hollow of the *Thorax*, there steamed out a very offensive Smell, notwithstanding the sharp Frost at that Time. The whole Cavity was empty above (as the Body lay supine) and beneath, all the right Side, and about $\frac{2}{3}$ of the Left, was filled with a Liquor, which took up in the Part to the Neckward a Hand-breadth, and ran 3 Fingers Thickness to the Left of the *Mediastinum*. The Liquor was like Cream, or rather like a Size of *Spanish-white*, having a Cast of Yellow like Beestings; for putting a Spoon into it, from the Bottom I took up a thick clammy Matter, just like that *Spanish-white* that sinks to the Bottom of its Size. In Quantity it might be about 3 Pints, contained in a Bag which was capable to hold as much more and better. The Bag ran along the left Shoulder, to the utmost of the right Side of the *Midriff*; not streight along, nor stissy stretched, but about a Hand-breadth from its Rise it went directly down to the *Midriff*, with which it closed all along. Its Skin or Coat was thicker than that of the Stomach, as well as its Capacity larger, inasmuch as the Flexures of the Ribs joined with it, and made up above half the Compass. Where it adhered to the *Midriff*, it was near a Finger thick: And in one Place, where I endeavoured to separate it from the *Midriff*, I hit upon a thinner Bag, whence issued 2 or 3 Spoonfuls of sheer Water. The *Mediastinum* was either wholly wasted, or else woven into the Thickness of the Bag, as was also the *Pleura*, as far as the Bag reached. It lay loofe and snapping from the left *Axillar* to the Chest, having been before filled and distended either with Wind or the Liquor. All the Hollow was bedabbled with

with

with the Wallowing of the Liquor about, as is the *Ouse* by the Ebbings and Flowings of the Tide in a Channel. That *Lobe* of the *Lungs* which should have been on the right Side was gone, and that on the left, wasted to near a third Part. In the lower Belly all was well.

The *Jolking* was exactly like that of Water or Milk. This Woman was as flat-breasted as a Man. It is probable, that the Liquor proceeded from the falling down of the *Chyle* from the *Axillars*.

An Hydrops
Pectoris; by
Mr. Sam.
Doudy. n. 224.
p. 390.

XII. A Noble Peer, many Years ago, was troubled with an extraordinary Shortness of Breath; his Lordship was always better in Bed, or lying, than sitting or standing, quite contrary to other *Asthma's*, in which the afflicted, in Fits, are not able to lie down, the Muscles of the Breast having a freer Motion when in an erect Posture. Upon opening the Body, both the Cavities of the Breast were found full of Water, which when standing or sitting, pressed so upon the *Diaphragme* that Respiration was performed with Difficulty, but when lying, that floating Load was so disposed, that that Office of Nature was better performed. This seems to be so natural a Symptom, that it may be almost an infallible *Diagnostick*, to distinguish an *Hydrops Pectoris* from other more frequent Diseases of the Breast, that give a Shortness of Breathing. His Lordship, though antient, was in all his *Viscera* very sound.

Perhaps it may not be impracticable to use the *Paracenthesis* in the like Case, when the Disease is certainly known, and without it Death is most likely to ensue.

Warm Water
injected into
the Thorax of
a Bitch; by
Dr. William
Mufgrave, n.
240. p. 181.

XIII. June 21, 1683. I syringed ℥iv. of warm Water into the Right Side of a Greyhound Bitch, which caused a great Rigour (especially in the hinder Parts) a Shortness of Breath, a burning Heat in the Flesh: She looked heavy, was unwilling to rise or stand long on her Feet. Those Symptoms wore off by Degrees, so that in a Week's Time she appeared as well as ever. July 2. I injected ℥xvj of warm Water into the Left Side of the *Thorax* of the same Greyhound; after which she was extremely hot, and short breathed: I felt a violent Throbbing of the *Heart*, but the Rigour was not so great as in the first Experiment; she recovered this also in the Space of a Week. July 15, I injected ℥iiss of warm Water into one Side of the *Thorax*, and ℥ss into the other Side of the same Bitch: The Symptoms attending it were (as in the former Experiment) a Burning in the Flesh, and a Shortness of Breath; they all went off, and in five Days she seemed perfectly recovered.

Thus we see a Quantity of ℥iiss of warm Water has been injected into the *middle Venter* of the same Greyhound, within the Space of one Month; and if we may be allowed to judge of the Recovery by a perfect Cessation of all Symptoms, as to outward Appearance, we must then grant, that this Water was carried off thence, some way or other, in the same Time. I shall only add, that having ordered the Greyhound to be tied away, after one of the two last Experiments, within two or three Days, I observed the

Boards

Boards of the Floor where she lay to be very wet, which I then imagined to be the Effects of the Injection, come off by Urine; perhaps as Nature hath furnished us with Vessels to bring off that Humour which is thrown into the *Ventricles* of the *Brain*, and by tarrying there would prove fatal to us; so likewise there may be some *Ductus* yet unknown (to me at least) which belonging to the *Thorax* may convey off thence what Liquor arises (either from the Condensation of Vapours, or from the Rupture of *Lymphaticks*, or any other Way) in the Cavity, mediately or immediately, into the Blood: Certainly these Experiments, as also the many Histories of *Empyema's* and *Dropsies* of the *Breast*, mentioned by Physicians as cured by large Evacuations by Urine, do in some Measure argue the Probability of such a Passage.

XIV. A German at *Montpellier* hath discovered the Vessels which convey the Chyle to the Breasts of nursing Women, and shewed, that they do issue out of the *Ductus* of *M. Pecquet*,

The Passage of Chyle to the Breasts; by M.

n. 65. p. 2083.

XV. *Eliz. Trevers*, 23 or 24 Years of Age, fair of Complexion, brown Haired, of an healthy Constitution, low of Stature, of honest Repute, but of mean and poor Parentage near *Plymouth*, went well to Bed July 3, 1669, and took good Rest and Sleep; but in the Morning, when she awaked, she found her Breasts so swelled and heavy that she could not turn herself in her Bed, or sit up; yet without all Pain and Weakness, either in her Breasts, or in any other Part. I advised for the present only an emollient and temperately warm *Fotus*, and once I gave her a *Bolus*, upon which she had 10 Motions *deorsum*, and the Swelling somewhat abated; but the Maid was so weakned upon it for 2 or 3 Days after, that I durst not attempt any thing of that Nature since: *Sed quia passa fuit Suppressionem Mensium per sex retrò Menses, Diuretica nonnulla, & Sanguinis Menstrui Prolectamenta præscripsi.* The *Tubuli*, or Pipes of the Breasts, are all very hard and swelled; and indeed, the whole Breasts seem to be nothing else but those *Tubuli*, and little or nothing but Wind or Water. As near as we can guess, the Left Breast weighs about 35 Pounds, but the Right somewhat less. And the Skin of the Back, Neck, and Belly, seem to be drawn towards the Breasts to serve for the Distension. The Circumference of the Right Breast is 2 Foot 7 Inches, of the Left 3 F. 1 $\frac{1}{2}$ Inch. The Length of the Right Breast from the Collar Bone 1 F. 5 $\frac{1}{2}$ Inches. The Length of the Left Breast 1 F. 7 $\frac{1}{2}$ Inches. The Breadth of the Right Breast, as it lies, 1 F. 1 Inch. The Breadth of the Left 1 Foot 4 $\frac{1}{2}$ Inches.

A sudden and excessive Swelling of a Woman's Breasts; by Dr. W.

Duriton. n. 52. p. 1047.

About the Beginning of *September*, she brought up, in Coughing, at several Times, some Blood, but this I soon took off; and at that Time there appeared several cutaneous Ulcers upon her Breasts and other Parts, & *abunde in Verendis (ut a Fæminis edocebar)* which last I cured; but those on her Breasts in Part remain, and daily discharge, by the sole Application of Cole-leaves, good Quantity of sanious Matter. She complained also of grievous interjuncture Pains, especially upon the *Tibiæ*; whereupon I applied

plied *Empl. de Ran.* and gave her three succeeding Mornings a Dose, which the third Day wrought, *sursum deorsum*, pretty briskly; after which her Pains vanished, and many of those *Ulcuscula*; and her Breasts, which at that Time were grown considerably bigger and very painful, much lessened, and her Pains also; but *OE. 21* she died. The next Morning we took off *n. 53. p. 1068.* the Left Breast, and found it of 64 lb Weight. Upon the opening of it (in several Places) we could find neither Water, nor cancerous Humours, nor any thing vitious, more than the prodigious Bigness; and the *Tubuli* and *parenchymous* Flesh were purely white and solid, and no other than what we see in the soundest Breasts of Women, or the best Udders of other Animals. She had lost her Stomach and Rest several Weeks before, and made great Complaints of her Breasts, from their great Distension; and her whole Body was exceedingly emaciated. The Breadth of her two Breasts (as she was laid out on a Table, being dead) I mean from the further End of the one to the further End of the other, was 3 Feet 2 $\frac{1}{2}$ Inches. The Circumference of the Breasts long ways 4 Feet 4 Inches. The Circumference of the Breadth 3 Feet 4 $\frac{1}{2}$ Inches. The Right Breast we took not off, but we guess it weighed 40 lb .

Some time before she died I began a *Salivation* with her, which lessened her Breasts in Circumference some Inches; but she proving not conformable, I was forced to desist. But she was wonderfully revived afterwards for some Time. I then caused a *Causstick* to be applied; upon which the *Eschar* falling off, yet nothing issued out of the Breast. Then an Incision was made 2 $\frac{1}{2}$ *n. 54. p. 1074.* Inches deep, but it was to no more Purpose than the former. I designed to have examined the *Viscera*, but her Aunt (a fond extravagant Woman) disappointed me. But indeed I believed there was little or nothing there extraordinary. For to the last, I could perceive no ill Smell from her Breath, or streightness upon the Chest, or Painfulness in her Breathing; and the *Egesta per Urinam*, &c. were well enough.

An aged Woman of 60 giving Suck to her Grandchild in Germany; by XVI. Having taken a Nurse for my little Girl, the Boy of that Nurse having been on that Occasion weaned, did, by repeated Sucking the Breasts of his Grandmother, a Woman of 60 Years of Age, cause such a Commotion in her, that abundance of Milk ran to her Breasts for a sufficient Nourishment to the said weaned Boy, whom also my Nurse, his Mother, after she returned Home upon the Death of my Girl, now again gives Suck to, though her Breasts had been for some Weeks dried up. *n. 105. p. 100.*

Ibid. N. B. This Relation was sent by a Person of great Veracity, and may be confirmed by two other like Stories recorded by *Diemerbroeck*, in his *Anatome Corporis Humani, Lib. II. Cap. ii.*

XVII. *A Paper omitted, viz.*

n. 105. p. 100. A Relation concerning a Woman of 66 Years of Age who gave Suck to her Grandchild; and another Woman, who recovered her Milk after it had, for 8 whole Months, been quite dried up. *Extracted from M. Diemerbroeck's Anatome Corporis Humani.*

XVIII. *Accounts and Emendations of Books omitted*

1. **J**O H. Swammerdam, M. D. *Amsterodamensis*, de Respiratione & Ufu Pulmonum. n. 28. p. 534.
2. Tractatus duo, prior de Respiratione ; alter de Rachitid. ——— n. 41. p. 833.
Mayow. Oxon. 1668. in 8°. n. 105. p. 110.
3. De Respirationis Ufu Primario Diatriba ; Auth. *Malachia Thruston*, M. D. cui accedunt Animadversiones à Cl. Viro in eandem conscriptæ, una cum Responſionibus Authoris. *Lond. 1670.* n. 56. p. 1142.
4. Ἀντιδιαρρητικὴν five Animadversiones in *Malachia Thrustoni*, M. D. Diatribam, de Respirationis Ufu Primario. Auth. *Georgio Entio*, Equ. Aur. M. D. *Lond. 1679. in 8°.* n. 142. p. 1072.
5. An Epistolary Address made to the Grand Duke of *Tuscany*, touching the whole Doctrine of Respiration ; by *Laur. Bellini*, at *Pisa.* n. 65. p. 2093.
6. Novæ Hypotheseos, de Pulmonum Motu & Respirationis Ufu, Specimen. *Lond. 1671. in 8°.* n. 70. p. 2141.
7. *Joh. Nicolai Pechlinii*, M. D. de Aeris & Alimenti Defectu, & Vita sub Aquis, Meditatio. *Kiloni 1678. in 8°.* n. 127. p. 67.
8. De Catarrhis à *Rich. Lower*, M. D. in 8°. n. 73. p. 2211.
9. Phthisiologia *Lancastriensis* ; cui accessit Tentamen Philosophicum de Aquis Mineralibus, &c. Auth. *Carolo Leigh*, M. D. *Lond. 1694. in 8°.* n. 77. p. 3017. n. 1002. p. 206.
10. Tractatus de Corde, item de Motu & Colore Sanguinis & Chyli in eum transitu : Cui accessit Dissertatio de Origine Catarrhi. Auth. *Rich. Lower*, M. D. *Lond. 1669. Amstel. 1661. in 8°.* n. 45. p. 909. n. 73. p. 2211.
A Correction is here made of an Error of the Press, concerning the Circulation of the Blood, which passeth through the Heart Thirteen (not Six) times in an Hour ; and of a Mistake committed by the Author himself.
11. *Pet. Chirac*. de Motu Cordis Adversaria Analytica. *Montsp. 1698. in 12°.* n. 263. p. 556.
12. *Ejusdem* Dissertatio Academica ; An Incubo Ferrum Rubiginosum ? *ib. p. 565.* *Montsp. 1694. in 12°.*

C H A P. IV.

The ABDOMEN.

- I. **S**EPT. 14. 1678. Opening the Body of a Reverend Clergyman at *Oxford*, we observed the *Liver* to be very large, and fastened to the *Diaphragm* more than usually ; the *Colon* so firmly joined to the *Liver*, near the *Gall-Bladder*, that I could not separate it without Incision. The *Liver* was very glibbous.

An Abscess in the Liver, Stones in the Gall-Bladder and conjoined Kidneys ; by Dr. Edward Tyson. n. 142. p. 1035.

gibbous Part of the *Liver* towards the Right Side, appeared discoloured, where making an Incision, there plentifully issued out a perfect *Pus*, very foetid; as likewise there did from a Wound I made in its cavous Part near the Fissure. This *purulent* Matter I found not contained in any particular *Cystis* or Bag, but in several *Sinus's* in that Part of the *Liver*; whereas the other Parts seemed sound and well coloured. This *Abscess* may well be presumed the Cause of that lurking *Fever* that took off the Patient, he labouring under it about 6 Weeks, yet without much Complaint of Sickness, but troubled with irregular Heats; yet sometimes such as were imperceptible to himself: Twice or thrice, but at great Distances, he had *Paroxysms* of chill Fits like an *intermittent Fever*, but such a *Fætor* and Driness in his Throat as proved obstinate to all Medicines. His approaching Death was attended with other Symptoms that usually follow the Affection of the *Brain* and *Genus Nervosum*.

Formerly he had been often subject to the *Yellow Jaundice*, though at present nothing thereof appeared. The *Gall-Bladder* was filled and crammed with Stones, the *Meatus Cysticus* and *Ductus communis* even to the *Duodenum* were very much extended with them; and in the *Porus Biliaris* also I met with several small ones. There was no fluid *Gall* contained in the *Bladder*, but some that was soft, of a deep Yellow Ochre Colour that filled up the Interstices of the Stones. These Stones were of a various Bigness, from that of a large Nut, or Nutmeg, to a Pepper-corn: Their Colour was of a darkish Yellow Ochre, although in some there appeared *Laminæ* of a Browner Colour. To the Touch; when a little dry, they seemed soapy: Their Weight was light, and their Scent very foetid, resembling that of the *purulent* Matter in the *Liver*. Their Consistence was friable; their Figure for the most part triangular, or inclining to that Figure, but all angular. That Side toward the *Gall-Bag* was protuberant and convex, the other two Sides were flat; so that having the lesser Angle towards the Center of the Cavity of the *Gall-Bladder*, like so many Wedges, they more compleatly filled it: I numbered I think above 36. Whether this *triangular Figure* may be from the Shooting of some *Salts* in the *Gall* is hard to determine: But however, I suppose, it will be found, that they usually affect this *Figure*; as in some others I have by me, taken out of the *Gall-Bladder* of a Woman at *Oxon* some Years ago, it does more plainly appear; which are also light, do feel soapy, consist of *Laminæ*, are of a whitish Colour, not ill-scented as the former, and of a *triangular Figure*.

Fig. 11.

We were surprized to observe an unusual Structure and *Conjunction* of both *Kidneys*, the *Parenchyma* of the one being continued over the *Spine* unto the other, so that they both made but one continued semilunary Body. They were very large, and that Part that conjoined them, and lay over the *Spine*, was something lesser than the true *Kidneys*, and in its outward Tunicie or Membrane had 3 Seams, although that *Parenchyma* inwardly seemed not to observe such a Division, but was the same with the Substance of the *Kidneys*. The *emulgent* Vessels were very numerous; for besides two larger Veins that were subdivided into several lesser Ramifications, there

were divers others that were single, even to their Insertion into the *Vena Cava*. The middle Part likewise, by which both *Kidneys* were conjoined, was plentifully provided with Blood Vessels; for it received from the *Aorta* two Arteries, which before their Insertion were each subdivided into three Branches; and it sent out two Veins, which being joined afterward into one, entered the *Vena Cava*. Besides, at the Seam at the lower Part of the left *Kidney* it had a Vein and Artery, which afterwards inserted themselves into the *Iliac* Branches of the *Aorta* and *Cava*; so that Nature, though erring from her wonted Rule in forming this Part, yet was provident in furnishing it with Vessels. But to the whole Compages of the *Kidneys* there belonged only two *Ureters*, but the great Dilatation of the *Pelvis* in each was remarkable; that of the left *Kidney* was the larger, and had a triple Origination, the Right had but a single one, and was less.

I am apt to think that this Structure of the *Kidneys* might occasion as well the great Dilatation of the *Vena Cava*, as also of the *Pelvis*; for the middle Part conjoining both the *Kidneys*, lying over the *Vena Cava*, by its Weight pressing thereon would hinder the free Return of the Blood, which yet would make room for its self by enlarging its own Channel, which was so capacious as to contain 3 or 4 of my Fingers. So likewise the *Ureters* running over that Part that conjoins the *Kidneys*, like Strings over the Bridge of a Viol, in some Position of the Body they might have their Passage so streightened, that the *Urine* being impeded and regurgitating, might swell and stretch the Membrane of the *Pelvis* to this Greatness.

A, the Right *Kidney*. B, the Left. C, the middle Part conjoining both *Kidneys*. d e f, three Seams in the Tunicle of the *Kidneys*. G, the *Arteria Aorta*. h h, two Arteries from the *Aorta*, which afterwards are ramified into three, and so inserted into the said middle Part. I, the *Vena Cava*. K K, two Veins arising from the middle Part, which uniting into one, entered the *Vena Cava*. L M, a Vein and Artery arising at the Seam f, which at last are both inserted into the *Iliac* Branches of the *Aorta* and *Vena Cava*. N M, the *emulgent* Arteries. O O, the *emulgent* Veins; whereof some are single, others variously ramified. P P, the *Pelves* of both *Kidneys*; that of the Left was extream large. Q Q, the two *Ureters*.

Explication of the Figure.

II. I send you here the Figure of the *Liver* of an *hydropical* Person. He was about 25 Years of Age, a Soldier in one of his Majesty's Regiments here in Town, who contracted his Distemper by drinking much Water, when he could not stir from his Duty, and catching Cold at Nights in being upon the Guard. He was under the Care of our Physicians in St. Thomas's Hospital for some Time, by whose Directions his Swellings did by Times abate; but afterwards it was observed, that the Method which had been beneficial to others, had not here the like Success, his Swellings returning upon him as before; so that there was nothing more now to be thought of but a *Paracentesis*; which Operation however we judged very hazardous, by Reason of the Time of the Year, and for that the Patient was very much emaciated; yet he being so much swelled that it was uneasy to him to lie in his Bed, he importuned us very often, and with great Earnestness, that the Operation

A Liver appearing Glau-dulous to the Eye; by Mr. J. Brown. n. 178. p. 1266.

might be performed. Hereupon a *Paracentesis*, by the Physicians Consent and Directions, was made by me, Nov. 14, 1685, whereby we drew from the Patient about 3 Pints of brinish Liquor, and within 4 Days after as much more; the next Morning he died; and his Death, as was found upon Dissection, was partly occasioned by a Mortification upon his *Scrotum* and *Penis*. Upon opening the Body, I believe I took out about 24 Quarts of Water; he had a large Inflammation upon the *Peritonæum*; all his other inward Parts not much disaffected, except the *Liver*, which now I am going to describe to you.

Fig. 12.

Its Magnitude was not extraordinary, but rather seemed less than usual. But that which was very remarkable (and I think the like Case scarce ever observed by any Author) and seems much to confirm the Opinion of the learned *Malpighius*, is this; It consisted, in its concave, convex, and inward Parts of *Glands*, which (with the Vessels) made up the whole Substance thereof. These *Glands* contained a yellowish *Ichor*, like so many *Pustules*, and was, I suppose, Part of the *bilious* Humour lodged in the same; though otherwise the *Liver*, between the *Glands*, was of its usual reddish Colour. In the Bladder of *Gall* we found a soft friable Stone, but otherwise nothing considerable in that Part.

Explication of
the Figures.

AAA, describes the *Glands* in the concave Part of the lesser *Lobe* of the *Liver*. *BBB*, the *Glands* in the concave Part of the greater *Lobe* of the *Liver*, which were of different Magnitudes, though in general they were much less in the Lesser than in the Greater. *CCCC*, the inward Part of the greater *Lobe* of the *Liver*, as it was divided. *DDDDD* are several black Specks that appeared inserted in those *Glands*, which were probably from the Divarications of the Vessels being divided upon opening this *Lobe*. *E*, the *Vesicula Fellea*, which was of a greenish Colour. *F*, the *Vena Porta* tied up with the *Ductus Biliarius*, &c. *G*, a particular Set of *Glands*, lodged between the same and the *Vena Cava*. *H*, the *Vena Cava*. *I*, Part of the *Ligamentum Suspensorium*. The convex Part of the *Liver* was in every respect, the same with the concave Part of both *Lobes* as to its *Glands* here described.

The Texture
of the Spleen;
by S. Mal-
pighi. n. 71.
p. 2150.

III. I have observed the Fibres of the *Spleen*, which have puzzled so many Anatomists, not to be nervous (as I sometime imagined) but fleshy. So that from its external *Involucrum*, and the transverse Fibres produced from it, there is composed a very singular Kind of Muscle, compressing the Cells of the *Spleen*, whereby the Blood is propelled through the Vessels of the *Viscus* in the Manner, and by something of a similar Structure to that which is observed in the large *Auricles* of the Heart. For the strong fleshy Fibres, running across the *Spleen*, are so interwoven with one another as to form a Kind of Net-work, compressing the Membranous Cells, and their Extremities wonderfully produced, make the fleshy Covering of the *Spleen*.

The Use of the
Spleen; by
M. Mich.
Behm. n. 34.
p. 651.

IV. Dr. *Higmore* and others have justly absolved the *Spleen* from an acid melancholic Juice, and from Sanguification. I have several Times observed the *Spleen*, while it was yet warm, resemble the Lungs in Sponginess,
and

and could be very much distended not only with Air, but with coloured Liquors; by which means its Vessels, Connexions and Uses explained by Dr. Highmore, were rendered more manifest. But begging that ingenious Gentleman's Pardon, I cannot help doubting whether these numerous whitish Vessels are Nerves turgid with animal Spirits, or rather Tendinous Fibres, serving for the Dilatation and Contraction of the Spleen, as in the Lungs. For I imagine that the Blood, which is not sufficiently mixed with the Chyle in the Heart, is mixed more intimately in the Spleen, and strained in it as through a large Sponge, its more watery Parts being sent off by the *Pancreas*, and then strained anew through the Liver for the Separation of the Bile, and when the Blood, either by its Motion or any violent Accident, distends the Heart too much, then lest that Organ should be oppressed, or the Head affected with the too great *Impetus*, the Spleen receives a great Part of the Blood, as may be felt by any one from its Swelling and Pulsation, emulating the Heart, when the Body is very warm. I believe the Spleen and *Mesentery* may be affected by Disorders of the *Mesentery* and the Hypochondriac Disease, but I imagine that these Disorders seldom or never arise from a Fault in the Spleen.

V. In my Anatomical Dissections of the first Year, after I was made the publick Anatomist at Venice, I met with nothing curious, but the *Virsungian Channel* manifestly inserting itself in the *Spleen*, and admitting a Silver *Stiletto*; which I had never observed in any Corps: And then a *Liver* divided into 5 Lobes, together with a *Spleen* of the Figure of a Saw, of extraordinary Bigness. Last Year, one drowned, of about 35 Years of Age, had the *Lacteous Vessels* so apparent and so big, that having shewn them how they lay in the Body, I shewed them yet the Day after in the *Mesentery*, taken out and displayed upon a Table.

Observations about the Spleen and Liver; by S. Jacomo Grandi. n. 58. p. 1188.

VI. A Daughter of Mr. *Thomas Sedgwick*, Merchant in *London*, when she was fourteen Years of Age, entered with a Mistress to learn *Embroidery*, in which she was so assiduous, that she spent whole Days, and almost every Day upon it, for the Space of two Years. Hence a melancholic Disposition which was natural to her became morbid, accompanied with Paleness, want of Appetite, Obstructions of the *Menstrua*, and a Cough; and after three Years, with a heavy Kind of Pain in her left Side below, which continued till her Death. She died of a Fever, in her twentieth Year, and her Body being opened, I found the Lungs, Liver, and all the other *Viscera* sound, except the Spleen, which was surprisngly increased in its Bulk and swelled, being more than two Inches thick, four broad, and almost ten long. So that, though the human Spleen, when it is found, scarcely weighs five Ounces; in this young Woman it weighed upwards of twenty-five. And as this Viscus when it is morbid, for the most Part grows hardened with schirrous blackish Tumours, here on the contrary, its whole Substance becoming putrid, sent forth a foetid Steam, and it was so very soft and friable to the Touch, that it appeared like grumous Blood, and broke

A diseased Spleen; by Dr. Neh. Grew. n. 194. p. 543.

by

by its own Weight if you offered to lift it. For all this, it was of a florid red Colour both within and without, and there was no Ulceration, nor Matter truly purulent to be observed in it.

In this Case three Things are to be considered, *viz.* her Manner of Life, her Age, and the Period of her Age. For first, from such a long Want of Exercise, an unequal Distribution of the Aliment must necessarily happen. And as the Bones, and frequently the *Viscera*, are increased above their natural Size in the Rickets, from an unequal Nutrition, so in this Case the Spleen, from the same Fault in the Nutrition, seems to have received too great a Bulk. Especially as in the second Place, the Want of Exercise happened in the Time of Life before the Parts were grown to their full Size. For Exercise is very necessary to promote even a due Nourishment; and still more for the equal Growth of the Parts. And in the third Place, it happened in that Period of Life, when the Menstrual Discharge begins first to appear; which thereby being suppressed, or at least very much diminished, that Blood, which slothful Nature neglected to send off in the usual Way, fell partly upon the Spleen, as a kind of Diverticulum for it. Want of Exercise is therefore most hurtful to Girls about this Age, that is, from fourteen to twenty or thereabouts.

A Polypus in a Dog, near the Spleen; by Dr. Will. Mufgrave.
n: 266. p. 690.

VII. In a *Dog* which was dissected privately at *Oxford*, we happened to fall upon a globular Body near the *Spleen*, at first Sight very much resembling a Gland. It was three Inches in Diameter, and had a Coat resembling that of the Veins. On each Side of it we observed a Vein, *viz.* a Branch of the Splenick, going to the Coats of this round Body. Having opened it, we observed its Substance fleshy, but confused, imperfect, and intespered with grumous Blood. Through its Middle a Passage was allowed to the Blood, and its Bulk seemed to argue that it was long a growing.

The Structure of the Glands; by Sir Edm. King. n. 52. p. 1046.

VIII. As I have Opportunity, I shall shew, I hope, that all Sorts of *Glands* (so called) are nothing else but Vessels (and their Liquors) variously wrought, and Receptacles of several Liquors for divers Uses; the Difference of which alters their Colour, Consistence, &c. My Meaning is, that there is no reputed *Gland* in any other Thing than in the Body of the *Testis*; *viz.* That it hath not this, or that intermediate Substance, but that the Liquors regularly come and go to and through them in fine Tubes (in such and such Heaps and Figure, as may make them appear so and so formed in several Parts of the Body, where they are situated) as also, that the more conspicuous Vessels of the Body have other Vessels that help to make up their Coats, and serve for the Nourishment of the same, besides such as import or export those Liquors, for the Conveyance of which they were designed for common Use.

The Use of the Glands; by Gasp. Bartholin. n. 164. p. 753.

IX. Those Discoveries which have been made concerning the *Pancreatick Duct* and *Juice* by the Industry of later Anatomists, have opened a Way for finding out the Vessels of other *Glands*, and assigning their proper Uses.

For

For a Gland now, wherever it is found, is no more reckoned useleſs or unactive, and only fit to carry off ſome ſuperfluous Humours, but rather ſerves as a Strainer to ſeparate a Fluid from the Blood neceſſary for the Preſervation and Well-being of the Individual. For as the Blood is ſent to all Parts of the Body by Arteries, and before it can return from them by the *Capillary Veins*, muſt depoſite various Particles in ſome of them, which are ſeparated by peculiar Veſſels (commonly called Excretory by Anatomifts) hence that ſurrounding Subſtance between the *Capillary Arteries* and the Orifices of the Excretory Veſſels properly deſerves the Name of a Strainer or Sieve, as it keeps back the whole Maſs of Blood from paſſing, and only allows certain Particles ſecreted from it to get thorough. It is called like- wiſe *Parenchyma*, *Affuſio*, or the Fleſh of the *Viſcera*. So in the Blood, after the mutual Action of the different Humours upon one another, Particles of different Kinds ſeparated from the whole Maſs, find out proper Paſſages for themſelves through theſe Sieves. And whoever rightly comprehends this general Deſcription of a Sieve, will at the ſame Time underſtand the Conſtruction of all the *Viſcera* which have Excretory Veſſels. But ſuch are thoſe *Viſcera* which are commonly called Glands, and which have hitherto been uſed to be divided, upon Account of their Structure and Figure, into the received Diſtinction of *Conglobate* and *Conglomerate*.

The *Conglobate Glands* are thoſe, which have an equal Surface, are formed as it were of one continued Subſtance, and that Kind of *Lymphatick Excretory Veſſels*, which was firſt diſcovered and deſcribed by my Kinſman B. M. But the Diſtribution of theſe *Lymphaticks* through the *Conglobate Glands* is thus. Some of them are ſpread upon the Surface of the Glands in their Origin; ſome go from the concave Part of one Gland to the convex Part of another; and ſome again are continued from the concave Part of theſe Glands to the Place of their Inſertion in the *Vena Cava*, and that either immediately, or by Means of the intermediate *Thoracick Duët*. So that all theſe *Lymphaticks* which carry off the Fluid ſeparated from the Blood in the *Conglobate Glands*, return the ſame Fluid as it were in a Circle back again to the Blood. Such Glands are found in the *Mefentery* between the Veſſels which receive the *Chyle* from the *Inteſtines*, and the Roots of all the Receptacle of the *Chyle* in the Loins near the *Vena Portarum*; between the *Lymphaticks* of the Liver, and the Roots of the ſame Receptacle; in the Loins, Groin, about the Lungs, in the *Maxilla*, the Neck, the *Fauces*, under the Arm-pits, in the *Omentum*, and elſewhere. I remember I once found in an Hoſpital at *Florence*, in the Body of a Woman deceaſed, two *Conglobate Glands* with their *Lymphaticks* of an extraordinary Size, in the Fat between the Skin and the Muſcles of the Abdomen in the left *Ilium*. In the Body of another Woman there who died of a Dropsy, having opened the *Abdomen*, I found it quite full of Water, and all the Glands, which ſeemed more numerous than uſual, appeared to me to be ſchirrous and full of a purulent Kind of Matter. I could not help wondering at the unuſual Number of Glands, and their preternatural Bignefs, the laſt of which I attributed to the contained *Morbifick Matter* diſtending them. But as to the unuſual Number of them, I was in doubt, whether any new
ones

ones could be produced which did not exist there before, or whether those Glands which before were so small as not to be discernable, were now so much increased in their Bulk, as to become remarkably visible, as is certain in the Glands of the Breast, which exist in all, but are more observable in some than in others.

Certainly a true Knowledge of the *Conglobate Glands* must be of great Service in explaining the Nature of that troublesome obstinate Disease the *Scrofula*, and the Symptoms which attend it. For you frequently enough see large Sacks contained within the *Conglobate Glands*, full of either a yellowish, or a Gypseous Kind of Matter, which is easily discovered to be the thicker Parts of the *Lymph*, strained through the Glands, and not finding a free Outlet, gradually increase and form Cavities for themselves. But what is said concerning the Sympathy between the Glands of the Neck and of the *Mesentery*, seeing for the most Part when there are scrofulous Swellings in the Neck, the same Kind of Swellings are found in the *Mesentery*, this is not owing to any immediate Communication between the Neck and *Mesentery*, nor any occult Sympathy that is betwixt them, but to the same Blood depositing the same Kind of Contents into all Glands of the same Nature and Structure. Hence it follows, that if the Quantity of Matter is small, there will either be only one Gland affected, or a good many together, but obscurely; but if the Quantity is large, there will be more Glands filled with it, and if the Nature of the Blood be afterwards changed by resolving Liquors, the above-mentioned Matter being resolved in the Glands, the Humours will disappear.

The *Coglomerate Glands* are composed of various Parts and of lesser Glands as it were, with an unequal Surface. They have only *Lymphaticks* going out from them, and quite of a different Kind from those of the *Conglobate*, seeing they immediately deposite the Liquor secreted from the Blood in the Glands to which they belong, into proper Cavities; as the *Salivary Glands* into the Cavity of the Mouth, and the *Pancreatick* into the Cavity of the *Duodenum*; and all Glands of this Kind, at least those whose *Excretory Vessels* are hitherto discovered, furnish a Liquor, whereby the Resolution of the Aliment is first begun. Hence these Glands are found chiefly in the Mouth, and through all the Tract of the Alimentary Canal, either small and solitary, or heaped up in Clusters. And when they are situated on other Parts of the Body, such as the Glands of the Eyes and Nose, as soon as the Humour secreted in them has besmeared the Eye-Lids, and falling into the Nose (by the Canals called formerly the *Puncta Lachrymalia*) has served, together with the Humour of the Nostrils, for the Application of odoriferous Particles, it is at length derived into the Alimentary Canal, together with the above Humour flowing from the Nose.

If we enquire into the Structure of Glands, we will find, that a great many Things impose upon us by the Appearance of Flesh, as it is commonly called, which are really *Excretory Vessels*, as is the Case in the *Kidneys*, as *Malpighi* observes. For as in the *Kidneys* the greatest Part of the Substance which the Ancients took for Flesh, is composed of very minute
Canals

Canals, through which the Urine flows into the *Pelvis*, and is surrounded by a real Glandular Substance for the Secretion of Urine; so a great Part of it likewise which we consider as a *Parenchyma* or peculiar Kind of Flesh in the Glands, is composed of various Convolutions of small Tubes and *Excretory Lymphatick Vessels*, Nerves, Blood Vessels, and I may add fleshy Fibres, with which the Substance of the Glands is not only surrounded, but connected together.

X. The mechanical Reason of the *peristaltick* Motion of the Intestines is by some Anatomists deduced principally from *annular* Fibres, constituting, according to the received Doctrine, one of the Coats of them. Others are of Opinion, that they are rather numerous, though small *sphincter* Muscles, than single Fibres, to which that Motion is to be attributed; Muscles being in most, if not all other Instances, owned to be the adequate Instruments of Motions analogous to this; and Fibres, though absolutely necessary, yet being no otherwise so than as (a Number of them being collected, and fitly disposed) they constitute a Muscle. But I found it very difficult to conceive how the actuating Matter could be transmitted from one Fibre or Muscle to another, down along the whole Tract of the Intestines, since, according to this *annular* Supposition, each single Fibre or Muscle must be distinct, a latent Contiguity being all that can be pretended. This, and many other Difficulties which occurred to me, put me upon a stricter Examination. I made the first Experiment in a Portion of the upper *Intestines* of an Ox; which, by reason of their Largeness of Proportion to those of most other Species of Animals, seemed fittest for the Trial; afterwards in those of Sheep and Calves, and not only in the smaller *Intestines*, but in the *Colon* and *Cæcum* also. The Circumstances and Result of which Trials are as follow:

*The spiral
Structure of
the Fibres of
the Intestines;
by Dr. Will.
Cole. n. 125.
p. 603.*

To effect a due Disjunction of the Membranes and Fibres (which I found it was hard, if not impossible, for me to make, while it was raw) I was fain to cause the *Intestines* of Oxen to be boiled 5 or 6 Hours, of Sheep 4; whereby the Compages of the Parts were so loosened, that the two outward Coats, *viz.* the common one, and that consisting of *right* Fibres, were easily separated (if it were attempted soon after it was taken out of the Water) from that to which my Search was destined, and left those reputed *annular* ones naked (though, by the Way, too long Cocti-on would prove prejudicial on the other Hand, by too much intenerating the Fibres) These at the Top of the *Intestines*, I attempted to separate from one another; and when those that had been decurtated by the unequal Cutting of the Knife were taken off, I found,

1. That I could not separate a single Fibre from his Fellows to any considerable Distance, all of them (to my Observation) being very small, and in the Separation running smaller and smaller, and withal by reason of their Implication or stricter Cohesion one with another easily breaking; but a Congeries of them (to be observed especially, though not precisely always, in those Places where, by gentle extending the *Intestine* several Times, and then letting it return again, the Cohesion of the several Series of

them became loosened) which, at first View, would resemble a pretty large Fibre, would, without much Difficulty, rise together; the very small constituting Fibres of which Clusters, yet if the Boiling had been very long continued, whereby the Compages was very much relaxed, would, in the raising, be very apt to separate from one another, and appear distinct by reason of their Insertion by and by to be mentioned.

2. That when beginning at the Top, I attempted the Separation of one of these (supposed *annular*) Clusters of Fibres towards my Right Hand (on that Side of the *Intestine*, I mean, which was turned towards me) a whole Ring would come off together (excepting that some *Fibrille*, which rising from contrary Parts, decussated one another at the Top in that *Phasis*, would a little retain it) but endeavouring it towards my Left, I found, for the most Part, I could easily enough unravel that Cluster to a considerable Length, *viz.* That of sometimes more than 2 or 3 Spans, before Ruption (of the whole Cluster I mean) which yet at last it would be subject to. For,

3. Though those Convolutions, as to the greatest Part of them, appeared distinct, yet I found, that from every one of them, at short Distances, some Fibres did obliquely, and the most of them, to my best Observation, according to the Course of those I have mentioned, insert themselves into the next Convolution, and become a Part of it; though withal, some I observed to have a contrary Tendency, and rather seemed to ascend from the lower to the upper Convolution, and help to constitute it, and so to observe the Course mentioned; nay, sometimes would go further than the next Convolution, and running under it, apply themselves obliquely to some higher, which yet being in a smaller Number than the rest that lay in the Order contrary to them, did not very much hinder the Dissociation of the main ones: Which Fibres breaking off, and that in some Places in greater Numbers than in others, would at last (and the sooner if the *Intestine* began to grow dry, which it would quickly do) cause the whole Cluster to break off.

4. I observed, that as the most of these Fibres would by Degrees, according to the Order of the Convolutions, insert themselves into the next, so some of them would (in the same Order) pass over it, and more (so far as I have observed) would run under it, and either adjoin themselves to some more remote, or elude my Searching by hiding themselves under them. This Insertion of these Fibres seems to be the Reason of the *annular Phasis*, that I mentioned even now, in the contrary way of Separation; for the attempting it contrary to their Order, must hinder in some measure the ready Dissociation of the next Convolutions upwards; especially near the severed Extremity, where there is less Resistance of the adjacent Parts; the mentioned Fibres also seeming somewhat bigger, and consequently stronger, in the upper, than after their Insertion into the lower Convolution: Though indeed,

5. I found, that if I began at a lower Part of the *Intestine*, and tried to unravel upwards, there was not much more Difficulty in so doing, than when beginning above, I attempted it downwards; of which the Reason, I suppose, might be the Tenderness of the Part occasioned by long Boiling,
where-

whereby I could not perhaps judge of the Degrees of Renitency in those small Fibres. In this contrary Way of Separation too, the Operation, I observed, would not succeed unless I attempted it in the contrary Order, *viz.* towards my Right Hand.

6. When, before Boiling, I caused the Inside of the *Intestine* to be turned outward, as I did in two Trials, and afterward by taking off the glandulous and vascular Coats (which I think to be distinct from one another, as I said before of those consisting of Right Fibres, and the supposed *annular* ones) endeavoured to unravel the Fibres, I found they would come off in the contrary Order, *viz.* from my Left Hand toward my Right; which I conceive confirms the Observation above delivered, in regard the *Intestine* being inverted, the Order of Separation must be so too; though I found (or thought) the Operation more difficult, by reason of some Fibres lying in the opposite Order (mentioned under the third Particular) and in this Appearance lying uppermost.

7. In one of these Attempts of unravelling the Fibres of the *Intestine* of an Ox, so inverted, I found, that though the Fibres I took up came off in the Order I just now mentioned, yet running over some others, they made a more oblique Excursion, and for 2 or 3 Convolution left betwixt them a considerable Area of Fibres, amounting (according to my Conjecture) to 5 or 6 times, or more, the Breadth of those that so came off, till going deeper and deeper among the other Fibres, and at last running under them, they could be no longer traced, but brake off. Whether this be usual, or only *Lusus Naturæ*, I cannot determine.

8. I found it much more difficult (in that one Trial I made) to unravel the Fibres of the *Cæcum* than the other *Intestines*, which seemed more interwoven than those of the rest, and to have contrary Tendencies one among another.

This is the Sum of my Observations hitherto concerning this Coat, which I take leave to think one *concave* and *helical Muscle* (if I may so stile it) And that it might be supposed such, the forementioned Insertions seemed to evidence, they appearing to me in the separating appositely enough to represent the Fabrick of a Muscle delivered by the accurate *Steno*. Where the Tendons of it are fixed, is not evident; but if I may have the Liberty to conjecture, I should think the upper of them to be radicated (at least) at the *Pylorus* (if not as high as the *Sphincter Gulæ*, if this be not it) since the carneous Coat of the *Stomach* being, by the Learned *Dr. Willis*, found to be a Muscular Contexture, and there being a Continuation of Motion between that Part and the *Intestines*, it seems to me not altogether improbable they may be but one Muscle; and the other at the *Anus*.

XI. In the Dissection of a Dog, in July 1685, I observed that the *Peri-* The Motion of
staltick Motion of the *Guts* was continued through the *Stomach*; the *Pylorus* the Stomach
 (that usually appears, after opening the Dog, as high as the *Diaphragme*) and Guts; by
 being in every waving brought below the very Bottom of the *Stomach*, I Dr. Chr. Pitt.
 could n. 243. p. 278.

could manifestly observe a Constriction in the Middle of the *Stomach*, at every Motion downward, passing it in so as to be able to compress what was contained in its Cavity: And these Motions were as regular and orderly as ever I saw it in the *Guts*. I have since seen the same Motion in 2 or 3 others; so that one may safely conclude it holds true in all. The Motion of the *Stomach*, being after this manner, may give us a clear Account of the Quickness of the Distribution of the Nourishment; the Meat being no sooner opened by the Spittle and Liquor that we take in, than that it has a free Motion by the Descent of the *Pylorus* into the *Intestines*, which is almost *pleno flumine* from this Compression in the Middle of the *Stomach*.

The Cure of a Horse staked into his Stomach; by Dr. J. Wallis. n. 219. p. 178.

XII. My Son (Mr. J. Wallis, of *Soundes* by *Nettlebed* in *Oxfordshire*) had a Horse, which in Harvest-time 1695, leaping over a Hedge, chanced to stake himself very dangerously. A Boy being sent for him, rode home upon him about 4 o'Clock, without discerning the Hurt, till (upon his alighting) he found his own Legs bloody, and then discerned the Wound, somewhat behind the Fore-Legs, a little inclining to one Side. When the Farrier (*Tho. Bishop jun.* of *Wallingford*) came, which was not till after 10 o'Clock that Night, he searched the Wound; and after he had enlarged it in the outward Skin and Rim of the Belly, he found a Wound in the *Ventricle*, or *Maw*, at least 3 Inches long: He then removed the *Maw* outward, and ordered a Servant to cleanse it from the chewed Grass, and whatever he found in it, as being less likely to gangrene when empty. The *Maw* being thus cleansed, the Farrier sewed up the Wound therein, and then thrust it back into the Body; and then sewed up the Wound in the Rim of the Belly: The Wound in the outward Skin he did not sew up, but only tacked it loosely together about the Middle, leaving Room on both Sides to put in Tents and Medicines for the healing of it. The Horse after this continued for some Time much indisposed, but in a Month or six Weeks Time (with careful Attendance) the Wounds were closed and perfectly cured; and the Horse worked at the Plough and other Services as before.

A Knife cut out of the Stomach; by Mr. Will. Clerk. n. 250. p. 97.

A Knife swallowed by a Lad in Saxony; by — n. 219. p. 280.

XIII. Amongst the Rarities in the *Anatomy-Hall* at *Leyden*, there is preserved a Knife, 10 Inches in Length, which was cut out of a Peasant's *Stomach*, and he lived 8 Years after.

XIV. Jan. 3. 1691, one *And. Rudloff*, a Country Lad, near *Hall* in *Saxony*, about 16 Years of Age, playing Tricks, with a Knife in his Mouth, it accidentally slipped down his Throat into his *Stomach*. The Knife was in all about 6½ Inches long with a Harts-horn Haft: The Curiosity of the Case did oblige *M. Wolfgang Christ. Wesenern*, Physician to the *Electo*r of *Brandenburg*, to take Care of him. The Knife was felt to have changed its Position several Times; and after a few Months, ceased to be very troublesome, and in about a Year was so much diminished, as to be difficult to be felt from without. Not long after, an angry Tumour, with Inflammation,

Inflammation, broke out 3 Fingers Breadth below the Pit of the *Stomach*, which being ripened, the *Apoſthem* was opened *May 24, 1692*; and being kept open, the Point of the Knife firſt appeared thereat, *July 18* following. The Point they faſtened with a Silk-Thread, and the Wound being widened, the Knife was drawn out thereat *Aug. 2.* (a Year and 7 Months after it had been ſwallowed) and, in a little Time, the Lad was perfectly well. The Knife was exceedingly conſumed in all its Dimenſions.

XV. About 10 Years ago, my Son *Will. Underhill*, aged about 3 Years, ſwallowed by Accident two Copper-Farthings, but Half a Year one after the other. Upon the firſt Farthing, he eat nothing for 10 Days, and complained of a great Pain at his *Stomach*, and droveled as if he had been Salivated; and often ſaid, he had a nauſeous, venomous Taſte in his Mouth, the Farthing not coming from him in Half a Year. After the ſwallowing of the ſecond Farthing, he began by Degrees to loſe his Limbs, his Breſt growing narrow, and the Child conſumptive; who was after perfectly cured by the *Bath*, and his Breſt dilated and grew broad as before.

Two Copper-Farthings ſwallowed by a Child in Worcester; by Mr. Hen. Underhill. n. 246. p. 424.

XVI. 1. In *Feb. or Mar. 1692*, one *Tho. Gobſill*, of *Shelden* near *Coleſhill* in *Warwickſhire* (a lean, ſpare Man, aged about 26 or 27) told me, that about 3 Years before, he was extremely tortured with Wind: And one Day making a Complaint to an old Woman in the Neighbourhood, ſhe adviſed him to ſwallow round white Pebbles, which he did as oft as he had Occaſion; and the Stones paſſing eaſily through him, he found great Relief. But after ſome Months, being ſeized with a violent Fit, he ſwallowed as uſually about 9 Stones; which not paſſing he repeated the Doſe, till he had taken above 200. He had theſe Stones in him above 2 Years and a Half, when he firſt came to me, and then complained that his Appetite was gone; that he could digeſt nothing, but threw up every thing he eat. Upon examining his Belly, I found the Stones lay almoſt as low as the *Oſ Pubis*; and thruſting my Fingers juſt above that Bone, ſo that the lower Part of the *Abdomen* might lie on my Hand, I could, with the Motion of my Hand, ſhake them and make them rattle, as if they had been in a Bag. Hereupon I cauſed a Ladder to be ſet againſt a Wall, and hung him up by the Hams upon it, with his Head downwards; when in this Poſture, he told me the Stones were got up to his *Stomach*; but being ſet down upon his Feet, after a very ſmall Time, we could plainly hear the Stones drop diſtinctly one after another.

A Diſeaſe cauſed by ſwallowing Stones; by Sir Ch. Holt. n. 253. p. 190.

If his Body be not *laxative*, he vomits all he eats or drinks; to prevent which he commonly keeps it open with Whey. As he lies in Bed, the Stones will ſometimes get up (as he expreſſed it) almoſt to his *Heart*, and give him great Diſturbance; at which Times he is forced to get upon his Knees, or to ſtand upright, and then he can hear them drop, as is before-mentioned; and at ſuch Times he can always count above 100. He is ſo diſabled by theſe Stones, that he cannot work but in Pain, and then he finds the ſame Night, and the next Day, a great Soreneſs in the Bottom of his Belly, and voids large Quantities of Blood by Stool. He has been under the Hands



of several Quacks: Some had vomited him with *Stibium*, and purged him; others purged and glystered him; but all the forcing Medicines they made use of, could never bring one Stone from him.

Remarks on it,
by Dr. Sloan.
Ib. p. 192.

2. Some People (who see Birds languish, unless they swallow Gravel or small Stones) take up an Opinion, That the swallowing Stones helps the *Stomach* to digest their Food: But I have been always against this Practice; because though the *Stomachs* (or *Gizzards*) of Birds (they wanting Teeth to grind their Food) are made very strong, muscular, and defended in the Inside with a Coat, by the Help of which, and these Stones, their Victuals are ground; yet the *Stomachs* of Men being very different, 'tis not reasonable to think they should be of Use to them. I knew one Mr. *Kingmill*, who used to swallow for many Years (if I remember right) nine at a Time once every Day, without any Injury. They were near as large as Walnuts, roundish and smooth, and he found they always passed: But afterwards he died suddenly.

Prune-Stones
breaking out
at the Navel;
by Mr. Green-
hill. n. 265.
p. 617.

XVII. Sir *Fran. Butler's* Lady being surprized with a large and painful Tumour of the *Umbilicus*, consulted Dr. *Eeles* and Mr. *Knowles* about it. After some Time, it broke of itself, and discharged a great Quantity of Prune-Stones; and notwithstanding all the Care could be taken of it, she died in about 20 Days.

A rusty
Needle break-
ing out at the
Side; by Mr.
Greenhill. *Ib.*

XVIII. A Servant to Sir *Anthony Keck* complained of a Pain and Hardness of his Right Side, which had continued more or less for 12 Years, and was observed to approach daily nearer the Skin. I made an Incision, and plucked out a rusty broken Needle with my *Forceps*, which he thought he might have formerly swallowed. It stuck in a manner so firm in the Flesh, as if it had been fixed in Wood, so that it could not be extracted without some Violence, and a small *Hemorrhage*.

The Glandulæ
Miliares; by
Dr. M. Lister.
n. 95. p. 6062.

XIX. The *Glandulæ Miliares* of the *small Guts*, which may also in some Animals be well called *Fragi-formes*, from the Figure of the one Half of a Strawberry, I take to be *excretive Glandules*, because *conglomerate*.

A Bed of
Glands in the
Stomach of a
Jack; by Mr.
Musgrave. n.
162. p. 699.

XX. Aug. 19, 1684, Mr. *Musgrave* took Notice, in the *Stomach* of a Jack, of a large Bed of *Glands*, making about $\frac{2}{3}$ of the Inside of the *Stomach*, and seated near the *Pylorus*. The whole Bed appears of a Brownish Red Colour, and is divided into several Ridges, which run parallel to one another, and the same Way with the *Stomach*. For the better Contraction of that Part, especially when empty (at which time these *Glands*, being fixed to the inmost Coat, are, together with it, drawn up into Wrinkles) that Edge of this Bed of *Glands*, which is nearest the Head of the Fish, is dented, the Ridges breaking off on a sudden; but at the other End, a little on this Side the *Pylorus*, they diminish almost insensibly. By these *Glands* he supposes at least a considerable Share of the *Menstruum* (the great Efficacy of which makes this Fish a fit Subject to illustrate the Nature of *Digestion*) is separated

rated from the Blood; for Blood Vessels may be seen in great Numbers, on the other Side of the *Glands*, and inner *Tunic*, by separating it and them from the Middle and Musculose *Tunic*: And, as a farther Argument of this Use of these *Glands*, he has observed, that that Part of the *Stomach* where they are, is generally moister than the other Part near the Mouth; and that in dissecting Jacks whose *Stomachs* have been filled with some large Fish of the Pinnaceous Kind (which must enter with the Head foremost) the Head and fore-most Parts of the devoured Fish have, as far as the *Glands* reach, been either actually dissolved or fairly turning into a Mucilage; whereas, at the same time, the other, and less bony Part of the included Fish, being not yet come within the Power of the *Menstruum*, has still retained its Form and Consistence.

Figure 13, represents the Inside of the *Stomach* of a Jack which was one Foot and 8 Inches long; the *Stomach* itself, about $8\frac{1}{2}$ Inches. *AAAA*, the Bed of *Glands*. *BBBB*, that part of the inward *Tunic*, which reaches from the Bed of *Glands* to the Mouth of the Fish: It appears much whiter than the *Glands*; the Fibres run the same way with the *Stomach*. *C*, the Entrance into the Passage which leads to the *Bladder* of Air. *D*, the *Pylorus*. *E*, the Hollow of the *Stomach* continued beyond the *Pylorus*.

Explication of
the Figures.

Fig. 13.

Figure 14, represents the other Side of the Bed of *Glands*, separated together with the inner from the middle *Tunic*, and great Numbers of *Capillary* Vessels belonging to the *Glands*, but broken off in Separation.

Fig. 14.

XXI. 1. I here give you an Account of an *Artificial Digester*, which I hope may something illustrate the Natural One. The Taste of it is like Meat vomited out of a full *Stomach*, something soure, but will not ferment with an *Alkali*. It is prepared from *Spirit* of Sulphur, *Spirit* of Hartshorn, the *Chyle* of a Dog, and the *Saliva*: It is Pellucid, and without any Smell; the *Salt* that it shoots into is *Cubical*. Upon Veal it afforded these *Phænomena*: Into a *Dram* of this Liquor I put a Piece of Veal about the Bigness of a Nut, and set it upon a digesting Furnace; in two Hours Time there came from the Meat a Liquor that had the Colour and Taste of *Chyle*, and the Meat afterwards was lighter, dry, and insipid. And it afforded the same *Phænomena* also in Beef, Mutton, or any other Meat that I could meet with. From these Observations we may reasonably conjecture, That by some such *Menstruum* the Meat is digested in the *Stomach*.

Experiments
concerning Di-
gestion; by Mr.
Ch. Leigh.
n. 162. p. 694.

I would not here be thought to affirm, That by a *Liquid Menstruum* alone the Meats are digested, but that there are likewise required these further Requisites, in some, or in most Creatures. 1. That the *Stomach* receive a gentle Heat from the *Liver*. 2. That the *Stomach* have a natural Situation. 3. That it be assisted by the *Omentum*. This may be argued from those Creatures that have no *Caul*, helping *Concoction* by doubling their hinder Legs, and resting their Bellies upon them, as *Hares* and *Conies*.

4. That

4. That the *Stomach* have a *Tunica Villosa*; 1. Because that by that it is enabled to divide the Meat into Parcels, which undoubtedly must much facilitate the Operation of the natural Ferment. 2. If it had not a *Tunica Villosa*, the *Tunica Carnosa* would be apt to be too much distended by our Meat and Drink, which would necessarily weaken the Tonical Motion of the *Stomach*. 5. That there be *Windings* of the *Intestines*; for if it were not for these, the *digested* Meat would move too fast from the *Stomach*, and so torment us with perpetual *Hunger*.

The *Ingredients* of the *Natural Ferment* I take to be these; the *Saliva*, the *Succus* of the *Glands* of the *Stomach*, and a *Nitro-Aerial Spirit* of the *Nerves*. That the *Saliva* is an *Ingredient*, may seem probable from these Reasons; 1. Because that by the Help of this, Meats, though impregnated with different Principles, may be made to mix with a *Menstruum*. 2. Since the *Saliva* is impregnated with a volatile Salt, it is probable, that that too may help *Digestion*. The second *Ingredient*, I take to be a *Liquor* that is separated by the *Glands* in the Bottom of the *Stomach*: For, besides the Authority of the famous *Willis*, and *Sylvius de le Boe*, it is observed, that those Creatures which have the most of these *Glands*, are the most voracious. Lastly, That the *Nitro-Aerial Spirits* of the *Nerves* are an *Ingredient* of the *Stomachical Ferment*, seems reasonable from the Arguments of *Dr. Mayow*, who argues thus: *Jam vero cum Spiritus Animales e Particulis Nitro-aereis constant, haud difficile erit intellectu quomodo Effectus praedicti ab iisdem in Ventriculo perficiuntur. Quamquam enim Spiritus Nitro-aereus Acidus non est, ab eodem tamen Ferrum corroditur, Vitriola perficiuntur, Salia Fixa ad Fluorem perducuntur, Rerumque Compages tanquam ab Universali Menstruo solvuntur.*

Pharm. Ration. p. 6.

Syl. de la Boe. p. 881.

Mayow, p. 55.

By *Mr. Musgrave*, n. 162. p. 699.

2. *Aug. 19, 1684.* Part of a Mucous Substance taken out of the *Stomach* of a Jack, near the *Pylorus*, and mixed with *Solution* of *Sublimate*, became much whiter than it was before. Another part of it, mixed with *Syrup* of *Violets*, turned Green.

The like Effects were observed by mixing a *Liquor*, found in the *Stomach* of a Hedge-hog, with *Syrup* of *Violets*, and with *Solution* of *Sublimate*.

These Experiments may be urged as an Argument against the Existence of an *acid Ferment* in the *Stomach*. It seems probable, that the great Work of *Digestion* proceeds from a *volatile Alkali*.

The Manner of Concoction; by *Dr. Clopton Havers*, n. 254. p. 233.

XXII. It has been the Opinion of some Physicians, That the *Concoction* of the Food is a kind of *Elixation*, and that the grosser and more solid Parts being as it were Boiled in the Liquid by the Heat of the *Stomach*, and the Parts adjacent to it, as the *Liver*, *Spleen*, and *Omentum*, are by a long and continued *Elixation* first rendered more tender, and then colliquated and dissolved into minuter Particles, so as to mix more equally with the Fluid, and with that to make one Pulpament, or *chylous Mass*. Others have supposed it to be performed by *Attrition*, as if the *Stomach*, by those repeated Motions, which are the necessary Effects of *Respiration*, when it is distended by the Aliment, did both rub or grind off some minuter Particles from the grosser Parts, and by continually agitating the Mass of Food, make

make those Parts, which are not contiguous to the *Stomach*, strike one against another, and break one another in Pieces, until they are all attenuated. Others think that the *bilious Juice*, others, that the *Spirits* are chiefly concerned in this *Affair*. Others there are that will have the Food *dissolved* by a *Menstruum*, which is supplied from the *Glands* of the *Stomach*, or some other way: But these differ in their Notions of the Nature of the *Menstruum*; for there are some that suppose it to be an *Acid*, which does erode the grosser Parts of the Food, and dissolves them in the same manner as *Vinegar*, *Spirit of Vitriol*, or any such like *Acid*, will dissolve even so solid a Body as Iron. And it cannot be denied, but that *Oil of Vitriol* will dissolve *Flesh-meat*, and reduce it to a Pulp. But it is not to be supposed, that the *Fibres* of the *Stomach* can admit any such strong and corroding *Acid*, without something to correct it, but it must be injured in its Tone, and labour under great and extraordinary Pains. Neither does such a *Menstruum*, though it will digest some Things, seem capable of dissolving so great a Variety of Things as we eat, especially when a great many of them are of a contrary Nature. Some will have the *Menstruum* to be a *Nitro-aereous Spirit*, that is quick, and very penetrating, and included in its proper Vehicle; which, being in its own Nature apt to penetrate the Mass of the Aliment, does diffuse itself through the whole, and breaking the *Vinculum* of the most solid Parts, does dissolve their Compages. By others it is thought to be some *saline Juice* in the *Stomach*, by which the Parts of the Aliment are divided and dissolved, and those which are fit for Nourishment are volatilized. Lastly, There are some who suppose the *Digestion* of the Food to be performed by the Benefit of a *Ferment*, which, when it is mixed with the Aliment, excites in the Mass an intestine Motion, and the different and contrary Motions or Tendency of the Parts, making some kind of Collision, gradually break off Particles from the grosser and more solid Parts, till they are so attenuated as to be apt to mix more equally with the fluid, and with them to make one soft, or *chylous* Substance. But these also differ in their Opinion of this *Ferment*: For some think it to be the *Remains* of the *Food* that was last *digested*, which having lain some Time in the *Stomach*, after the rest is carried down into the *Intestines*, contracts an *Acid*, or some other Quality, and is so altered as to partake of the Nature of a *Leaven*. And this *Leaven* being a part of the Food, which has been already *digested*, is so soft and liquid as to be capable of mixing with the Aliment which is next taken into the *Stomach*, and being agitated with it by the repeated Pressures of the *Diaphragm*, *Liver*, and *Abdominal Muscles*, upon the *Stomach* in Respiration, does diffuse itself through the whole Mass, and being mixed with it like *Leaven*, or *Yeast* added to new Wort, &c. puts it into a State of *Fermentation*, and by this *Fermentation*, or the Expansion of the *Ferment*, and the more tenuious Parts, which are first put into Motion by it, those which are more solid, and with which they are intermixed, are rent and divided, and so attenuated as to become a soft and pulposus Matter. And although the greatest Part of the Food, that is thus broken and concocted, is by the Contraction of the Fi-

bres of the *Stomach* pressed into the *Duodenum*, yet they do not contract themselves so as to force out all the Aliment, but leave between the *Rugæ* or Folds on the Inside of the *Stomach*, a sufficient Quantity to be a *Leaven* to the next Meal; and so from Time to Time. Some have a Notion, That this *Ferment*, or Principle of *Fermentation*, is in the Aliment it self; which being a Congeries of Matter, consisting of various Parts of a different Nature, is no sooner inclosed in the *Stomach*, and digested in the Heat of that and the adjacent Parts, but the more spirituous and subtile Particles are put into Motion, both from that Warmth and the Difference of their Natures, and enter upon a *Fermentation*; and so by their intestine Commotion, and the Violence they offer to those Parts which oppose the Tendency of any of them, they break and dissolve what is more solid. Again, some suppose, That this *Ferment* is supplied from the *Glands* of the *Stomach*. And *Lastly*, others, and perhaps with much better Reason, contend for the *Saliva*, and make that to be the *Ferment* which serves principally for the *Digestion* of the Food; which in *Mastication* being mixed with our Aliment, is with that carried down into the *Stomach*, where the Parts of it being put into Motion by a kindly and agreeable Heat, they do *ferment* with, and exagitate first those Parts of the Food which are most apt to *ferment* with it, then both conspire to break and dissolve the grosser and more stubborn Parts.

But according to my *Hypothesis*, *Concoction* is performed after this Manner: In order to the more easy and effectual *Digestion* of the Food, Nature has appointed some Parts for the breaking our Aliment, and reducing whatever is gross into smaller Parts, before it is put upon *Digestion*: Others, to supply the *Ferment* by which it is to be dissolved and concocted, and which, before it comes to be included in the *Stomach*, does moisten, and make it more soft, that it may more easily be penetrated and broken by those Parts which serve to divide every Morsel into smaller Pieces, and prevents the Inconvenience and Trouble which would arise from the Nourishment sticking about, or between them, when it is dry or viscous.

For the Breaking of that Part of our Food which is not liquid, Nature has furnished us with *Teeth*, and those of two Sorts: For some are ordained to divide and break off smaller Morsels from a larger Mass; others are made for the Grinding those Morsels into much smaller Parts. The *Teeth* which serve to break off Pieces of a convenient Magnitude from a larger Mass, are of two Sorts, accommodated to the Nature of the Substance which we eat. These are the *Incisores*, and the *Dentes Canini*. If the Substance which we have to eat be not hard, but more easily penetrated and divided, then the *Incisores* are capable of making an Impression upon it, and fixed firmly enough in the *Jaw* to break off that Part which they take hold of. But if it be more solid, and not easily penetrated, nor any Piece without Difficulty to be separated from that Body whereof it is a Part, then we apply the *Dentes Canini*, or *Eye-Teeth*, to it, which are not spread, nor have such an Edge as the *Incisores*, but are sharp and pointed like an

Awl,

Awl, and so do more readily penetrate a Substance that is hard, and which the *Incisores* can scarcely make any Impression upon. And as the Parts of a more solid Body are commonly with more Difficulty separated, and there must be a greater Strefs put upon those *Teeth* which pull it into Pieces, so these *Teeth* are much more firmly fixed in the *Jaws* than the *Incisores*, though they have but one single Root. Besides, the Position of all these *Teeth* is accommodated to their Use, as being planted opposite to the Aperture of the Mouth, so that they may be conveniently applied to the Substance which we have to eat before it is broken, and when it is too large to be admitted within the Mouth. The *Teeth* which do by a Compression and Attrition reduce the little Morsels to smaller Parts, are, from the Manner in which they break the Aliment, called *Dentes Molares*, because they do, like so many little Mill-stones, grind the Food between them. And that they might be rendered fit for this Purpose, they are made broad at that Extremity which stands out of the *Gums*, by which Means they retain some Quantity of the Food between them every Time the *lower Jaw* is pulled up and forced against the *Maxilla Superior*. And as they are Broad, so they are formed with Inequalities and Protuberances, and by the Motion of the *lower Jaw*, from one Side towards the other, they grind what they have between them into Pieces. The Position of these *Teeth* too is as convenient as that of the *Incisores*, and the *Dentes Canini*: For being designed to break those Pieces of our solid Food which are taken into the Mouth, and these Pieces when they are compressed and moved by the *Dentes Molares* being apt to fly out of the Mouth, if there were no Contrivance to prevent it, they are placed beyond the Aperture of the Mouth, and opposite to the Checks, which keep the Food within that Cavity; and not only so, but press it in between the *Dentes Molares* on one Side, as the Tongue does on the other, until they have sufficiently broken and divided it.

At the same Time, whilst the *Dentes Molares* are breaking the Food, there flows into the Mouth a *salival Juice* which mixes with it, and not only serves to moisten it, and to render it more apt and easy to be divided, but seems to be the *Ferment*, by the Benefit of which the Food is dissolved and *digested*: And therefore it is intimately mixed with it by the *Teeth* agitating or stirring them together in *Mastication*. This Liquor, which we commonly call the *Saliva*, or Spittle, seems to be a Composition made of two several Juices, very different in their Nature. And therefore the several Parts of it are separated by their proper *Glands*, and Nature has planted no fewer than 4 Pair about the Mouth, which supply the Juices that make the *Saliva*; to wit, the *Parotides*, and the *Glandulæ Nuckianæ*, the *Glandulæ Maxillares Internæ*, and *Sublinguales*. Of these two Juices, I think one to be an *acid*, the other an *oleaginous Liquor* something like Oil of *Turpentine*. For amongst many Experiments this gave me most Satisfaction: I took a Piece of raw Flesh, and having cut it into pieces, but much larger than what our more solid Food is reduced to by due *Mastication*, I mixed some Crumbs of Bread with it; then I poured in Oil of *Turpentine* to them, and upon that Oil of *Vitriol*, and having shaken them together, I digested them about 4 Hours in *Balneo Ma-*
ria,

ria, and then shaking them again in the Glass, I found the Meat dissolved, and they all became a thickish Pulp. I could not but take Notice, that Oil of *Campfire* (though it does not otherwise seem much different in its Nature from Oil of *Turpentine*) and Oil of *Vitriol*, which upon Mixture will produce an Effervescence as well as the Oil of *Turpentine* and Oil of *Vitriol*, yet did not touch the Meat upon which I poured them, so as in the least to dissolve them. I cannot deny, but that an *Acid* and a Solution of *Salt of Tartar* did dissolve some Part of the Flesh Meat, which I mixed them with, but yet neither so soon nor so perfectly as the two fore-mentioned Oils. And I do the rather think one of those Juices, which constitute the *Saliva*, to be of the Nature of Oil of *Turpentine* than of *fixed Salt*, because it will correct and temper even Oil of *Vitriol*, so as to render it more tolerable to the Fibres of the *Stomach*. Not that I suppose the *acid* Part of the *Saliva* to come near to the Acidity of Oil of *Vitriol*: For though when they are mixed, they will make a Liquor that may not be injurious to the *Stomach*, yet the *acid Juice*, if it were so corrosive as Oil of *Vitriol*, would certainly be injurious and painful to the *salivatory Ducts*, which convey it to the Mouth before it is mixed with the *oleaginous Liquor*. But I only say, it is an *Acid*, and in some Degree approaches to the Nature of that Oil.

I do also conceive, that 4 of the 8 *salivatory Glands*, or 2 Pair of the 4, do supply one of these Juices, and the other 4 *Glands*, the other. And this seems to be a very good Reason why they are so planted, and the Orifice of their *Ducts* so ordered, that the *Juice* which is supplied by one *Gland*, is discharged into the Mouth very near to the Orifice by which the Juice of a different Nature is transmitted from another; so that they must necessarily meet and mix together. Thus the *Glandulæ Nuckianæ* and the *Parotides* throw in two different Juices by Orifices which open into the Mouth very near to one another, and the *Glandulæ Maxillares Internæ* and *Sublinguales* do below supply the same Kind of Juices by Orifices, that open so near to one another as to secure the Mixture of the two different Juices. These *Glands*, I say, do between them afford two divers Sorts of Liquors, of such a Nature as are apt to ferment upon their first Mixture, but perhaps more considerably when they come to be digested by the Heat of the *Stomach*. So that the *Colluctation*, or *Fermentation*, which attenuates and concocts the Food in the *Stomach*, does not ordinarily arise between the *Aliment* and the *Saliva*, but between the several Parts of the *Saliva* it self. And indeed if the *Saliva* did not consist of two Juices whose Nature is in such a Manner different, as to render them apt to ferment upon their Mixture, it would be very hard to conceive how it should so readily and indifferently serve for the *Digestion* of all Eatables; how it should ferment with, and dissolve so great a Variety of Things, not only of a different, but of a contrary Nature; how it should ferment with *Acids* as well as *Alkalies*; digest Things that are cold as well as hot or temperate; some Things that are salt, others that are insipid; bitter and sweet; mucilaginous, oily, &c. But if we suppose that the *Fermentation* which serves for the Digestion of the Food, arises from a peculiar Difference in the Nature of two Juices which constitute

constitute the *Saliva*, it will be easy to give a rational Account of our *Concoction* of innumerable Things of a different Nature. And this seems to be as effectual, and a more certain Way to attenuate and dissolve the grosser Parts of our Food, than if the *Fermentation* were made only between the *Saliva* and the *Aliment*: Besides, the *Saliva* seems to discover a *Fermentation* upon the Mixture of its constituent Juices, even at those Times when we do not actually eat; for it is always attended with Bubbles, and a Froth, when it has not been at all agitated in the Mouth, and many of those Bubbles will remain for some considerable Time after we have spit it out.

Nature therefore having appointed the *Saliva* for the *Digestion* of the Food, has taken Care that it shall be thrown in upon the *Aliment* on every Side. Thus the *Glandulæ Nuckianæ* and the *Parotides* supply their Juices to that Part of the Food which lies on the Outside of the Gums, between the Cheeks and the Teeth, and the *Glandulæ Maxillares Internæ* and *Sublinguales* do bestow their Liquor upon the Meat which is within the Teeth and Gums. She hath also had a Regard to the Mixture of the two different Juices of the *Saliva*, which is necessary to its *Fermentation*: And therefore, as I have already observed, the Orifices of the *Ducts* which belong to one Sort of *Glands*, are placed near the Aperture of a *Duct* which conveys a Juice from one of the other *Glands*. So the *Ducts* of the *Glandulæ Nuckianæ* and the *Ductus Stenoniani* do on each Side open into the Mouth near one another; and the *salivatory Ducts* of the *Glandulæ Sublinguales* and the *Maxillares Internæ*, though they have distinct Orifices, empty themselves under the same *Papillæ*; and the Juices, which are supplied by them, meet there and flow into the Mouth together. The *Saliva* being thus mixed, and beginning a *Fermentation*, does partly as it is agitated with the Food by the Teeth and some other Parts of the Mouth, partly by its own Fluidity, insinuate its self into, and mixes with the Food, and not only moistens and softens it, but excites the *Fermentation* which is to dissolve it. And when the *Aliment* is thus mixed with the *Saliva*, which serves to ferment the whole Mass, it is then conveyed into the *Stomach*, that great digestive Vessel of the Body, where it is kept in a *digestive Heat*, and the *Fermentation* not only continued but improved. This *Fermentation* in the *Stomach*, first agitates the more tenuious or subtile Parts of the Food, and puts them into Motion, and so with the *Fermentation* of its own, and those alimentary Parts which it first communicates a Motion to, improved by the *Heat* of the *Stomach*, the *Saliva* must necessarily act upon the grosser Parts. For the intestine Motion which is excited in the Mass, does not give the Particles which are fermented the same Tendency, but what is so various and confused, that they must inevitably strike not only one against another, but against those which are more gross, so as to attenuate them, sometimes by a Collision, which strikes off smaller Particles from the larger Parts; sometimes by a Compression, when the Particles, which are in Motion, happen to strike directly against any grosser Part on every Side of it; sometimes by a kind of Explosion: For without Doubt, the *Saliva*, which is fluid, insinuates itself into the *Interstices* of the more gross Parts
of

of the *Aliment*; and whatever is agitated or expanded in those *Interstices*, requiring a larger Space for the Freedom of its Motion, and offering a Violence to every thing that opposes its Tendency, will, like Gunpowder included in a Shell, force its Way out, and tear to Pieces that Matter which does endeavour to confine it. Thus the grosser Parts are broken and divided, until they are at last so far attenuated, as to mix more equally with the fluid, and with them to make one Pulp, or *chylous Mass*. And although I do not apprehend how the *Stomach* should, by its reciprocal Motions, in Inspiration and Expiration, be able to break and attenuate any Matter that will not be softned and dissolved by Agitation in a Liquid; yet it is certain, that these Motions caused by the *Diaphragme* and *Abdominal Muscles* in Respiration, do make those Parts which are broken off, as they are dissolved, mix more intimately with the Liquid, as the Meat, which I digested with *Oil of Turpentine* and *Oil of Vitriol*, did, by Agitation, mix more equally with the *Oils*, and became a Pulpament.

It is further probable, that from the Mixture of the two *Juices* of the *Saliva*, and their *Fermentation*, there results such a *Tertium quid* as is apt to ferment with the *Bile*. And therefore, when the *Aliment* has been under the *Fermentation*, excited by the *Saliva*, a sufficient Time, it is then thrown into the *Duodenum*, where it meets with the *bilius Juice* which flows into that Intestine from the *Liver*, from which a new *Fermentation* seems to begin; and the Commotion of the Parts of the *Aliment* being still continued, does carry on the Business of the *Digestion*, until the Food is perfectly concocted. Though it is probable, that this new *Fermentation* serves not only for the more perfect *Digestion* of the Food, but likewise for the Separation of the *Chyle* from the *fæculent* Parts. And I was confirmed in the Opinion, that from this Mixture and *Fermentation* of the two *Juices*, which constitute the *Saliva*, there results a Matter which is apt to ferment with the *Bile* by this Experiment. The *Bile* being generally allowed to have much of a *saponary* Nature, I made a Solution of *Soap* in fair Water, and mixed it with the *Oils* of *Turpentine* and *Vitriol* first put together, and from their Mixture, I observed a very easy and gentle *Fermentation*, which continued for a considerable Time.

The Colour of
the Chyle in
the lacteous
Veins; by
Dr. M. Lyster.
n. 95. p. 6060.

XXIII. 1. It hath been long in my Thoughts and Desires, to have discovered the actual Passage of the *Chyle* into the *lacteous Veins*; of which yet I never doubted, as I find some do at this Day. The Difficulty lies in the certain and unalterable Character of the *Chyle's Whiteness*, especially when received into those *Veins*. And yet it is certain, that in a *Diabetes* the Urine retains all the Qualities of the Liquor drank. Also in that famous Instance of those that eat the Fruit called the *Prickle-pear* (if I remember right) their Urine hath affrighted the Eater with the Colour of Blood, that is with the not altered Colour of the Juice of the Fruit. In these Instances, at least, we cannot doubt but the *Chyle*, even in the *lacteous Veins*, was qualified according to the Food and Drink.

To effect then something to this Purpose, we laced the Skin of the *Abdomen* of a Dog loosely for a Hand's Breadth; and then opening it underneath the Stitches, we took out either the *Duodenum*, or any other Part of the *Tenuia Intestina*. The *Gut* took out we opened with a very small Orifice, and having ready Tinged Liquor luke-warm, we injected it upward and downward. Carefully stitching up the *Gut*, and then drawing the Lace, we unloosed two of the Dog's Feet, laying him on his Side for what Time we thought convenient. The Tinged Liquors we used, were good *Barbadoes Indigo*, dissolved in fair Water, and filtrated; also Lumps of *Indigo* thrust down his Throat; good Broth (as they call it) of a blue Fat; *Indigo* in Milk; *Saffron* in Milk. Again, we tried in some Dogs fed before-hand, and injected the Liquors in the very Height of the *Chyle's* Distribution; into others yet Fasting, and that for a longer or shorter Time. The Success was so constant, that we cannot say we ever did find the least Discolouring of the *Chyle* on the other Side of the *Guts*; that is, within the *laeteous Veins*, but ever *white* and uniform.

But the Success of some latter Experiments was as follows: I caused a n. 143 p. 6. Dog to be fed, and after 4 Hours, or thereabouts, having ready by me a clear Tincture of *Indigo* dissolved in fair Water, and filtered, I opened the *Abdomen*, and making a small Incision in the *Jejunum*, I injected an Ounce or two. This done, we stitched up the *Gut* and all again, and the Dog turned upon his Legs. After one Hour and a Quarter, we cut the Stitches, and then beheld a copious Distribution of *Chyle* and turgid *laeteal Veins*, but as *white* as ever. And yet carefully searching the *Guts*, we perceived none of the injected Liquor any where. Another Dog, which was kept Fasting 40 Hours, had a very little Flesh without Water given him about 5 Hours before the Injection of the Tincture of *Indigo*, which was performed after the same Manner as before, only it was now well warmed, and about 12 Ounces thrown up the *Duodenum*, and down the *Ileon*. Here were empty *Guts*, and not the least Appearance of any *laeteal Veins* in the *Mesentery*. After full 3 Hours, the Stitches were cut again; and carefully examining the *Mesentery*, we found many *laeteal Veins* of an *Azure* Colour, and cutting some of the biggest of them asunder, we plainly saw a thick *bluish Chyle* to issue forth, and to spread itself over the transparent Membranes of the *Mesentery*. Hence it is most evident, that the *Laeteal Veins* receive what they carry from within the Cavity of the *Intestines*.

2. I have found Dr. *Lister's* Experiment to succeed, by Injecting a Pint of a Decoction of Stone-Blue into one of the *Intestina Tenuia* of a Dog kept Fasting 36 Hours; which not only claimed my Assent to his Conclusion, that a coloured Liquor may find Admittance into the *laeteal Vessels*, but also inclined me to an Opinion, that the *Laeteals* frequently convey Liquors which are not *white*. And I am more confirmed in this Opinion by Experiments of these three Kinds.

The Laeteals frequently convey Liquors that are not white; by Dr. William Musgrave. n. 166. p. 812.

1. I kept 2 Dogs Fasting, one 48 Hours, the other 3 Days, and then opened them; in both a considerable Number (above 20 were fewest) of the *Laeteals* appeared *pellucid*, like *Lymphaticks*; only not so full and turgid

gid as those under the *Liver* are generally, or as the *Lacteals* themselves are sometimes seen. I cut several of them in each Dissection, and immediately a *transparent* Liquor flowed out of the Orifice.

2. A Dog, which had neither eaten nor drank in 3 Days, was suffered to lap a Quart of common Water: An Hour after which he was opened, the *Lacteals* shewed themselves in a great Number (perhaps above 60) all *limpid*, from the Liquor contained in them, as in the former Experiments: Part of the Water was supposed to be still in the *Stomach* and small *Guts*; for the Quantity of Water seen there, was far greater than that in the *primæ viæ* of either of the Dogs killed Fasting.

3. Another Dog, after three Days Fasting, had a Piece of fat Meat given him; an Hour and Half after which, he lapped about a Quart of common Water, and Half an Hour after this, was opened. I first tried the *Ductus Thoracicus*, then examined the *Lacteals*; which I saw in as plentiful a Number, and as full as (perhaps) they were ever seen in this Species of Animals. 8 or 10 of them, at the first opening of the Dog, appeared perfectly *white*, very many of a faint diluted *white*; but most of them were *pellucid*, especially at the latter End of the Dissection; by which Time several, which at first were either of a lively, or of a fading *White*, were now grown *transparent*. That I might satisfy myself as to this Difference in the Colour of these Vessels, I opened the *Intestinum Jejunum* and *Ileon* in several Places, and found the Water was got as far as the *Cæcum*, and had carried down divers little Parcels of the Meat with it; by which Means the Liquor seen in the *Lacteals*, at the first View of them, was either of a perfect, or of a diluted *White*, or else *pellucid*, according to the Mixture of the Meat with the Water in the *Guts*.

I ordered about 3 Pints of Broth to be given a Dog, which had been kept Fasting 24 Hours; and opening him 4 Hours after this, I observed the *Lacteals*, beginning at the *Duodenum* (which, with the other small *Guts* and *Stomach* was very much distended with the Matter of the last Meal) all the *Lacteals* that I saw at first were of a perfect *white* Colour; several of which I pressed between my Fingers, drawing them from the Circumference toward the Center of the *Mesentery*; by which Means I found, that the *Chyle* contained in these Vessels appeared *white*, when it ran in a shallow Stream, as well as when it filled the *Lacteals*. Viewing the rest of these Vessels along toward the *Cæcum*, I observed, that near the Middle of the *Intestinum Ileon*, they began to be of a more diluted *White*, and a little farther, they were really *pellucid*, and as turgid, to Appearance, as those that were *white*; after which, turning back again toward the *Stomach*, I saw the same Vessels (I think) in as great Numbers as at first (perhaps above 80) but the Colour of most of them was changed, for they were all now *pellucid*: Some 3 or 4, which I at first cut asunder for my better Enquiry into the *white Chyle* contained in them at that Time, being *limpid* together with the rest. The same Thing succeeded in a Dog kept Fasting two Days, and then opened 3 Hours after he had lapped 3 Pints of Milk, Part of which was seen in the *Stomach* of the Dog: About 15 of the *Lacteals*,
arising

arising from the *Duodenum* were *white*; above 100, proceeding from the *Intestinum Jejunum* and *Ileon*, were more or less *transparent*; as also were those of the *Duodenum* at the latter End of the Operation.

The Experiments of the first Kind do sufficiently prove, That the *Lacteals* convey not only *Chyle* (which results from *Aliments* lately taken into the *Stomach*, and may be called *Liquor Novitius*) but also another Humour separated (as is most probable) from the Blood, and now returning to it again; which (by Means of the aforesaid Experiments) may be seen purely by itself, without any Mixture of the *Chyle* with it. And it seems not unreasonable to derive this *Liquor Refluus*, or at least Part of it, from the Hollow of the *Intestines*, if we consider that the *Pancreas*, and *Glandularum Plexus Fragiformes* (not to mention the *Liver*) do daily discharge a Liquor into the *Intestines*; which (considering that Dogs, after three Days Fasting, will, as I have often observed, have very hard *Fæces* in their *Intestina Recta*) we cannot well dispose of any other Way, than by saying, it re-enters the Blood by the *Lacteals*, and is that very Liquor which conduces to the making some of them appear *transparent* after so long a Fast. It seems also probable, from the same Experiments, that the *Lacteals* are very seldom, or never, all empty at the same Time; for tho' the *Chyle* flows only in certain Tides, or Flashes, *pro ratione Ingestorum*, yet the *Liquor Refluus*, running in a more constant Stream, does, when there is no Flash of *Chyle* going in, keep the *Lacteals* from being absolutely empty. And 'tis farther evident, that this *Liquor Refluus* is, in its own Nature, *transparent*, and passes through the *Lacteals*, after long Fasting, when no *Chyle* is mixed with it; which is no inconsiderable Step to the making out of my Proposition, if we recount how long, and how often, very many *Quadrupeds*, beside Men, do fast from all sort of *Aliment*; during which Time, after the *Chyle* of the last Meal, or Time of Drinking, is all mixed with the Blood, we may suppose, that this *pellucid Liquor Refluus* goes alone into the *Lacteals*.

The Experiments, both of the 2d and 3d Kind, seem to intimate, that a great Part of the *Chyle* itself is, in its Journey through the *Lacteals*, altogether *limpid*. Against which it may be objected, That some of the *Lacteals* were in a like manner *pellucid* in all the Experiments of all the 3 Kinds; and therefore it does not appear, but that they may be filled with a *Liquor Refluus* in the 2 last Cases, as well as (for certain) they were in the first Case. To this Objection, beside what may be answered from the extraordinary Number, and Fulness of the *limpid Lacteals* in the two last Kinds of Experiments, comparing these Vessels with those of the same sort seen in the first Kind (which comparative Excess cannot be imputed to any Cause so reasonably, as to the Matter given the Dogs a little before the Dissections of the two last Kinds.) Besides this, I say, it may farther be replied, That in all the Instances of the 2d and 3d Cases, a considerable Quantity of *Aliment* was taken in by each Dog, not long before his Death; that some of this Matter was seen in the *Primæ Viæ* of every one of them when dead (an Argument it was not all distributed.) That there is no Way

certainly known, by which Liquors are discharged the *Primæ Viæ*, in this Species of Animals, besides Vomiting, Siege, and by the *Lacteals*; and that, seeing neither of the two former took Place, it may not be unreasonable to suppose, that Part of this Matter was, at each Dissection, in its Way through the *Lacteals* to the Blood, all the Operations being at such Distances from the Time of the Matter's being taken in, at which most liquid Aliments are observed to swell up the *Lacteals*.

If therefore the Liquor, seen in the *pellucid Lacteals* of the two last Kinds of Experiments, did in a great Measure (for I by no Means exclude the *Liquor Refluus*) consist of the Matter lately taken in before the Dogs were opened, we may with good Reason imagine, that Water drank on an empty *Stomach* (as it was in the 2d Case) by several other Quadrupeds, and Men as well as Dogs, will pass the *Lacteals*, not under a *white* Colour, but rather *pellucid*; and these Cases are not uncommon amongst us; particularly this seems to hold true in those who drink great Quantities of diuretick Mineral Waters, in the Morning fasting; of which suppose any Person takes and evacuates 3 Quarts by Urine in the Forenoon, and with his Dinner, and in the Afternoon drinks 3 Pints of Beer, or the like (allowing that all the *Chyle* produced from what he takes in at Dinner, and in the Afternoon, amounts to 2 Quarts, and that these 2 Quarts of *Chyle* are perfectly *white*, which in all Probability is not true,) yet, I say, according to this favourable Account, 3 Pints of *pellucid*, for 2 of *white Chyle* will pass the *Lacteals* in this Person in 24 Hours. And what is here said of Water, is not unlikely to be true (*mutatis mutandis*) of several other Liquors, as Wine, Beer, &c. at least so far as that they may not pass *white* through the *Lacteals*, which is sufficient for my Purpose. Again, If this Principle be true, the 3 Kinds of these Experiments will go yet farther, and argue, That the whole Quantity of *Chyle*, arising from some Sorts of Meat and Drink, taken either at, or near the same Time; or from some Sort of Meats taken alone, is not always *white*; for the *Lacteals* which appeared perfectly *white* in the several Instances of the 3d Kind, were far inferior in Number to those that were *pellucid* in the same Dissections.

From these Premises there appears some Reason to think, that the *Lacteals* frequently convey Liquors which are not *white*; and that *Chyle* may (not improperly) be divided into 3 sorts at least, *viz. white, pellucid, and intermediate* to these; contrary to the Opinion of those *Anatomists* who thought it to be always *white*, as that Word is contradistinguished to *pellucid*; although by *Chyle* they understood (as I likewise do) the Effects of Drink, as well as Meat, concocted.

The Distribu-
tion of the
Chyle; by
Dr. Lister.

n. 149. p. 242.

XXIV. It seems probable, 1. That in the *Digestion* of Meat in the *Stomach*, there is made a Separation or Solution of *urinous Salts*, no otherwise than in the Rotting of Plants or Animals. 2. That the *Chyle* is highly impregnated with this *urinous Salt*. 3. That the *Whiteness* of the *Chyle* is from the *Fermentation* it has from its Mixture with *urinous Salts*, and that if diluted with fair Water, it is wholly deprived of that Colour, the *Fermentation* ceasing.

ceasing. 4. That the salt *Chyle* is conveyed into the venal Blood, and with it enters the *Heart*; and it is thence thrown out again *Chyle*, as it comes in, by a continual Pulsation, into the Arteries. 5. That as oft as it enters the *emulgent* Arteries, it there leaves behind it part of its salinous Liquor or Urine, and consequently abates of its Colour. 6. That when sufficiently freed of its *urinous Salt*, it becomes a *Lympha*; which we think nothing else but the Residue of the *Chyle*, not yet made into the Nature of Blood, as not sufficiently depurated of its saline Particles. 7. That probably it circulates long under the Nature of a *Lympha*, often visiting all the Parts of the Body by the Arteries, and returning again to the *Heart*, partly by its own Vessels, and partly by the Veins. 8. That in Defect of *Chyle* (for we cannot constantly feed) Nature continually supplies the Mass of Blood with the *Lympha* or old *Chyle*. 9. That upon every Supply of fresh *Chyle*, much of the old Stock or *Lympha* is (according to the Necessity of Parts) converted into this or that Use, and not till then. 10. That there is ever more *Lympha* in the Mass of Blood, than there is need for the Diluting of it. The arterial Blood (be the Animal never so much exhausted by Hunger) always parting with some, upon Extravasation and Coagulation. 11. In the Coagulation of extravasated Blood, there is no Precipitation of Parts, as in curdled Milk, &c. for if the *Chyle* be freshly distributed into the Mass of Blood, it will again separate itself as Oil will from Water; and in like Manner it is with the *Lympha* or old *Chyle*, neither of them being as yet any essential Part of the Blood. 12. The venal and arterial Blood have probably both a like Quantity of *Lympha* to dilute them; but the arterial in coagulating involves within its *Craffamentum* more than the venal: The Reason may be, for that the arterial is fuller of Air, which rarifies and renders the arterial *Craffamentum* more porous and capacious of lodging the *Lympha*; which yet as it subsides by long standing, parts with more and more *Lympha* daily. 13. The great Instrument of the Circulation of the Blood, is the *Systole* or Vibration of the Heart, which yet would not be sufficient for hindring the Coagulation of the Blood, without a continual Supply of the *Lympha* to dilute it.

XXV. In the Reception of the Aliment, whose Grossness of Parts requires *Mastication*, the *Dentes Incisorii* are for the most Part employed to divide it from the more bulky Part. When a proportionable Piece is thus taken into the Mouth, the Lower-Jaw is variously moved by its proper Muscles, and *Mastication* is begun and carried on by the Assistance of the *Tongue*, *Cheeks* and *Lips*; the two first still applying the less divided Parts of the Aliment to the *Dentes Molares*, till there is an equal Comminution of all its Parts. At the same Time divers of the Muscles, employed in the Motion of the Lower-Jaw, are also serviceable, in hastening the *Saliva* or Spittle separated from the Blood by the *parotid Glands*; those of the Lower-Jaw and under the Tongue into the Mouth; the *salival Glands* of the Cheeks and Lips also contributing their Juices, do altogether join with the *masticated* Aliment,

Chylificati-
on; by Mr.
William
Cowper. n.
220. p. 231.

ment, before or at the same Time it is made fit to be swallowed ; which Action is called *Deglutition*, and is thus performed.

The Aliment, as well what is fluid as that *masticated*, being lodged on the Tongue, which does somewhat hollow itself, by Means of its own proper muscular Fibres, for the more commodious entertaining the larger Quantity, its Tip and Sides are applied to the Insides of all the Teeth of the Upper-Jaw (and *Gingivæ* or Gums of those who want Teeth) the Tongue is suddenly drawn up by the *Musculi Styloglossi* and *Myloglossus*, together with those Muscles which pull the *Os Hyoides* upwards ; at the same Time the *Fauces* are also drawn up, and their Cavity enlarged by the *Musculi Stylopharingei* ; and about two thirds of the Tongue's superior Surface is adequately applied to the Roof the Mouth ; the *Epiglottis*, from its Position being consequently depressed, does thereby cover the *Glottis* or *Rimula* of the *Larynx*, and prevents any Part of the Aliment from descending into the Wind-pipe. In this Part of the Action of *Deglutition*, the *Glands* under the Tongue, and the *excretory Ducts* of those of the Lower-Jaw, are compressed, and their separated Liquors or Spittle voided by their *Papillæ*, situated at the lower Part of the *Frænum* or Ligament of the Tongue ; and this is done by the *Musculus Mylo-hyoideus*. When the Aliment is thus forced into the *Fauces* or upper Part of the *Gula*, at the same Time the *Gargareon*, together with the *Uvula*, are drawn upwards and backwards by the *Musculi Sphænostaphyli* ; by which Means any Part of the Aliment is hindred from ascending into the *Foramina Narium* ; and the *Fauces* by the *Musculus Pterygopharyngeus* and *Oesophageus*, are contracted ; whereby the Aliment is not only compressed into the *Gula*, but the Matter separated from the Blood by the *Glands* of the *Fauces*, especially of those large ones called *Tonsillæ*, is forced out of their Cells or *excretory Ducts* to join with it in its Descent to the Stomach by the *Gula*, through which latter it passes, by the Action of its *muscular Fibres*.

Myot. Ref.
p. 76.

Myot. Ref.
p. 88.

The Aliment thus impregnated with *Saliva* in *Mastication* and *Deglutition*, being received into the *Stomach*, there, meets with a Juice separated from the Blood by the *Glands* of that Part, whose *excretory Ducts* open into the Cavity of the *Stomach*. By the Commixture of these Liquors, whether of *Saliva* or Juice of the *Stomach*, a proper *Menstruum* is composed, by which the Parts of the Aliment are still more and more divided by its insinuating into their Pores, by which the Air before imprisoned in their less divided Parts, is not only set more at Liberty, but by the natural Heat it must necessarily suffer such a Rarefaction, as that thereby the whole *Stomach* becomes still more and more distended: Hence it is that we have less Appetite some time after eating (when this Intumescency is made) than we had immediately after: Hence also arise those frequent Eructions from divers Aliments, as old Pease, Cabbage, and divers other Vegetables we frequently eat ; all which become very much disturbing in depraved Appetites and weak Stomachs. At the same Time when this Intumescence and Agitation of the Matter is made in the *Stomach*, the Contents of the neighbouring *excretory Ductus's*, namely the *Bile* in the *Gall-Bladder*, and *Liver Ducts*,
and

and *pancreatick Juice* in the *Ductus Pancreaticus* are compressed into the *Intestinum Duodenum*, through the Extension of the *Stomach* itself; the re-fluent Blood of the *Stomach*, at that Instant, being, in some Measure, retarded, whereby the *Muscular Fibres* are more liable to be contracted. Nor can we conceive how the Liquor of the *Stomach*, after having joined with the *Saliva* and Aliment, should be still so plentifully excreted from the *Glands* of that Part, as to irritate its internal Membrane, and excite its *muscular Fibres* to contract, since the Muscles of the *Abdomen* would, in like Manner as in *Vomiting*, be drawn into a Consent of co-operating, and the Aliment would be forcibly rejected by the Mouth: Besides, should the Liquor of the *Stomach* be so disturbing in *Chylification*, what would it be, so soon as all its Contents were discharged? The Irritation the *Stomach* undergoes in Hunger, we are firmly perswaded does not arise but through an Accumulation of the *Saliva* in the *Stomach*, in Conjunction with the Liquor of the *Glands* of that Part: Hence it is we rather discharge the *Spittle* at that Time by the Mouth, than to suffer any more of it to descend into the *Ventricle*. Hence proceeds what we call the *Watering of the Mouth*: Hence also, when the *Saliva* is vitiated, the Appetite is depraved. The *Stomach*, by Means of its *muscular Fibres* contracting itself, does gradually discharge its Contents by the *Pylorus* into the *Duodenum*, in which *Gut*, after a small semicircular Descent, it meets with the *pancreatick Juice* and *Bile*; both which joining with it, renders some Parts of the Aliment more fluid, by still disuniting the grosser Parts from the more pure; and here *Chylification* is made perfect.

The *Bile*, which abounds with *lixivial Salts*, and is apt to intangle with the grosser Parts of the concocted Aliment, stimulates the *Guts*, and deterges or cleanses their Cavities of the mucous Matter, separated from the Blood by the *Glands* of the *Guts*, and lodged in their Cavities; which not only moistens the Insides of the *Guts*, but defends the Mouths of the *laeteal Vessels* from being injured by alien Bodies which often pass that Way. The Contents of the *Intestines* moving still on by Means of the *peristaltick* or Worm-like Motion of the *Guts*, whilst those thinner Parts fitted for the Pores of the *laeteal Vessels*, called *Chyle*, is absorbed by them; the thicker move still more slowly on, and by the many Stops they continually meet with, by the *concurrent Valves*, all the *Chyle* or thinner Parts are at length entirely absorbed, the Remains being merely *excrementitious*, are only fit to be excluded by Stool.

The analogous *white* Appearance of the *Chyle*, whether in the *Stomach*, or *Intestines*, and always in the *Venæ Laeteæ* and *Thoracick Duct*, may be seen in the Commixtures of divers Liquids, which separated exhibit no such Appearance: Nor is this *Phenomenon* any otherwise than a Transposition of Particles, whether by a *Menstruum's* insinuating into them, dividing them into gross Globules, as an *Acid* into a *Sulphur*, or *Vinegar* into *Oil*, &c. or else by *Precipitation*, as when a gummous or resinous Body is dissolved in a spirituous *Menstruum*, and mixed with a *Pblegm*; so *Tincture of Myrrh* and *Benjamin*, &c. make a Milky Appearance in common Water.

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The *longitudinal* and *transverse* Orders of Fibres of the *Guts*, are the Instruments by which the *peristaltick* Motion of them is performed, which Motion is not only necessary for pushing their Concerns forwards; but by the reciprocal Contraction of those Muscular Fibres of the *Guts*, and Apposition of their *connivent Valves*, the Mouths of the *Lacteals* are disposed to receive what is fitted for them: Hence it is we can by no means make any Fluid whatever pass from the Cavity of the *Guts*, in those *lacteal Vessels*, in a dead Animal. A farther Use of this Contraction of the Muscular Fibres of the *Intestines*, is to accelerate the *Chyle* in its Progress in the *Lacteals*, till the *Lympha* derived from the Extremities of the Arteries of the *Guts* joins with it, which Conjunction is made in the *Lacteals*, before they leave the external Surface of the *Intestines*. By this Means, the Progression of the *Chyle* is made towards the *Mesenterick Glands*, into whose Cells it is received, where it again mixes with a Juice brought in by the Arteries of each *Gland*; which Juice, or *lymphatick Liquor*, not only farther dilutes the *Chyle*, like that from the Arteries of the *Intestines*, but adds a fresh *Impetus*; by which its Motion is farther carried on through the *Vasa Lactea secundi generis* (arising out of each *mesenterick Gland*, and discharging their Contents into the *Receptaculum Chyli*.) Here the *Chyle* meets and joins with the *Lympha* sent through the *Lympha-Ducts* from the inferior Limbs and neighbouring Parts, whereby the *Chyle* is not only farther prepared, but its Ascension is promoted in the *Thoracick Ducts*, whose several Divisions and *Inosculation*s (like the Veins of the *Testicles*) with its many Valves looking from below upwards, and advantageous Situation between the great Artery and *Vertebrae* of the Back, together with the *Lympha-Ducts*, discharging their *Lympha* derived from the Lungs and neighbouring Parts of the *Thoax*, does demonstrate the utmost Art still used, in order to its Ascension towards the Left *subclavian Vein*. Before the *Thoracick-Duct*, thus charged with the *Chyle* and *Lympha*, empties itself into the *subclavian Vein*, it receives the *Lympha* brought from the superior Parts; all which joining, are soon discharged into the Left *Subclavian Vein*, where meeting with the reflux Blood of the superior Parts, passes with it through the descending Trunk of the *Vena Cava*, and joins with the reflux Blood of the inferior Parts, in the Right *Auricle* of the *Heart*, whence it is expelled by its Contraction into the Right *Ventricle*, when the *Heart* is in *Diastole*; but by the *Systole*, or Contraction of the *Heart*, it is again driven out thence into the *Arteria Pulmonalis*, through whose Extremities, in Conjunction with those of the *Vena Pulmonalis*, it passes to the Left *Auricle* and *Ventricle* of the *Heart*, from whence it is again expelled in the *Systole* (as above) in the *Aorta* or *Arteria Magna*, by whose Branches it is conveyed through the whole Field of the Body: The three *tricuspid Valves* in the Right, and two *Mitral Valves* in the Left *Ventricle* of the *Heart* opposing its Return into the Veins, and the *semilunary Valves* of *Arteria Pulmonalis* and *Aorta* preventing its Ingress into the *Ventricles*, are sufficient (when rightly considered) to demonstrate the Necessity of a Circulation of this Grand Fluid, called *Blood*.

XXVI. A Minister near *Dantzick*, about 50 Years old, being much indisposed, and often relapsing into a Distemper accompanied with Vomiting and Purging, his Physician told me, he was persuaded, that his Cure was obstructed by the Patient's being obliged to study; for when by the Help of the Medicines prescribed to, and used by him, he was brought to a considerable Degree of Recovery, his Studying and Preaching made him constantly relapse. And to confirm this Conjecture concerning the Spirits being drawn away from the Stomach, and leaving the digestive Power languid, he added, That the Preacher one Day falling into a Relapse, after a Sermon preached by him, and Vomits coming strongly upon him, he cast out, amongst other Matter, several Pieces, some as large as the End of a Man's Finger, some less, of a Substance, to the Touch and Eye perfectly resembling Tallow; 4 Pieces whereof weighed Half an Ounce.

An ill Digestion by too much Study; by M. Chr. Kirby. n. 96. p. 609.

XXVII. Some Colliers working in a Coal-Pit at *Horstol*, about Half a League from *Leige*, one of them in *Feb.* 168 $\frac{3}{4}$, pierced a Vein of Water, which gushing in violently, drowned one: Those that were near the Mouth of the Pit were drawn out; but 4 of them being further within, saved themselves upon a little Ascent within the Mine. 24 Days were spent in drawing off the Water, and the 25th they were drawn out: I saw and examined them myself. They had not a Morsel of Bread with them, but lived on the Water of a little Fountain which broke out by them; 2 Bottles of which I caused to be evaporated, but found nothing but a scarce perceptible Calx remaining.

Four Men living on Water without Food 24 Days; by — n. 158. p. 577.

XXVIII. Having heard of a Person at *Bristol* that eat his Meat twice, I procured the following Account of him from Mr. *Day*, at that Time Mayor of *Bristol*, in Answer to a Set of Questions I sent thither.

A ruminating Man; by Dr. Fred. Slare. n. 193. p. 525.

He begins to chew his Meat over again within a Quarter of an Hour after his Meals, if he drink with it; if not, some Time longer. This chewing, after a full Meal, lasts about an Hour and an Half. If he go to Bed presently after Meals, he cannot sleep till the usual Time of chewing be over. The Victuals, upon the Return, taste somewhat more pleasant than at first. Bread and Meat, and Cheese and Drink, does seem to me to return much of such Colours as they would be of, if they were mixed together in a Mortar. Liquids, as Broth or Spoon-meat, return to his Mouth all one as dry and solid Food. The Victuals lie heavy in the lower Part of his Throat, as it seems to him, until it has passed the second Chewing; afterwards it passes clean away. This he always observes, that if he eats of Variety of Things, that which passes down first, comes up first again to be chewed. If this Faculty leave him, it signifies Sickness, and he is never well till it return. He is about 20 Years of Age, and was always thus since he can remember. His Father does so sometimes, and in small Quantities, but nothing like to this. He was formerly bred up in the Mines, but now he is a Day-Labourer, and of tolerable Sense and Reason.

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I have known several in *London* that do not fail to throw up an ill-tasted and bitter Mass, Half an Hour, or an Hour after feeding, and that to their great Disgust; but in true *Rumination* it returns pleasant, and they chew it the second Time with Delight.

A Balimia;
by Dr. James
Burrough. n.
264. p. 598.

XXIX. In *May* or *June* 1700, a Labouring-Man, of middle Age, at *Stanton* (7 Miles from *Bury*) had for many Days together so inordinate an Appetite, that I had it attested to me from an Eye-witness, that he eat up an ordinary Leg of Veal roasted at a Meal. He would eat Sow-Thistles, and divers other Herbs as greedily, during the Time his βουλιμία lasted, as the Beasts that are wont to use such Food; and all he could get was little enough to satisfy his Hunger. I am told he voided divers Worms, as long and as big about as an ordinary Tobacco-Pipe. After which his Appetite declined by Degrees, till it came to be of a common Rate with that of others. He cannot do so good a Day's Work now as he was wont, but has almost recovered his wonted Strength again.

The Order of
all the Bowels
inverted; by
Dr. Henry
Sampson. n.
107. p. 146.

XXX. A Minister in *Yorkshire* was troubled with a Cough, and other Mischiefs; for Relief against which he took a Journey to *London*, and that, for the most Part, on Foot. He lived not above a Fortnight after he came up. In his Sickness he was much addicted to drink Brandy, which hastened his Death. We observed his Limbs to be much macerated, his Belly was swelled with some Inequality, especially in the Tract of the Right Muscles: A considerable Quantity of Water was taken out of it; his Guts inflamed, and extended with Wind; his Gall very viscid; his Lungs inflamed, and beset with divers Glandules. The Order of his Bowels were inverted; his Liver, which was very large, lay in the Left *Hypochondre*, and his Spleen in the Right; the Cone of his Heart was on the Right Side, and accordingly the larger and thinner Ventricle was found on the Left; and the thick one, which in others is on the Left Side, was in him on the Right. The great Artery descended on the Right Side, and the Vena Cava ascended by his Liver on the Left. The Oesophagus descended to the first Orifice of the Stomach on the Right Side, which made the Pylorus and Entrance of the Pancreas be on the Left, and the first Flexure of the small Guts to be towards the Right: So that the Beginning of the Colon, with its Appendicula, lay at the Left Os Ilium, and the Flexura Sigmoidæa, towards the Right. This inverted Situation of his Bowels had not any evident Influence upon his Diseases and Death. He was about 30 Years of Age, a married Man, had several Children, was of a Middle Stature, healthful till toward the latter End of his Time: He had no Prominency on the Left Side, more than the other; was not Left-Handed, nor had any Weakness on his Left Side.

The Cæcum
of a Bitch cut
out; by Dr.
Will. Mus-
grave. n. 151.
p. 324.

XXXI. In *Easter-Week*, 1683, I cut out the Cæcum of a Dog; but 2 Days after the Operation the Dog died. But in *April* 1683, I took a Bitch, of about a Year old, and opened the Abdomen, on the Right Side, in the *Regio Iliaca*, passing my Knife through the Musculus oblique ascendens,

dens, and by the Side of the *Musculus Rectus*: Having found the *Cæcum*, I immediately put up the other Guts again into the *Abdomen*; after which I separated the *Cæcum* from the *Ilium*, cutting the Membrane which binds Part of the former to the latter; then, having made a Ligature on the *Artery* which comes to the *Cæcum*, I made 3 or 4 Prick-seams through the Sides of the *Cæcum*, at the farther End of it, where it is continued to the *Rectum*; and by thus sewing the Sides together, stopped the Passage of the *Fæces* that Way: After this, I cut off the *Cæcum* about $\frac{1}{4}$ of an Inch from the Stitches, and sewed together the new made Lips. The Wounds being sewed up, and the Bitch tied away, she lapped a small Quantity of Milk the next Morning, and by Degrees recovered: So that in 3 Weeks she seemed as well as ever; and in a little Time grew fat, and proud, and brought a Litter of Whelps. In *Sept.* following I caused her to be hanged, and when I had opened her, we found a great Part of the *Omentum* lie in a Heap on the Right Side; it had not recovered its natural Posture since it was put up with the Guts, at the first Opening; the Edges of the Wound were well grown together, and we did not find any thing that seemed to intimate the least Want, or supply the Place of the *Cæcum*.

XXXII. *An.* 1689, a Lady about 64 Years old, had a hard round *Tumour* in the lower Region of the *Belly*. They moved this Globe in the same Manner as they do the *Matrix*, when it is big with a Child of 6 or 7 Months old; no Accidents like a *Fever*, Pain, Vomiting, Loss of Blood, *Fluor Albus*, &c. accompanied this *Tumour*, but a constant voiding of Urine. The Physicians, after much Search and Consultation, agreed that it was a *Schirrus*; but some placed it in the *Epiploon*, others in the *Mesentery*, and others fastened it to the *Matrix*. In View of this, they gave her *Emeticks*, strong *Purgatives*, *Diureticks*: They applied *Emollients* and *Resolvents*; but all to no Purpose. But having taken the Air one Day in her Coach, at her Return she had an Inclination to go to Stool, and filled a Bason with gross Excrements, a little black, and not very stinking: This she did a second Time, and found herself immediately relieved; her *Swelling* disappeared, her Urine stopped, and in a few Hours she was perfectly well.

A Year after that, she fell into an *Apoplexy*, out of which she recovered by *Emeticks* and *Purgations*. In 1691, the *Tumour* shewed itself again with the same Marks as before; and all possible Care was taken to make Nature do again what she had before done with so good Success. But though the *Purges* and *Clysters* did very strongly their Office, she was nothing relieved; the *Tumour* augmented daily, and two Years after its first appearing, the Party died.

When I had opened the Body, the *Tumour* appeared to be nothing else than the *Cæcum* dilated; its Membranes were outwardly smooth, and of the same Colour with the *Intestines* without Alteration, and full of Vessels of all Sorts. The *Ileon* laid along the *Tumour*, being flat against it, and returned to join the *Colon* as is usual; so the Excrements had the Liberty to pass from the *Ileon* to the *Colon*, without entering into it. I found in this *Tumour* about 3 *Chopins* (or *Quarts*) of greyish Matter, without Smell, and

The *Cæcum*
dilated with
an almost li-
quid Matter;
by M.—Giles.
n. 225. p. 402.

of a Consistence rather liquid than thick. The interior Membranes were very beautiful; and all the Parts of the *Swelling*, as well as of the neighbouring Organs, appeared very sound.

I could not discover any Hole or Communication this *Tumour* might have had with the *Ileon*, yet some there must have been in the Beginning by which it discharged its gross Excrements; but after this Evacuation I believe that this Opening was stopped, and that the Sides of this great Bag, which had come close together by the going out of this gross Matter, did by Degrees stretch and open themselves to receive this heterogeneous Stuff, which I found there, produced either by the *Glands* of these Parts, or some *lymphatick Vessels* which I saw there, or some fluid Bodies expressed from the *Chyle*, or other Humours. The Compression which the *Tumour* made on the Bladder, made the Urine run out as fast as it came in; its *Sphincter* not being able to resist the Violence of this Load.

The Cæcum
extended with
Cherry-stones;
by Mr.
Knowles.
n. 265. p. 617.

XXXIII. Mr. *Knowles* being called to open a Youth, who died, as was supposed, of the *Cholick* and *Convulsus*, found the *Cæcum* vastly extended, and stuffed with abundance of Cherry-stones, which were the Occasion of his Death.

The Use of the
Intestinum
Cæcum; by
Dr. M. Lister.
n. 95. p. 6062.
n. 155. p. 455.

XXXIV. We have observed (among many other Particulars in the *Guts*) the Use of the *Intestinum Cæcum* to be subservient to that of the *Colon* and *Rectum*, which is manifest in such Animals, where Nature intends a certain and determinate Figure to the Excrements.

I understand by determinate Figure, 1. The Excrements divided into many small Parts of a like Shape; such as Sheep, Deer, Conies, Hares, Rats, Mice, Horses, Caterpillars, some Snails, &c. do naturally void. 2. In a greater Latitude, I oppose figured Excrements to liquid, as *C. Celsus* in some Place doth: Thus the Dung of Pigeons, Geese, and Men, Cats, Dogs, &c. may be said to be figured. Now the *Cæcum*, in my Opinion, is subservient in some Measure to the Figuration of both, but most manifest in the first Kind. My Meaning is, that probably the Use of the *Cæcum* is to keep the Excrements, which shall pass into its Cavity (and I believe all, or most Part of them, do so in sound Animals) so long until they are sufficiently drained, baked, hardened, or of a due Consistence (as Clay is tempered for the Mold) to receive the Figure to be given it from the *Colon* and *Rectum*. This Use, I say, of the *Cæcum*, seems to me to be much more manifest in such Animals as have figured Excrements of the first Kind. In Rats, for Example, whose Excrements are constantly alike figured, the *Cæcum* is very large, more capacious than the Stomach itself. But its Use in receiving the Excrements, or exhausted *Chyle*, is not more apparent, from its large Capacity, than that other of farther drawing and tempering them to a Stiffness, for the Service of the *Colon*, from the admirable Contrivance and Structure of this latter Gut, which is a *Phænomenon* that deserves further Consideration: It is, I say, to be noted, that immediately under the Valve of that Gut, in this Animal, are certain spiral Fibres, which make a Kind

of

of Screw. Now it seems to me, that the Excrements, after they are brought to a due Consistency by the necessary Stay they make in the *Cæcum*, and being carried out thence into the spiral Foldings, or Screw of the *Colon*, cannot descend in a Perpendicular, as formerly through the small Guts, but still gently glide, and that very leisurely by the Winding of the Screw; whence arises the Figure. And I am apt to believe, that if the *Cæcum* of a Rat, or any of the first Kind of Animals mentioned, was tied up, or otherwise hindered from its Receipt, the Animals would unavoidably fall into a *Diarrhæa*; there being, I say, no Reason, that I can foresee, why the yet liquid Excrements, or exhausted *Chyle*, such as we constantly find it, even at the very Bottom of the *small Gut*, should stop at the Entrance of the *Colon*, and not speedily glide through the Screw, in a downright Descent; that is, elude the Device of Nature, and make the Configuration of that so curiously contrived Part useless: We, I say, supposing the Experiment to have taken away the necessary *Diverticulum* and Repository of the unprepared Excrements, in tying up the *Cæcum*.

I know not whether the Observation will hold good in general Terms, because, I say, I have not yet purposely examined divers Animals in Nature; *viz.* That wherever there are elegantly figured Excrements of the first Kind, there is ever a capacious *Cæcum*; and, on the contrary, the less accurately figured and more liquid the Excrements of any Animals are, the lesser the *Cæcum*, or none at all. This is certainly true, that some Animals which are naturally loose, have no *Cæcum* at all, or very little, as the *Talpa*, the *Echinus Terrestris*, the *Gulo*; and amongst Birds the *Wood-pecker* Kind, the *Hawk* Kind, &c.

We forbear to offer some Doubts we have, concerning Nature's End in the necessary Figuration of the Excrements in some Animals; as first to prevent *Diarrhæa's*; Secondly, to abide Hunger the better: Thus Snails in Winter rest with full Intestines. Thirdly, and chiefly to heighten the *Fermentation* and *Digestion* in the Stomach and small Guts.

XXXV. I. The Root *Ipecacuanba* is an infallible Medicine for curing *Dysenteries* and Loosenesses, how dangerous and inveterate soever the Distemper may be. But I must except all such Patients as are diseased in their *Lungs*, and *Hydropick* Persons, whose Fluxes are Signs of approaching Death; and such as have already *Gangrenes* in their Bowels, which they surely discover when they are disordered in the Head, have a *Hickcough* and a Vomiting, with a Pain in the lower Belly, accompanied with Stools resembling the Dregs of Wine, or the Washings of Meat, smelling like Carrion. As for all others sick of a *Dysentery*, they need but observe the following Rules, and they will be cured.

For 3 Days together, Morning and Evening, they must take one of the Papers of Powder marked with *A*, diluted with half a Glass of Wine and as much Water, to dispose them by Degrees for Purging, and to sweeten and correct the sharp corrosive Humours, which are of the Nature of *Aquafortis*, and the *Spirit of Nitre*, and which eat away the Tunicles of the *Intestines*,

and the Mouths of the Vessels ; from whence it comes to pass, that from a single Looseness they often fall into a *Dysentery*, because those depraved Humours become sharp and corrosive, and the Malady augments every Day ; so that to make a sure Cure, we must begin by destroying the Sharpness and Malignity of those Humours, which is done by this first Remedy.

A. ℞ Antim. Diaph. Crabs Eyes, of each *gr. 10. Croc. Martis*, *gr. 8. Mace*, *gr. 4.* He must eat small Broth 2 Hours after, or a Crust of Bread dipped in it, or a fresh Egg in fashion of an Amulet, and dine lightly : If they find they have Need of Nourishment, after Dinner they may eat a Toast and Wine and Sugar, or a little Bisket steeped in Water or Wine. At Night they may take another Paper marked *A*, as before, and sup lightly.

The 4th Day they must take the Dose marked *B. ℞* of good *Ipecacuanba*, well pulverised \mathfrak{z} j. with \mathfrak{z} vi. of *Cinnamon*, diluted in small Broth, or in half a Glas of Wine, to clear the Stomach of a viscid Bile, that weakens the natural Heat, and hinders the Digestion of the Food ; so that the *Chyle* growing sour, instead of growing bitter, does change all the Mass of the Blood, and trouble the whole Oeconomy of the Body, which produces all the Accidents which ordinarily accompany this Disease. They shall take, 4 Hours after, some Broth, and the Remainder of the Day eat sparingly ; the Day after they shall take 2 Papers marked *A*, as before.

The 7th Day they shall take the Medicine marked *C. ℞* good *Rheubarb*, \mathfrak{z} ij. *Ipecacuanba*, *gr. xv.* pulverise them well, and mix them in a Glas of *Ptisan D*, described hereafter. This Medicine will take away Part of the Obstructions ; they shall take, 2 Hours after, Broth.

The 9th Day they shall take the Dose marked *B 2. ℞* good *Ipecacuanba* \mathfrak{z} ij. with *Cinnamon*, *gr. vj.* well pulverised, and mixed with Broth or Wine.

The 11th Day they must take a 2d Dose marked *C*, and observe the same Regimen as at first.

On the 13th they must take the Dose marked *B 3. ℞* good *Ipecacuanba* \mathfrak{z} j. half a \mathfrak{z} of *Cinnamon* with *vi. gr.* of *Nutmeg*, and observe the same Diet as on the two others.

On the 15th they shall take the Dose marked *B 4. ℞* good *Ipecacuanba* \mathfrak{z} j. with *Nutmeg gr. x.* well pulverised. They must keep themselves as on the 3 former Days.

Though by this Time they find themselves cured, yet they must take Care that they suffer not Cold in their Feet, nor elsewhere, while the Distemper continues ; and they must yet observe as strict a Diet as if they were sick. They must purge once in 15 Days with the Medicine marked *C*, by which Means they will infallibly prevent a Relapse, by freeing Nature of the Weight that oppresses it.

The 8, 10, 12 Days, they shall take in the Morning and Evening one of the Packets marked *A*, as before.

If the Sick has no Rest in the Night-time, because of great Pains, or too frequent Stools, it is convenient to take a Spoonful, or one and a half, of the *Syrup of Coral*, according to the Violence of the Distemper, mixed with

a Glass of *Prisan*. This Syrup will allay the Fermentations, and the Boilings of the Humours, and procure Sleep, which repairing the Force of Nature, will give the Remedies Liberty to act more effectually. They must also take a Spoonful of that Syrup at the Evening of that Day in which they have taken the Remedy *B* or *C*.

All these Remedies marked before, must be taken in the Morning fasting, and two Hours before Supper. Those who do not love to take them mixed with Liquor, may take them in a Wafer, drinking after them. If any of these Remedies cause Vomiting, as it happens sometimes, he must not be discouraged, for he shall not fail to be cured notwithstanding, because these Remedies act briskly on the Cause of the Distemper, only he must take to drink after his Vomiting, 3 or 4 Glasses of warm Water, that he may vomit with less Pain.

Children, delicate Persons, and Women with Child, shall use it in the following Manner. For Children that are yet under 3 Years old, they must take but the 8th Part of the *Doses* of the Remedies; Children from 3 Years old to 10, shall take a 4th Part; from 10 to 15, a third; from 15 to 20, the half. The same *Dose* will serve for tender Persons, and such as are aged, and Women big with Child. As for robust Persons, from 20 to 60, nothing shall be diminished from the *Doses* above marked. But all Persons, who by reason of their tender Constitution, the Weakness of their Age, or big Bellies, are forbid the whole *Dose*, shall use the Remedies a second Time, in the Manner I have now prescribed, if the first *Dose* do not cure them.

In many Occasions, when the *Dysentery* is accompanied with a *Fever*, that the Evacuations of Blood are extraordinary, or the Pains excessive, the Patient may be blooded once or twice, if the Strength of the Patient allow it, to empty the Vessels, to calm the Pain of the *Fever*, and stop the impetuous Motion of the Blood; after which the Remedies may be continued. In this Case, I would advise to take, before all Things, the Packet *B* 4, which before is ordered for the 15th Day; to take away that Fulness which is sometimes so great, that there is Danger in delaying it; after which the Patient shall return to the *Dose* marked for the *first* Day, and so for the rest; on the 15th the Patient shall rest.

After all these Remedies are used, the Party shall take, for 15 Days, a Spoonful of the *Stomachick Elixir* pure, or in 4 Spoonfuls of Water: It is made after the following Method.

℞ of *Red Saunders*, of *Lignum Aloes*, each half an Ounce; *Cinnamon* *Stomachick*
2 Ounces; of little *Cardamoms*, *Galangal*, *Cloves*, *Zedoary*, each an Ounce; *Elixir.*
of *Aniseed*, *Fennel*, and *Kermes*, each 2 Drams; of *Liquorish* 2 Ounces;
of *Cashu*, of *Chrystal Mineral*, of each one Ounce; of *Raisins* 4 Ounces;
Dates 10 or 12: Cut the *Dates* and the *Raisins* into little Bits, and having
beaten that which ought to be beaten, put all into a *Matras*, and pour up-
on them a Quart of Brandy, in which the *Chrystal Mineral* shall be dis-
solved: Infuse them a whole Night, and the next Day add 2 Pounds of
Aqua Vitæ, and let all infuse in the Cold for 4 Days, shaking the Glass 4
or 5 Times a Day; then filter the Liquor, and dissolve a Pound of fine
Sugar in the *Elixir*, which is thus compleat. Its

Its Effect is to fortify the Brain, the Heart, and all the noble Parts, weakened by the Dissipation of the Spirits; to fortify the Stomach, and correct the Crudities, and dissipate the Wind and Swellings thereof, which are common Accidents of this Distemper.

One must, during the Course of the Disease, eat little, and only such Things as are of good Nourishment; as Broth made of a Piece of Beef, of the bloody End of a Piece of Mutton, or a Partridge, or an old Cock, whose Bones have been broke, and that without Herbs; instead of which one may take 2 or 3 white Onions, with as many Cloves in them, refraining boiled Meats, when one can have other Nourishment, till he feel himself perfectly well, because they load the Stomach; and eat, to Dinner and Supper, Roast-Meats, tender and nourishing, that are not larded, chewing the Meat well before-hand; to drink at his Repasts old Wine and Water, and take for his ordinary Drink the *Ptisan* after marked. Above all Things, the Patient ought to keep himself in a quiet Frame of Spirit, that he suffer not himself to be transported by any Violence of Passion; the least of which is able to raise a new Ebullition of the Blood, and to trouble the Humours.

If the Patient be not rich, and cannot go to the Expence of these Aliments we have mentioned, he may make Broths as he is able or Milk-Meats, or Food with Water, as it shall most agree with his Palate, with many fresh Eggs: This Sort of Nourishment will cover the affected Part, and will defend it, and preserve it against the Sharpness of the Humours.

It is very necessary for the Diseased to forbear much Drinking, indiscreetly to quench their Thirst; for the Heat and Thirst which they feel, are only Symptoms and Accidents of their Distempers, and not the Cause; they ought therefore to be more moderate in Drinking than ordinary, seeing nothing hurts them more than Excess of Drinking, which weakens the Stomach, and stifles the natural Heat. It is therefore convenient only to gargle the Mouth with Water sugared, or to keep some little Verjuice in their Mouths, that may keep them from being thirsty; but if he drink, it must not be till one Hour after Meals. And seeing it may fall out, that some are enfeebled and emaciated by the Length of the Disease, it will be convenient in the Intervals to give them Clysters made of Broth, which will serve to maintain them, and to bring them more quickly to their Strength. After the Use of the Remedies, they may, to keep themselves in a good Habit of Body, take Goat's or Cow's Milk, with a little Chocolate, which we leave to the Judgment of the Physician, putting always to it a little grated Nutmeg, and 4 or 5 Grains of Salt in the Milk, that it may not curdle so soon.

Ptisan.

For the ordinary *Ptisan*, ℞ of Red Saunders, the Rind of the Pomegranate, a. ℥j. Tormentil Roots, ℥ss. Wild Succory and Dandelion, a. ℥ij. choice Sumach, ℥ji. Leaves of Agrimony, 2 pug. Make all boil over a clear Fire, in 6 Pints of Water, which ought to be boiled to one Half: At the End of the Decoction, as you take it off the Fire, add to it 2 Drachms of Cinnamon, and as much Powder of Liquorice.

If all these Things cannot be had, use a Decoction of *Dandelion* in *Smilbs Water*, with a little *Cinnamon*.

If the Pains which accompany the Flux continue while he uses the Remedies that serve for Purgation, he shall take, as there is Need, *Clysters* made after this Manner. ℞ *Shepherd's Purse*, 2 Handfuls; *Linseed*, 3 ℞. *Red Clysters*, *Roses*, 2 Drachms; *Salt*, a Handful. Make all boil in a Decoction of Barley, strain it, and mix it with the Yolk of a fresh Egg, and 2 Ounces of *Honey of Roses*. If the Pains be very violent, one may add two Heads of *white Poppy*. But Care must be taken not to mistake the Pains of the *Guts* for the Pains of the *Fundament*, which may be opened by the *Hæmorrhoids*. To appease these Pains, one may use *Juniper Oil*, drawn by a Retort in an open Fire, from which the Spirit is separated by the Tunnel. If the *Hæmorrhoids* be outward, you must rub them with this Oil with a Feather, every fourth Hour; or if they be internal, one must syringe them with a Quarter of a Spoonful of this Oil: The Pain will cease in less than 2 Hours, and the *Hæmorrhoids* will wither away, without having Need of applying any other Medicine. This was communicated to me by *M. Gaselier*, one of the best Artists of his Time, and employed by *M. Colbert* for his Surgeon. For the Hæmorrhoids.

2. Although I am of Opinion, That the *Root* mentioned in the foregoing Paper, is not so infallible a Remedy for *Fluxes* as is pretended, yet considering that sometimes those Distempers yield not to ordinary Means, I think it ought to be considered of by proper Judges of the Circumstances of the Sick. Some Notes;
by Dr. Hans
Sloan. ib.
p. 78.

This Herb seems to have been first taken Notice of by an anonymous *Portugueze*, who lived in *Brasile*, and speaks of an Herb there called *Igpecaya*, or *Pigaya*, which I verily believe to be this. Purchas's
Pilgr. Vol. IV.
Lib. vii. Cap.
I. Sect. 5.

Igpecaya, or *Pigaya*, says he, is profitable for the *Bloody-Flux*; the *Stalk* is a Quarter long, and the *Roots* of another, or more; it hath only 4 or 5 *Leaves*; it smelleth much wheresoever it is, but the Smell is strong and terrible. This *Root* beaten, and put in Water all Night at the Dew, and in the Morning, if this Water, with the same *Root* beaten and strained, be drunk, only the Water, it causeth presently to purge in such Sort, that the *Laske* ceaseth altogether.

XXXVI. *Fig. 15.* represents a mortal *Convolvulus* from a Rupture and Circumvolution of the *Mesentery*, making a Stricture upon the *Intestines*. A A, the *Ilium*, surprisngly distended with *Chyle*, Wind and Aliment, and inflamed. B B, the broken *Mesentery*, making a Kind of Ligature, binding down the *Intestines*. C C, a remarkable *Band*, produced from the ruptured *Mesentery*, and bracing the *Intestines* almost in the Manner of a *Tendrel*. D D, the *Ligature* delineated separately, together with its *Tendrel*, consisting of two Circumvolutions. E E, the *Convolvulus* of the *Intestine*, or Part of the *Ilium* strongly contracted with the *Ligature*, and almost mortified; whereby the Belly was quite constipated, so that the Contents of the small *Intestines* were propelled upwards, with almost continual Vomiting. F, Part of the *Ilium*, preternaturally exhausted by that *Intestine's* A Convol-
vulus and an
unusual Rup-
ture of the
Mesentery;
by Dr. Swam-
merdam.
n. 112. p. 273.
Fig. 15.

testine's being violently and surprisngly pushed through the Ligament D D and refembling a Kind of *Cæcum*. G, the Extremity of the *Ilium*, where it terminates in the *Colon*. K, the *Colon* moderately contracted, and in a natural State. L, the *Intestinum Cæcum*.

The Fæces
discharged at
an Ulcer in
the Groin; by
Dr. Will.
Earnshaw.
n. 176. p. 1204.

XXXVII. A Woman of *Alcester* in *Warwickshire*, about forty Years of Age, returning home from a neighbouring Town, was suddenly seized with an excessive Pain, in her right *Groin*, succeeded with a violent *Hiccup*. In about half an Hour afterwards a Swelling appeared there of the Size of a Nutmeg, which became gradually hard, and at last black. She was so feverish and tormented with Pains (no Physician being called in to her Assistance) that she was quite light-headed and knew no Body; so she was recommended to the Prayers of the Publick, as a Person certainly dying. At last however by the Application of some Kind of *Cataplasim*, the *Ulcer* broke, and whatever she eat or drank was discharged by it, almost unchanged, within a Quarter or Half an Hour after taking it; but without the least Pain either in the *Ulcer* or *Intestines*. So that one Day having eat some boiled Milk, first the Milk itself, and afterwards the same curdled, burst out from the *Ulcer* with a Noise (as from the *Anus*) and a Kind of Froth. At last I was called to her, and found her hectic, emaciated, drougthy; but in the mean Time she made Water, and went to Stool regularly without any Pain. The *Ulcer* was about three or four Inches long, one broad, not at all deep, but almost equal with the Skin. I sent her a purging *Ptisan* for four Doses; but the first Dose flowing presently out of the *Ulcer*, and she having no Stool that Day, I gave her a purging Bolus, part of which she voided in about Half an Hour, but she had two Stools afterwards, with a much lesser Evacuation from the *Ulcer* than formerly. She took the same Bolus the following Day, whereby she had three large Stools, with a great deal of *Fæces*, and the *Ulcer* discharged very little through the Night. After this I advised her to drink two or three Pints a Day of a drying *Vulnerary Drink*, and to repeat the purging Bolus now and then, by the Use of which Medicines she got well in a Fortnight, if I rightly remember.

The Lumbrici
Lati and Cucurbitini; by
Dr. M. Lister.
n. 95. p. 6062.

XXXVIII. 1. We have found in the Guts of a Dog, perhaps more than 100 of the *Lumbrici Lati*, or *Tape-Worms*. The *Duodenum* was exceedingly stuffed out and extended with them. Which also well agrees with another Observation I made in a Mouse, where I found the *Duodenum* to be far bigger than the Stomach itself, by reason of the great Numbers of these Worms, for Kind, which were contained in it. For Kind, I say; for these *Tape-Worms* were of a quite different Shape from those of the Dog, or any that I have ever yet seen. To proceed, we found them also in the Dog's *Jejunum* and *Ileon*, but not any one lower than the *Valvula Coli*, nor any higher than the *Duodenum*, or within the *Pylorus*. Below the *Duodenum* they lay at certain Distances one from another, though sometimes by Pairs, or more of them twisted together: Near them was constantly to be observed an Excrement

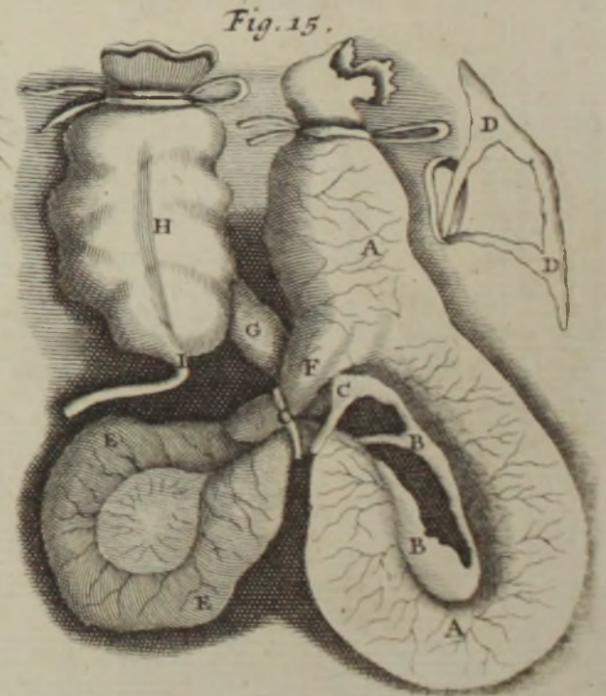
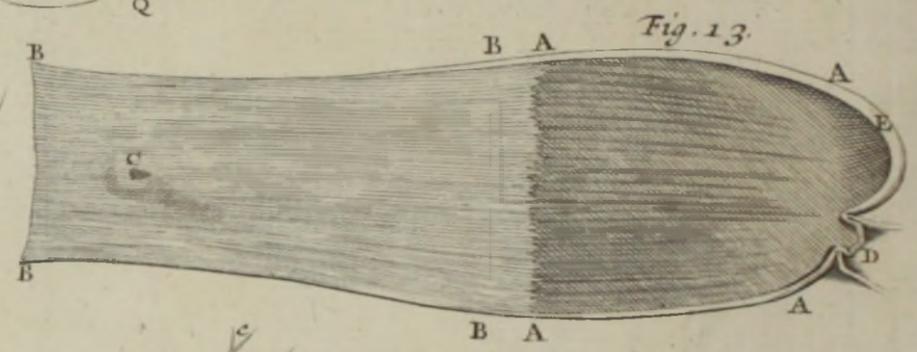
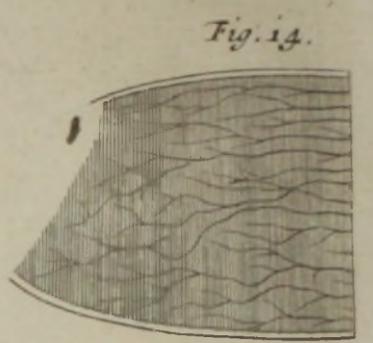
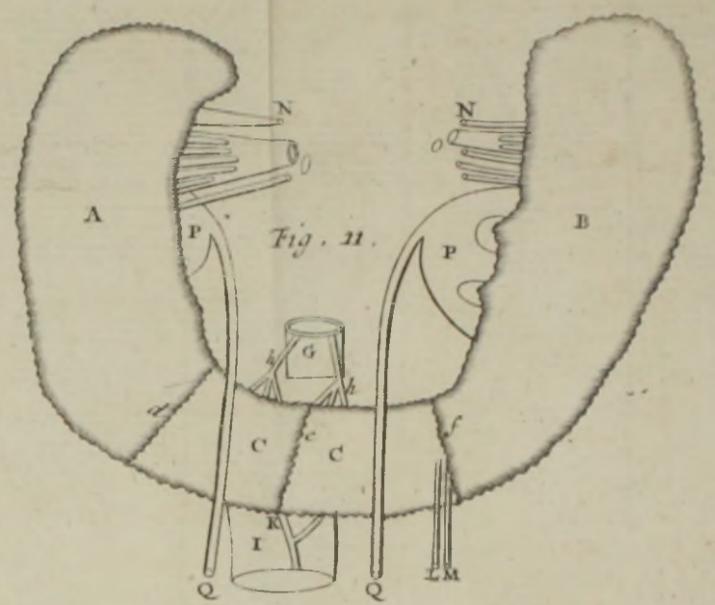
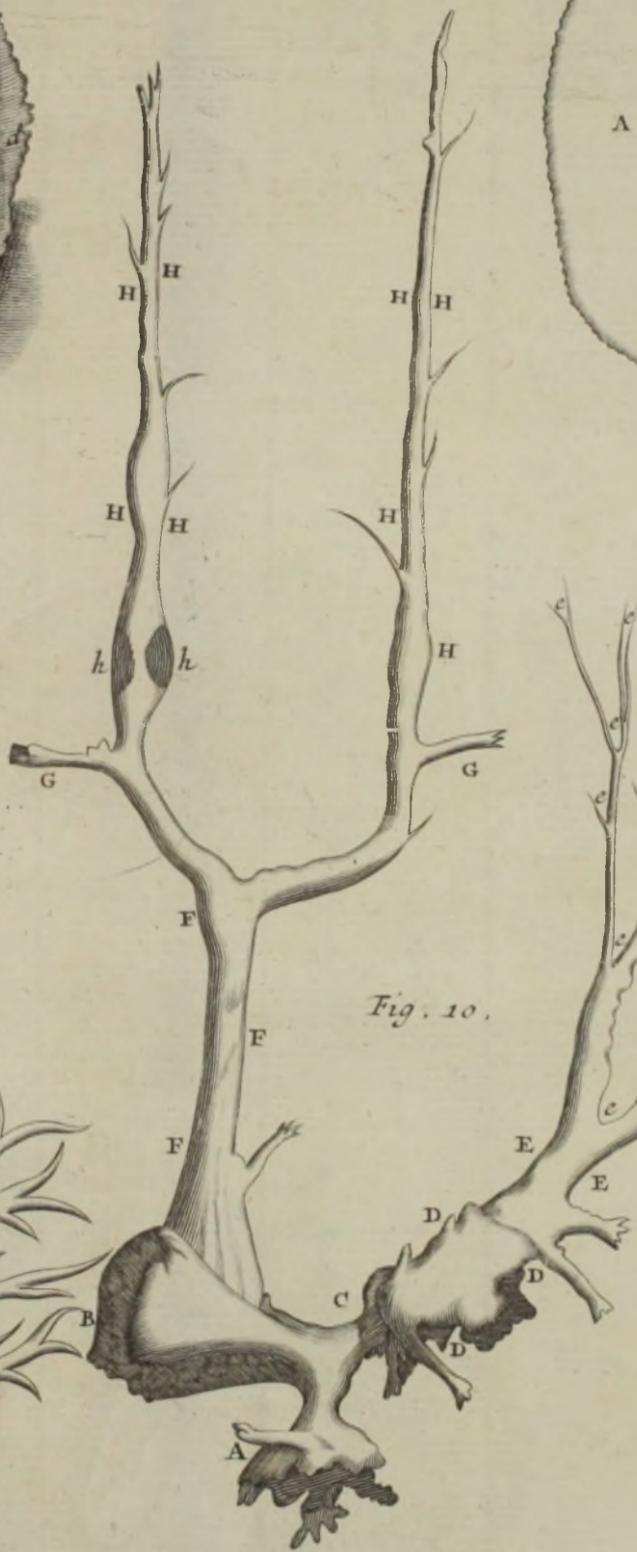
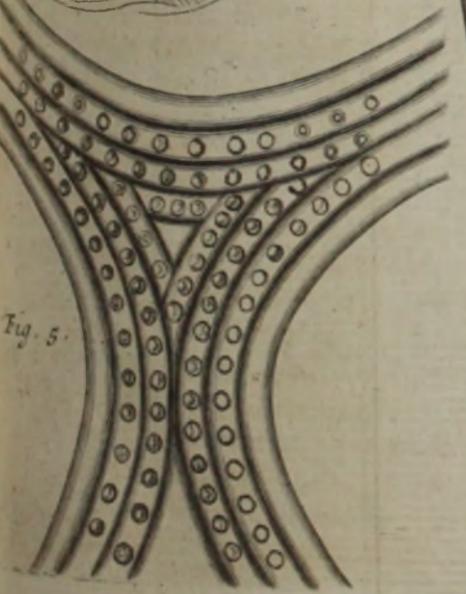
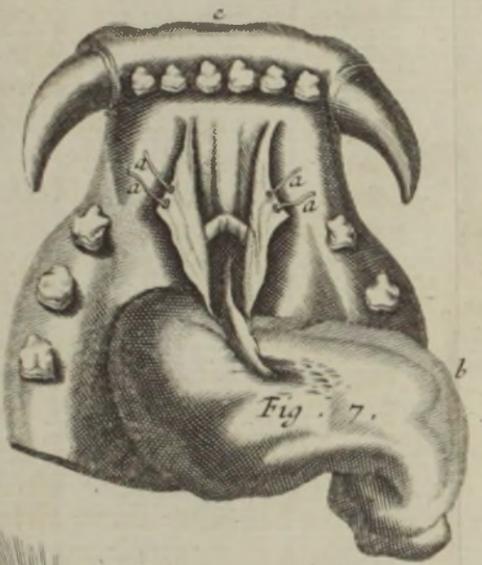
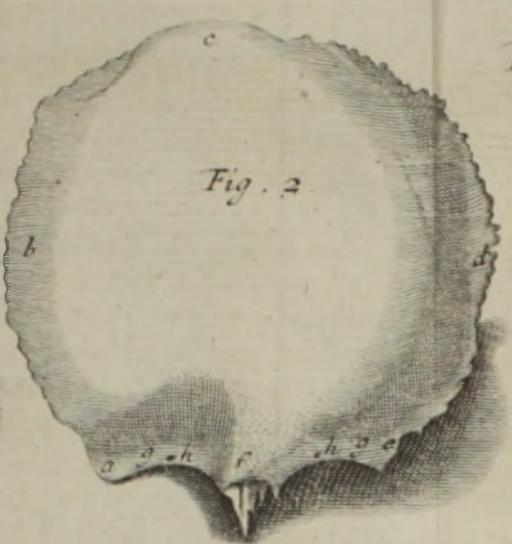
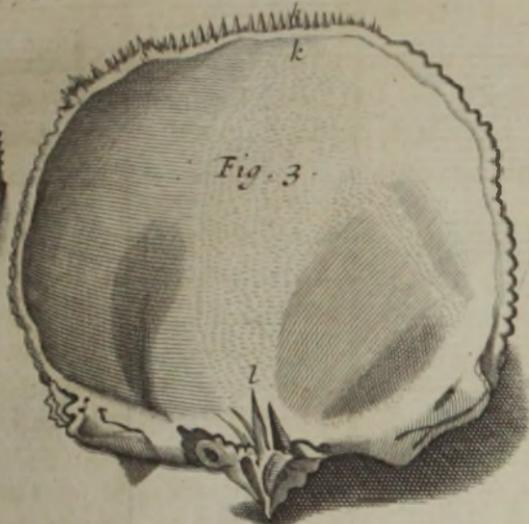




Fig. 14

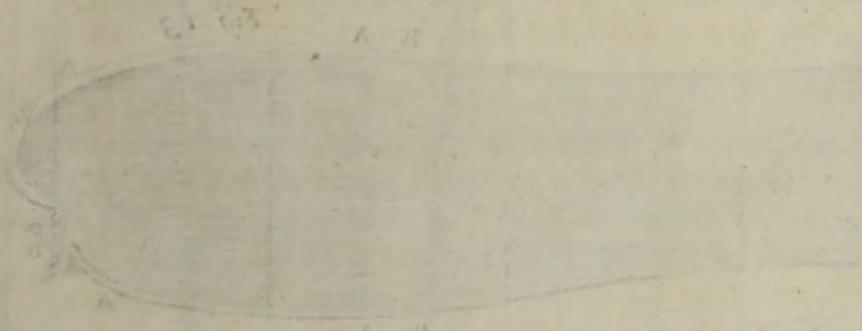
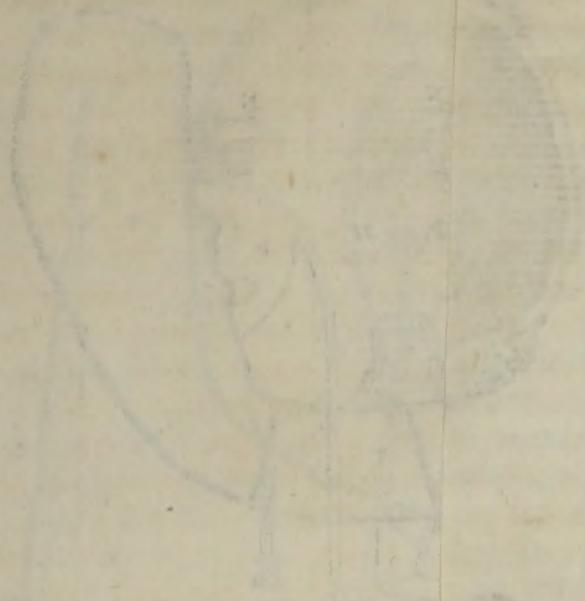
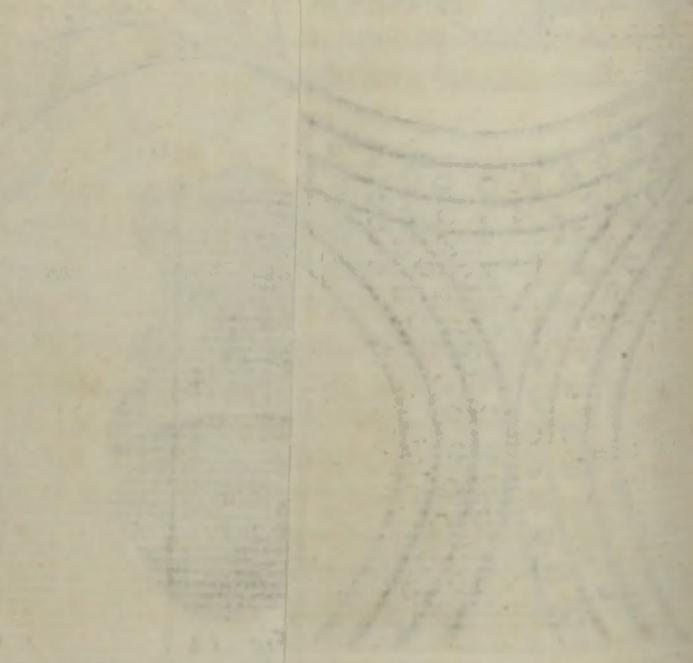


Fig. 13

A. B.

C. D.



Excrement of their own, distinct for Colour (more grey) and Consistence from the *Chyle* (the Observation being made in a Dog, plentifully fed for other Purposes) just as we find in Worm-eaten Tracts of Wood, where the *Cossi* leave behind them the Wood which hath passed through their Bodies. These *Worms* lay mostly with the small Ends upward, feeding upon, and expecting the *Chyle* in its Descent. These *Lumbrici Lati* were none of them above one Foot long, and most of them of an equal Length and Bigness. The one End was as broad as my little Finger-Nail, and pointed like a Lancet; the other End, coming small gradually for the 3d Part of the whole Length of the Animal, was knotted, or ended in a small Button like a Pin-head. They were every where, and in all Parts of them alike, Milk-white; of a flat and thin Substance, like fine *Tape*, divided into infinite Rings and Incisures, each Incisure having sharp Angles, on both Sides, looking to the broader End, standing out beyond each other: From which also I take the small End to be the Head, else the sharp Corners of the *Annuli* would necessarily hinder the Ascent of the Animal; whereas, if the contrary be true, they serve to keep it up. Each Ring hath also on the one Side only, and that alternately, one small Protuberance, much like the middle Feet of the Body of some Caterpillars. Comparing our Ani-

Med. Observ.
l. 2. c. 42.

2. There is another Sort of *Lumbrici Lati* to be met with very frequently in Dogs, called *Cucurbitini*, from the Likeness each *Annulus* or Link hath to a Cucumber-Seed. I have found of them about Half a Foot long; but more often broken into shorter Pieces. The former by us described, is undoubtedly a compleat and entire Animal; but there is great Reason of Suspicion, that this is a Chain of many Animals linked together. These Animals, for Kind, have been observed to have been voided by Men, and found enclosed in a Gut or Membrane of a prodigious Length. And a Person of great Integrity affirmed to me, That he once assisted at the Opening of a Dog, in which one of the Kidneys was observed to be quite wasted, and become a perfect Bladder, and in that Bladder they found something like an Animal of a monstrous Shape, which being dissected, was nothing else but a Skin full of these *Lumbrici Cucurbitini*. Perhaps the Snakes, Lizards, Beetles, Caterpillars, Toads, and such like Things as we read of in Medicinal Histories to have been voided, or found in any Part of the Body, if carefully examined, were nothing else but the like Disguises of this sort of *Worms*, much assisted by the surprized Fancies of the first Observers.

Lumbrici Cucurbitini found in the Kidneys of a Dog. lb.

The Lumbricus Latus; by Dr. Edward Tyfon. n. 146. p. 113.

XXXIX. The curious Researches of many inquisitive Persons after the Manner of the Generation of Insects, and their Discoveries therein, have much advanced the Doctrine of *univocal Generation*. Yet one great Difficulty remains with me, how to account for several of those that are bred in animal Bodies; not such as we may suppose to be hatched from the Eggs of the like Kind, that are received with the Food or otherways, but of which we cannot meet with a Parallel, or of the same Species, out of the Body, in the whole World as is known besides. I shall instance only in two, the *Lumbricus Latus*, and *Teres*, which remarkably differ from any others out of the Body, from whence, or from the Seed of the same, it may be any ways thought they may be propagated in it. But though we are gravelled in assigning how first these Sorts of *Worms* should come into the Body; yet being once there, there is nothing more plain, than that the *Lumbricus Teres* is propagated by an *univocal Generation*; there being in this Sort so perfect a Distinction of Sexes, Male and Female; and the Organs belonging to each so curiously contrived, so conspicuous and plain, that they may further illustrate the late Inventions of some, and do seem to shew, how solicitous Nature is in preserving and propagating the meanest Species.

I have made Observations upon both Sorts of these *Worms*; those on the *jointed Worm* I shall here give you.

1. This *Worm* is *flat*; and hence it is called *Lumbricus Latus*; and by *Hippocrates*, *Tavia*, i. e. *Fascia*; and by some in *English*, the *Tape Worm*. This *Flatness* of the Body, sufficiently distinguishes it from the others which are usually bred in the Body; and are either short or small, and then called *Ascarides*; or longer, as the *Teretes*: Nor is there any out of the Body, that I know of, that are thus *flat*. The Breadth of this *Worm* is various, both in the several Parts of the Body of the same *Worm*; as also in one *Worm* compared with any other. The longer the *Worm* is, the broader usually are the latter *Joints*.

2. The *Joints* of this *Worm* are so set on, that the Lines or extrem Edges of the former, come over the latter; which is to be well observed, and may direct us to that Part or Extream, where we may suppose the *Head* to be placed. These Edges of the former *Joint*, which shoot over the latter, in some I have observed to be plain and smooth, in others crenated, and indented in all. By drawing it through one's Fingers from the Tail to the Head, you will find a great Roughness; but if the other Way, from the Head to the Tail, it seems Smooth.

3. Many, who have observed this *Worm*, do take Notice of the Difference of its *Extreams*, how much larger one is than the other; but not well considering the Setting on of the *Joints*, abundance have been misled into an Error, by taking the *Head* for the *Tail*. Thus *Spigelius* and *Amatus Lusitanus* make the slender Part of the Body to be the *Tail*. But in all I have hitherto observed, I constantly found that *Extream* where the *Head* is set on (if we may allow it to have any) much smaller than the other, sometimes not half a quarter so broad; in others lesser or greater, often according to the Length of the *Worm*; but in all I take Notice, if they are of
any

any considerable Length, that the *Joints* towards the *Head* are vastly shorter than towards the *Tail*: For in one I have by me 24 Foot long, there about 5 *Joints* make an Inch; whereas the latter *Joints* here are above an Inch long: But in some I have taken out of Dogs, there were 30 or 40, sometimes above 60 *Annuli*, which towards the *Head* did make up but the Length of an Inch; whereas towards the *Tail*, 6 or 7 *Joints* did equal that Measure, and sometimes 3; so that gradually the *Joints* seem to increase, both in Length and Wideness, as they approach the *Tail*. But withal it must be observed, that according to the Corrugation or Extension of these *Joints*, their Dimensions will be altered, which is most apparent in them when alive; that likewise there is a great Difference of these *Joints* in the various Species of this *Worm* (for I think there are more Sorts than one.) And as to the Differences of them, there are these I have taken Notice of, 1. That in most, the *Joints* gradually, and very sensibly, increase in Length; but in a vast Quantity of this *Worm*, voided by a Person here in Town, but in several Pieces, 2, 3, 4, or more or fewer Yards long, I observed for a greater Length the *Joints* much the same; but I suppose I saw here neither the *Head* nor *Tail*. 2. In some, those *Orifices* which I take for *Mouths* were placed about the Middle of the *Joints*, on the Edges; in others, about the Middle of the *Flat* of the *Worm* near the *Jointings*. 3. These *Juttings*, or Lips of the upper *Joints* over the lower, in some were plain, in others crenated, in others the great Protuberatings at the Side rendered the whole *Worm* serrated. 4. Usually the same *Joint* is much of a Bigness throughout; but the upper Extream something lesser than the lower. But in one I took out of a Dog, I observed that in some of the last *Joints* towards the *Tail*, the upper Part of the *Joint*, by which it was fastened to the foregoing *Joint*, was very slender, in the Middle broad, and towards the other *Extream* grew taper again: But in another I took out of the same Dog, I could not observe the same Thing; as neither did I in a 3d I took out of another Dog, which was about 2 Yards long, whereas these were each 1 Foot, or $1\frac{1}{2}$ Foot long. 5. This *Worm* lies convoluted in several Places; and it is sometimes as long as all the Guts, and sometimes vastly exceeds that Length. *Olaus Borriccius* tells us, that a Patient of his, in a Year's time, has voided 800 Foot of this Sort of *Worm*, but in several Pieces, and that hitherto he has not met with the *Head*: For the Patient observed, that always in the Voiding it, he perceived it break off. I can parallel this with an Instance of a Person here in Town, once my Patient, who has voided vast Quantities of this *Worm* for several Years together, but in several Pieces, 2, 3, 4, 6, or more Yards long; but all put together, would much exceed the Length of that of *Borriccius*. But to be at any Certainty in this Particular, I think is very difficult: For when it comes to any considerable Length, by lying in several Clusters, or Convolutions, in the *Intestines*, the Descent of the *Faces*, especially being quickened by a Purge, will be apt to break Part off; which yet still will live and grow till quite carried out of the Body. Besides, I question, whether all those Pieces which are voided by the same Person, may be always reputed Parts of the same *Worm*, or of different.

But this is undeniable, that this *Worm* is vastly long, which plainly appears, even by those Pieces we see of them; for besides the Instances mentioned by several Authors, I have a Piece of one by me of a great Length, voided by a young Man about 20 Years of Age, upon the Use of an Emulsion of the cold Seeds. He dragged it from himself, not without some frightful Apprehensions that Guts and all were coming out; he plainly perceived it alive, and to move; and having put it in a wide-mouthed Glass, it often endeavoured, by raising its Body, to get out; but the cold Water, into which it was put afterwards, soon killed it. I measured it, and found it 24 Foot long. In it I numbered 507 *Joints*. Its Colour was extream *white*, being turgid with Chyle; its Body *flat*, about the Thickness of Half a Crown where thickest; and the *Joints* towards the *Tail*, about $\frac{1}{4}$ of an Inch broad, those towards the *Head* about $\frac{1}{4}$ as broad as those towards the *Tail*; and here the *Joints* were not $\frac{1}{4}$ of an Inch long, whereas those at the *Tail* were of a full Inch long and something more, and from the *Head* they seemed gradually to increase in length. The *Joints* much of a Wideness throughout; and the jutting Edges of the former over the latter usually plain and even, unless where the Contraction of the Body had rendered them a little crimped. The *Flats* of both Sides, just alike, and without any Spots, Protuberances or any thing remarkable, which might distinguish them, or be observed, only a smooth Superfice; but about the Middle of the Edges of each *Joint* I observed a protuberating *Orifice*, which would easily enough admit of a Hog's Bristle, and was open and apparent to the naked Eye. These *Orifices* were placed for the most part alternately, in one *Joint* on the Right Side, in the following on the Left: But sometimes I have observed them in two, more seldom in three succeeding *Joints* of the same Side; but never in one *Joint* more than once. These *Orifices* I take at present for so many *Mouths*.

Obs. l. 3.

4. But since I have here mentioned of what *Length* they have been observed in Man, I shall also add how *long* those were I have seen in *Dogs*. For though they are to be met with only in the animal Kingdom, yet in abundance of the Subjects of this, and those too of different Species; they are very frequent in *Fishes*, as in Pikes, Whittings, Bleaks, Crabs, Herrings, &c. and upon this Score sometimes they prove a great Damage to the Merchants, as *Platerus* observes, they being forced to sling them away. In *Bleaks*, in the Summer-time, if you open those that leap and tumble in the Water, from the Torment they feel within, you shall almost constantly meet with this *Worm*. In *Oxen* often they are observed likewise; not so much in *Calves*; in *Dogs* very frequently. I have oftentimes found them here myself in Dissection. I met the first Time with two; there was indeed another Piece, which I take only as broken off from one of the former, because here both *Extreams* were pretty large, and the *Joints* throughout proportionably long: But in the two others, the Disproportion was very remarkable; for besides observing here their *Heads* hispid, or thick beset with Hairs or small Spikes (which I shall afterwards describe) I took notice that this *Extream*, if extended, was very slender, and when a little contracted,

the *Joints* so very small, that they were scarce discernable by the naked Eye; but where I could better distinguish them, between 30 or 40 made the Length of an Inch: But towards the other *Extream*, or *Tail*, in one 4, in the other 6 or 7 *Joints* made that Length. One of these *Worms* was scarce a Foot long, the other not a Foot and half. In another Dog, I afterwards dissected, I found another *Worm* with just the same *Head*, but about 5 Foot long: Towards the *Head* in this, 60 *Joints* scarce made an Inch; but at the *Tail*, about 3 did equal that Space; and the *Joints* here were about a quarter of an Inch broad; and in the Sides of the *Joints* in this, I plainly perceived those *Orifices* I at present call the *Mouths*.

5. The *Head* of this *Worm* is *obscure*, and has created many Controversies amongst the curious *Anatomists*; who yet have been forced to confess, after observing vast Quantities of this *Worm*, that they are still at a Loss, and know nothing certain of it. But what I have observed of the *Head* of this *Worm*, in 3 several ones I have taken out of the Bodies of Dogs upon Dissection, where I know I have them whole, makes me to be something more at a Certainty. I opened a Dog at the *College of Physicians*, and found a *Worm* alive in the *Ileon*, not lying straight, but in many Places winding and doubling. Having taken notice how the *Joints* were, I traced it up, by carefully opening the *Intestine* to the smallest *Extream*, where I expected the *Head* to be, and which did lie towards the *Duodenum*; whereas the broader End was downward toward the *Rectum*; and this broad End was free, and did nothing adhere; whereas that smaller *Extream* did so firmly stick, and had fastened itself to the inner Coat of the *Intestine*, that it was not without some Trouble, by gently raising it with my Nail, that I freed it from its Adhesion. Having lifted it up, I carefully viewed it; and did observe neither that *Biceps*, in *Tulpius's* first Figure, nor the *Head* like a *Tricoccus*, as in *Mich. Febr.* but a very slender Body, which, being alive, it would sometimes shoot out a considerable Length, at others, retract it in again, and so very much alter its Figure, by becoming broader. But whilst I was doing this, by its wriggling its Body, it happening to fall off my Finger, it presently took hold again, and gave me as much Trouble to free it a second Time from its Adhesion as at the first. I put it for the present into Spirit of Wine, that I might more carefully view it with a *Microscope* at Home: And in doing this, making use of some extraordinary good ones, it very plainly appeared, as is represented in the 20th Figure, *Fig. 20.* thick beset with two Orders of Spikes, or Hooks, whereof the larger did arise from the Center or Middle, spreading themselves over the Edges of the Circumference; the other, which were lesser, issuing out about the Middle of the Center, and were shorter, as is seen in this Figure, and are represented sideways in the 21st. *Fig. 21.* I could not, upon my strictest Enquiry, and with extraordinary Glasses too, inform myself of any *Orifice* here, which we may suppose to be the *Mouth*; only a little indenting there was in the Center, occasioned by the issuing out of the Spikes thence. This End was not perfectly flat, but a little globous; and I could perceive by the Swelling a little below on the *Neck*, and wrinkling of the Skin, as in the Figures, how

how it did shoot out, and contract its *Neck*, as I observed it when alive. For some little Space here, I could not observe with the Glasses any *Joints* at all ; but after, very thick set, and small, and gradually increasing in Length, as they descended towards the *Tail*. The *Heads* of the other two *Worms* exactly appeared the same in the *Microscope*, as this described ; and afterwards, by carefully viewing them by my naked Eye, I could observe these *Hairs* or *Spikes*.

It was objected by some ingenious Persons, whether these *Spikes* or *Hairs* might not be like the small Feet of the *Tick*, or *Ricinus*, for its fastening itself the better to help its Suction. And indeed, were it Blood it lived upon, the Case were plain ; but since it is *Chyle*, what Service they could do it in this, I do not see ; for when they fasten, the *Head* is deep immersed in the inward Coat of the *Intestine*, and so may be thought, for that Time, to get but a very inconsiderable Soop, if any ; and nothing in Proportion to what is requisite for so vast a long Body, and what it is often observed to be turgid with. Upon the whole, what seems most agreeable to me, and to be the true Use of this Part, we call the *Head*, is this ; that by the Means of these *Hooks* and *Spikes* it might fasten itself, and so prevent its too easy Ejection out of the Body : For it being so very long, and large too, and its Body in many Places winding and convoluted, the Descent of the *Fæces* upon all Occasions would be apt to carry it out with them, had it not this Hold ; which is so fast, that rather than loosen itself, Parts of the Body are sooner broken off, which we frequently see in the Stool. When it penetrates the Coat of the *Intestine*, it contracts its *Hooks* in, and draws up its *Head* to a Point ; then expands them, and takes firm Hold of the *Membrane*, by darting its several *Poniards* into it ; which excites those intolerable *Pains*, which those that are troubled with them so much complain of, that I have known it to that Extremity that some have been scarce dissuaded from offering Violence to themselves, to free themselves, as they thought, from a great Misery : And hence it is that this *Worm* is so difficult a Cure, that though by Medicines and Purges, vast Quantities at Times may be brought away, yet some can hardly get a perfect Cure all their Life-time ; as I know of one, who for above 20 Years has been afflicted with it, that has had the Advice of several able and eminent Physicians.

6. But since in this *Head* we find no *Mouth*, we must seek it somewhere else. I am very sensible with how great Difficulty my present Thoughts concerning this will be received, and how obvious to all it will be to raise Objections. But if what I here offer be true, others will find it likewise ; if not, I shall not think myself obliged to believe it. Why at present I think those *Orifices* in every *Joint* to be so many *Mouths*, I shall now give my Reasons. I have already observed them to be of two Sorts ; that in several *Worms*, both from Human Bodies, as also in those of Brute Animals, they are placed much about the Middle of the *Joints* on the Edges ; most frequently alternately, in one *Joint* on the Right Hand, in the other on the Left ; sometimes in two, seldom in more, on the same Side : They are protuberant, something like a *Papilla*, and in the Middle a
Foramen

Foramen easily enough to be perceived by the naked Eye, and will readily admit a Hog's Bristle. In the other Sort, these Protuberances are placed about the Middle of the Flat of the *Worm*, towards the upper Part of the *Joint*, and seem to be represented by *Spigelius*, *Sennertus*, and *Tulpius*, in their Figures of this *Worm*, though with some Mistakes; and is that which Authors mean by their *Maculae Nigricantes* in their Descriptions of it.

I shall here chiefly insist upon the former Sort, which has occurred most commonly to me; and a short black Line here, placed tranverse to the Body, I think was the first that gave me Notice of them; though since, in others I have not so constantly seen it, but only a protuberant Orifice about the Middle of the Edges of the *Joints*. That these are so many *Mouths*, I shall argue, *First*, from the great Quantity of *Chyle* they are often turgid with. *Secondly*, from the great Appetite, but more often Thirst, and almost always that Emaciation which they occasion. *Thirdly*, that there is no other *Mouth* besides observed. *Fourthly*, that no Uses can so fitly be assigned to these *Orifices* as their being *Mouths*.

As to the *First*; None, who have observed them, but must confess that they are often very turgid; as that I have by me 8 Yards long, at first did very plainly appear; and having put it into Spirit of Wine, I found after a little while it had muddied it, by spewing out a large Quantity of a chylous Juice, which made a deep Sediment at the Bottom; as likewise it did a second Time, having changed the old, and put it in fresh Spirits. Whence all this should issue, I cannot see, but by these *Orifices* at the Sides, which first I suppose had received, and licked it in: And being in so large a Quantity, how otherwise it could be well received into the Body, but by these many *Mouths*; which being always open, and lying of all Sides too, do greedily exhaust and devour the best Part of the *Chyle* and nutritious Aliment. 2. That hence may be well accounted for, that *Appetitus Caninus*, that great Thirst, that *Atrophy*, I mentioned in my *Second* Particular, and are often observed in those that are afflicted with this *Worm*. But had they but one *Mouth*, how could they do this? But having as many, it may be, as the *Lasteals* themselves, it is no Wonder that they rob them; and by their nimble supping it up, prevent its passing into them. That thence we must necessarily expect an Extenuation of our own Bodies, in Proportion to the Increase of theirs; since the Nourishment we receive is but what they leave us, and that too none of the best, and corrupted likewise with their Recrements. 3. I argue, That these *Orifices* are so many *Mouths*; for if we do not admit them to be such, I know not where in the whole Body to find them besides. For in that Part we call the *Head*, even our *Microscopes*, as I have observed, cannot discover any; and those too, that guessed it to be there, they all acknowledged it to be very small; and it being so, and but single too, I cannot see how it can take in so great a Quantity of *Chyle*, which would be necessary for maintaining so great a Body, of so great a Length: For it can lick up no more than what just comes in its Way; so that the open *Mouths* of the numerous *Lasteals* would be too hard for it, and quickly starve it. Besides, since it nuzzles its *Head* so deep in the Coats of
the.

the *Intestines*, at that time at least, it may be thought incapable of getting scarce any thing at all. But the *Use* I have assigned that Part, I am apt to think, will satisfy others, as well as at present it does myself. Therefore, 4. Why I think those Orifices *Mouths* is, because I cannot think what they are besides: For to take them for so many Vents of their Excrement would be more unreasonable, since it is pure *Chyle* which they receive; which will not afford much, at least so gross an Excrement, as to need so many and large Orifices for the voiding it. And why so many *Anus's*, when but one *Mouth*? It is easier to imagine them *Bronchiæ*, or *Lungs*, which in Insects are observed in all the *Annuli*, or *Joints* of the Body; but withal I must observe, with how much Difference from our Subject: For in them you shall constantly see these *Orifices* of both Sides in each *Annulus*, but in our *Worm*, never but of one Side; in those they are not near so open, and large, as in this *Worm*, even so much, that I cannot see how it can be avoided, but that the *Chyle* must slip into them, and so spoil them for being *Lungs*; and indeed, what Use can we imagine of such here, which must almost constantly be occluded, either by Filth or *Chyle*. If I misremember not, by pressing them gently with my Fingers when fresh and turgid, I observed *Chyle* to issue out of them. So that I think I have little reason to doubt that the *chylous* Sediment in the Spirit of Wine, I had immersed them into, came hence. Upon the whole, what I have here offered, I think, is sufficient to render my Conjecture probable. And yet I have more Reasons to add why these *Orifices* should be *Mouths*; because the *Joints*, when broken off, yet still do live; and that too, as may be thought, for some considerable time; which they could not, unless they had *Mouths* in each, which might receive the Aliment for the Support of it. Which brings me to the last Particular I proposed, for discriminating this *Worm* from all others out of the Body, and shall now discourse of.

7. It has been stiffly maintained by Authors of great Note, both modern as well as the Antients, That the *Worm* itself scarce *lives*; and is only a *Spolium* of the *Intestine*, or at least, it is not one, but many *Worms*, included in that Membrane. But such Opinions seem wide of the Truth: For many Physicians have observed it to *move*, and therefore to be an Animal and *alive*. And a remarkable Instance I had of it, in that I met with upon Dissecting of a Dog in the Theatre of our College; where I particularly observed the Manner how it performed its *Motion*, which was very pleasing and in different Forms. For though all was performed by contracting and shortening the *Joints*; yet sometimes it rendered the Body, that was flat, round and a *Cylinder*; other times it made a deep Hollow or Concave on one Side, and a Convex on the other; but most times there was a bellying out at the Edges, about the Middle of the *Joints*; and though that Part towards the *Head* was very slender, yet upon Contraction it would become as broad as the last *Joints*. This Contraction of the *Joints* I sometimes observed, at several Places at the same Time at some Distance from one another, which must needs much advantage its progressive Motion; since being of so great a Length, otherwise it could make but small Advance; which is perhaps

perhaps requisite, that it may recover itself, when the Descent of the *Fæces* do drive it downwards. And for the Advantage too of its *Motion*, at every *Joint* there is a Prominence of the former over the latter; which, like so many Scales on the Belly of other *Reptiles*, do perform the Use of Feet.

But I find some Authors, who admit this *Worm* to be *alive*, yet assert, that it is not one, but many *Worms* linked together and included in a *Spolium* of the *Intestines*, and that this *Spolium* itself is not *animated*, but receives all its Sense and Motion from the *Cucurbitini* included in it. This *Gabucinus* very plainly, as he tells us, discovered in a Part of this *Worm*, shewed him by a Person that voided it. *Hæc Portio*, says he, *sefe commovebat, quo factum est, ut avidius Motus ipsius causam vestigarem; diligentissime tandem perquirens per ejus totam Cavitatem, Cucumeris similium Animalium Seriem sefe moventium ipsi Motum præstare conspexi: Quæ ex ea, veluti ex quodam Lectulo, prodibant, interdum unum, duo simul interdum complicata, plerumque quatuor plurave: atque eam abrasionis portionem, quæ vacua ab hujusmodi Cucurbitinis segmentis Animatis erat, nullo pacto moveri, imo subsidere.* But I very much suspect this Particular, because in that I met with in a Dog in the *College Theatre* whilst *alive*, and in my Hand, a *Joint* or two fell off, but I could no ways observe any Membrane hanging to the foregoing *Joint*, out of which it might slip, but it broke off entire. And although there were two single *Joints*, which I found in the *Intestine*, upon the first opening it, yet there was nothing I could see affixed to the last which might include them. And indeed the setting on of the *Joints* here is such, that it seems to me sufficient to shew, that this *Worm* cannot be a continued Membrane articulated only by the several *Cucurbitini* included in it, since there is so large a Protuberance of the lower Extream of the foregoing *Joint*, over the upper Part of the following; which I plainly perceived in this *Worm*. If only a Membrane, why constantly, and thus regularly, a Difference of both *Extreams*, as to their Length and Breadth? How happen the *Hooks* at the *Head*? How are those *Orifices* formed at the *Edges*, or on the *Flat* of the *Worm*? And if it was so as *Gabucinus* imagined, I cannot think but I must have perceived something of it in those several Pieces of this *Worm* which I have observed, and especially in that 8 Yards long, where I opened several *Joints*, and could find no such Thing. That *mucous* Matter therefore which is observed to be voided by those troubled with them, which he tells us the Women there take for the Beds of this *Worm*, may be better accounted for; it being likely in a great Measure to be but the *Mucus* of the *Intestines* themselves, or a slimy *Spolium* cast off from these *Worms*. Thus Leeches, I have observed, being put into Water, do cast out a Slime, which covers their Bodies, which afterwards they slip off, and is found in the Bottom of the Glass in the Form of a mucous Coat. So Earth-worms do void a large Quantity of a mucous Liquor, at several Parts of their Body; so Snails, &c. Upon the whole, I see nothing why we may not justly ascribe that *Life*, we find here, to the *Lumbricus Latus* itself, and not to any Animals we may fancy it pregnant with.

De Lumb.
Comment.
n. 3. p. m. 34.

And what I do give to the Whole, I must attribute likewise to the several Parts of it, even when separated from the rest of the Body; and cannot but think that they do *live* likewise: For, besides those Considerations, I have already delivered to prove that in every *Joint* there is a *Mouth* for receiving the Food (and no doubt answerable *Organs* for the *Digestion* and Distribution of it) I have also observed that both single *Joints*, and often larger Pieces have been voided *alive*; and where vast Quantities of this *Worm* too have been voided at the same Time, in abundance of Pieces, I have observed them almost equally turgid, and alike filled with *Chyle* in Proportion to the Magnitude of the Parts. Now I cannot think, that in voiding it can always be broken into so many Pieces; and if it be done some Time before, and they lie dead in the Body, they must be emacrated, and different from what they appear. But that Observation I have already often mentioned, of that *Worm* I met with in the Dog I dissected in the *College Theatre*, does furnish me with something apposite to our Purpose. For here, about the Middle of the *Worm*, as it lay in the *Intestine*, about a Foot and a Half from the *Tail*, or lower Extream, I observed two single *Joints*, about three Quarters of an Inch long, *alive*, and which continued their Motion briskly for three Quarters of an Hour, or more, in warm Water. That these were broken off from the *Tail*, I nothing question, being in all Respects so like them; and that it must be done some Time before, I am apt to think, because they were so remote from it. For they could not otherwise easily, being but single *Joints*, make so great an Advance, being upon all Occasions liable rather to be driven down, not being able, as I could observe, any ways to fasten themselves, and so resist the Force of the descending *Fæces*: Which is the Reason, when broken off, they are so frequently voided.

Upon the Whole, I have been sometimes apt to think, what Analogy there may be between this *jointed Worm* and *knotted Plants*, of which each Joint can so easily propagate itself; and whether it may not be thought an *Animal*, *Plant-Animal*, or *Zoophyton*, bred in Animal Bodies; since so large and frequent Detruncations of the Body do not destroy the Life of the Whole; which I think can scarce be instanced in any Animal besides.

Explication of
the Figures.

Figure 16, represents a *Worm*, or rather Part of a *Worm*, voided by a young Man in *London*; which was eight Yards long. The lesser Extream, is that Part towards the *Head*; the broader, the *Tail*. The Protuberances, about the Middle of the Edges of the *Joints*, are the Orifices I take for *Mouths*.

Fig. 17, a *Worm* I took out of a Dog, which was about five Foot long; and was *alive*. The small End shews the *Head*; as it appeared then to the naked Eye. The two Protuberances at the Sides, are the *Mouths*. The broad End the *Tail*.

Fig. 18, I met with this Figure in *Franc. Sanchez*, which, though rude and plain, yet very well represents those Orifices, which I take for the several *Mouths* of this *Worm*.



Fig. 18.

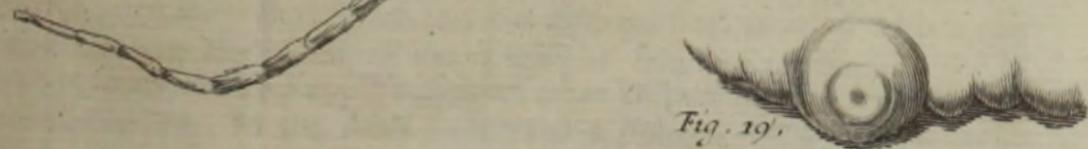


Fig. 21.



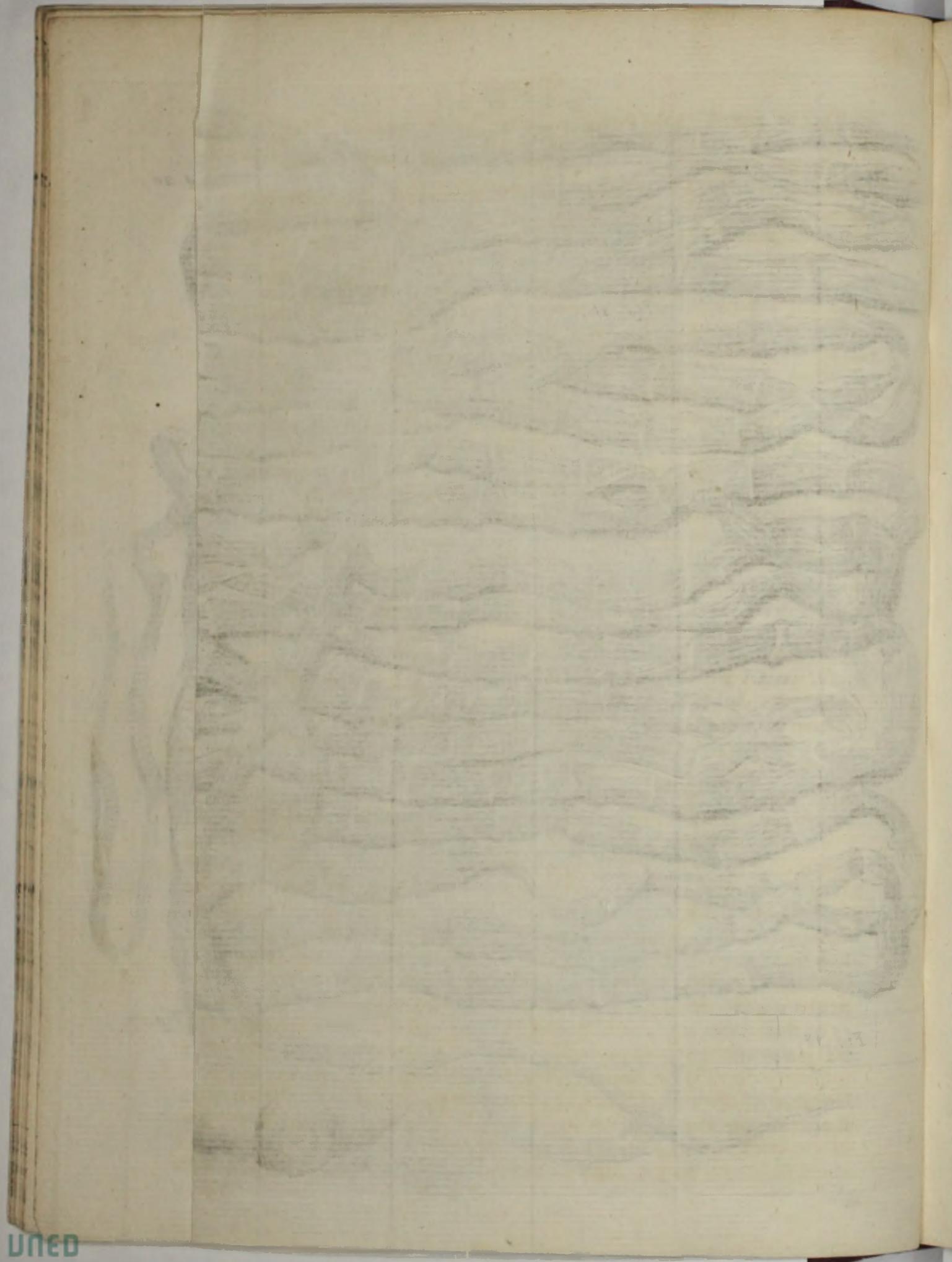


Fig. 19, represents the Protuberance or *Papilla* about the Middle of the Edges (as viewed with a *Microscope*) and in it the Orifice which I take for the *Mouth* of this *Worm*.

Fig. 20, is the *Head* of this *Worm* (as it appeared in the *Microscope*) in 3 several ones I took out of the *Body*, upon *Dissection*; wherein is observable a double Order of *Spikes* or *Hooks*, the longer arising from the *Center*, the other more towards the *Edges*, which at pleasure it can contract or protrude, and with them, part of the *Neck* too, as does appear by the Swelling out a little below, as it is very curiously delineated (as likewise the other *Figures*) by *Rich. Waller*, Esq;

Fig. 21, a Side-prospect of the *Head*, and the *Hooks* in it, of the same *Worm*.

XL. That common *Round Worm*, which Children usually are troubled with, is by *Hippocrates* named $\epsilon\rho\omicron\gamma\gamma\acute{\iota}\lambda\omicron\varsigma$; by *Celsus*, *Teres*. It is usually about a *Foot* long; but the *Male* is generally lesser than the *Female*: So that by their *Bigness* in the same *Body*, I have, before *Dissection*, been able to distinguish the *Sex*. They are about the *Bigness* of a *Wheat Straw*, or a *Goose-Quill*, and their *Colour* white. I did not observe those *Feet* or *Asperities* on the *Annuli*, as in the *Earth-Worm*. At both *Extreams* they grow narrow. Their *Mouth* is composed of three *Lips*; so the *Leech* hath three cartilaginous *Teeth* set in a *Triangle*, by which they make the *Wound* in the *Skin* in *Suction*. The *Anus* is a transverse *Slit* a little before the *extream Point* of the *Tail*.

The Lumbricus Teres;
by Dr. Edw. Tyson. n. 147.
p. 154.

In opening the *Body*, I found I cut through a large *Muscle* under the *Skin*: Which *Muscle* in *Earth-Worms* I find is *spiral*, as in a good measure is their *Motion* likewise; so that by this *Means*, like the *Worm* of an *Augre*, they can the better bore their *Passage* into the *Earth*. Their reptile *Motion* also may be explained by a *Wire* wound on a *Cylinder*, which when slipped off, and one *End* extended and held fast, will bring the other nearer it. So the *Earth-Worm* having shot out or extended its *Body* (which is with a *Wreathing*) it takes hold by those small *Feet* it hath, and so contracts the hinder *Part* of its *Body*. Likewise I observed, that dividing this *Part*, there issued out a copious *Ichor*; which is naturally discharged by some *Pores*, or small *Vents* in the *Skin*; which in the *Earth-Worm* is of great *Use*, by rendering the *Surface* of the *Body* slippery, that so it might the more easily glide into the *Earth*. And in these other *Worms* of the *Intestines*, this *Humour* (as in *Leeches*) makes a *Covering* to the *Body*, which is often cast off, and observed as a *Mucus* in the *Stools* of those troubled with them.

In these *Teretes* of animal *Bodies*, I never observed those transverse *Diaphragms* which are so numerous in *Earth-Worms*, and to intersect, or rather so deeply depress, the *Intestine*. The *Passage* from the *Mouth* was somewhat straightened for a short *Space*, and was distinguished, as in the *Figures*, from the following *Ductus*, which was a straight *Intestine* continued to the *End* of the *Body*, without any *Winding* or other *Distinction* of a *Stomach*, that I could observe. In the *Male* I observed a *Penis*, a *Vesicula Seminalis*, and a

Fig. 22, 23.

Testis: In the *Female* a *Pudendum*, *Vagina Uteri*, *Cornua Uteri*, and *Spermatick Vessels*.

In the *Male*, the *Penis* was placed at the *Tail*, or opposite Extream to the *Head*, and seemed to be able to exert itself almost the Length of a Barley-Corn, or proportionably to the Length of the *Vagina* in the *Female*. At the Root of the *Penis* was inserted the Neck of the *Vesicula Seminalis*, which gradually grew larger as it ascended in the Body, and usually did reach almost half-way. It was filled and turgid with a *milky Juice*, which it received from a slender *Vessel* of the same Colour inserted into it; which after one turning, was afterward very much convoluted, and being so, forms that Body I call the *Testis*. And although this Part be so loosely contexted, as even to the naked Eye it appears but as a continued Vessel, and may easily be unravelled its whole Length, which I measured was above a Yard, yet I make no Difficulty of giving it the Name of a *Testis*, since it was now sufficiently known, that the *Testes*, in more compleat Animals, are only a Congeries of *Vessels*; and a *Rat*, besides this *Worm*, is not only the Subject wherein I have found them thus loose and easily separable.

In the *Female Worm*, almost about the Middle of the Body, but more towards the *Head*, I observed an Orifice or *Pudendum*, which led into the *Vagina Uteri*; which soon divided into the two *Cornua*, which were large and remarkable: For descending something winding towards the *Tail*, they were then reflected again, and did each of them terminate in slender *Vessels*, white as they were, but much smaller; and did lie in several Convolutions and Windings amongst them. These I take for *Spermatick Vessels*. Having taken those *Vessels*, with the *Cornua Uteri* and *Vagina*, out of the Body, and laid them on a Paper to dry, I found from each *Cornu* to the End of the *Spermatick Vessels*, which I had preserved, that they measured above 4 Foot. I opened the *Cornua Uteri*, and found them turgid with a *milky Juice*: Having placed a little of it upon a small *Microscope*, I plainly perceived it was nothing else but an infinite Number of small *Eggs*, though to the naked Eye it appeared only as a fluid Body. These *Eggs*, when fresh, appeared as is represented in the *Figure*, covered with abundance of small *Asperities*; but as they grew dry, their Surface appeared smooth. By comparing that small Quantity I did observe, in which I could distinguish so many *Eggs*, with the whole Substance contained in both the *Cornua*, I cannot guess there can be so few as 1000 *Eggs* in each *Female Worm*.

How far different this *Worm* is from common *Earth-Worms*, as to these Parts, I need only refer to Dr. *Willis's* Figures and Account of it to shew: And I am yet to learn what *Worm* out of the Body has these Organs thus formed: When once there, the Case is plain how they propagate themselves, since the Distinction of *Sexes* is so evident: So that they are much mistaken who say, that these *Worms* do not generate. And I cannot but think, that they are also mistaken who make them *Viviparous*; and that they were imposed upon by the *Genital* Parts of this *Worm*; which not warily examined, might easily make them to think they are so many small *Worms*: For they are not *Viviparous* but *Oviparous*, as I have shewn; and their

Fig. 25.

De Anima
Brutorum,
c. 3.

their containing so vast a Number of *Eggs* in the *Cornua Uteri*, as I have expressed, does sufficiently account for that prodigious Quantity, that are sometimes observed to be bred in animal Bodies. And were it not that the greatest Part of the Litter of this *Worm* is usually carried forth by the *Faces*, it could not be avoided but we should be devoured by such a *multiparous* Enemy, which we breed in our own Bowels. That Caution therefore of *Henr. ab Heers*, I think is necessary, to avoid the giving the Powder of these *Worms* for expelling others, since we cannot be secure, but that at the same Time we may sow the Seed for propagating more.

Fig. 22, represents a *Male-Worm* opened. *a*, Shews the 3 *Lips* of the *Worm*. *b*, The *Oesophagus*, or Gullet. *c c c*, The large *Intestine*. *d*, The *Penis*. *e e*, The *Vesicula Seminalis*. *f*, The *Testis*.

Fig. 23, a *Female-Worm* opened. *a*, The *Mouth*. *b*, The *Gullet*. *c c c*, The *Intestine*, or Gut. *d d d d*, The two *Cornua Uteri*. *e*, The *Vagina Uteri*. *f f f*, The *Spermatick Vessels*. *g*, The *Anus*.

Fig. 24, the *Genital Parts* of the *Female Worm* explicated. *a*, The *Pudendum*, or *Foramen*, as it appears on the Outside of the Skin. *b*, The *Vagina Uteri*. *c c*, The two *Cornua Uteri*. *d d*, The *Spermatick Vessels*.

Fig. 25, the *Eggs* of this *Worm*, as they appeared, being viewed by the *Microscope*.

XLI. In *Apr. 1673*, a *Chirurgion* at *York* brought me about 20 *Worms*, which he had just taken out of an ulcerated Ankle of a Girl of about 8 Years old. She had been in great Misery for some Months; and had been sent up to *London*, where she was touched and dressed for the *Evil*. Some Time after her Return, her Pain continuing, a young Puppy was opened and applied to the Sores. The *Chirurgion*, who took off the Puppy, found it, to his great Admiration, full of *Worms*, at least 60 in number, what with those he found in the Body of the Puppy, and what he drew out of the fore Ankle; into which, he said, they crawled down as *Worms* do into the Ground. The same Puppy was again applied, and at the second taking it off I made her a Visit. I found the Leg sound all but the Ankle, which was vastly swelled, and the Girl otherwise hearty and well-coloured. I saw only one *Worm* got out into the Puppy, but a very live and stirring one: Many were afterwards killed by Injections. These *Worms*, I affirm, according to my best Knowledge (and I had the Opportunity of comparing them) were of the very Species of the *Lumbrici Teretes*, which Children familiarly void from the *Guts*. They were betwixt 3 and 4 Inches long; all, about the matter, of an equal Bigness, as of one Brood, something thicker than a Duck's Quill; very sharp at both Ends, stiff, and exactly round; without Incisures, visible at least, and yet could move and twist themselves readily enough. All the Difference was in the Colour, these being much whiter than any I have seen from the *Guts*.

Obs. Med. l. 1.
Obs. 9.

*Explication of
the Figures.*

Lumbrici Teretes found in an ulcerated Ankle; by Dr. M. Lister. n. 95. p. 6064.

XLII. The

*A Remedy for
Worms in
Children; by
Sir Theodore
Mayern.
n. 211. p. 164.*

XLII. The Sugar, or Remedy, given by *Pontæus* (a famous *Chymical Mountebank*) for *Worms* in Children, is 15 *Gr.* of *Mercurius Dulcis*, with 5 *Gr.* of *Scammony*, and 2 or 3 times as much *Sugar*, made up in *Lozenges*.

He says, that this *Dose*, which in *France* purges grown Persons, does nothing here in *England* on those above 15 Years old, and ought to be augmented.

His *Mercurius Dulcis* is made without *Vitriol*, which, though good, is yet corrosive ; he takes only *Ashes* with decrepitated *Salt*.

*The Lumbricus Hydro-
picus; by
Dr. Edw.
Tyson.
n. 193. p. 506.*

XLIII. In the Dissection of a *Gazella*, or *Antelope*, brought from *Aleppo*, I observed several *Hydatides*, or Films, filled with limpid Water, about the Bigness of a Pidgeon's Egg, and oval, which were fastened to the *Omentum*, and some in the *Pelvis*, between the *Bladder of Urine* and the *Rectum*. I had before met with the like watery Bags, or *Hydatides*, in other Animals, and I suspected them to be a particular Sort of Insect bred in animal Bodies, or at least the Embrio's or Eggs of them: 1. Because I observed them included in an outward Membrane, like a *Matrix*, so loosely, that by opening it with my Finger or a Knife, the inward *Bladder*, containing the *Lympha* or *Serum*, seemed no where to have any Connexion or Hold to it, but would very readily drop out, still holding its Liquor, without spilling any of it. 2. I perceived, to this inward *Bladder* there was a Neck, or white Body, more opake than the rest of the *Bladder*, and protuberant from it; but so as I could observe an Orifice at the Extream of it, which then to me seemed to be occasioned by the Retraction of some Part of it inwards. By this I fancied it might, as by a *Mouth*, suck the *Serum* from the outward Membrane, and so supply its *Bladder* or *Stomach*. 3. Upon approaching this Neck to the Candle, we found that it did really move, and then shorten itself. Mr. *Richard Waller*, being present at the Dissection, made these Figures of it.

*Explication of
the Figures.*

Fig. 26, represents one of these watry Bladders, inclosed in its outward Membrane or *Chorion*; its Shape was almost round, only flatted as a Drop of *Quicksilver* will be by lying upon a Solid. *a*, Shews the Neck, seen through the Membrane, which in

Fig. 27, is more plainly represented (the outward Membrane being taken off) but as appearing to the naked Eye; where we may observe an open Orifice at the Extream of it, and that it is made of circular Rings or Incisures, which in

Fig. 28, being viewed by a *Microscope*, do more evidently discover themselves. This Part is granulated with an Abundance of fine Eminencies all over. The Orifice at the End seems here to be occasioned by drawing itself inwards, and upon Trial we found it so, for in

Fig. 29, is represented the Neck of this *Worm*, drawn out its whole Length, and magnified; where may be observed the lessening of the Rings, and its tending to a Point at the End. And having opened it, within we found 2 small *Strings*, *a a*, proceeding from the Neck, and floating in the Liquor.

What these two *Strings* may be, is hard positively to assert: Leaving others to their own Conjectures, I shall deliver mine. That this *Worm*, by protruding its Neck, sucks from the outward Membrane (which involves it, and is furnished with Blood-Vessels) the Moisture, or Nourishment, which is conveyed by these two *Strings* or Pipes into the Stomach or Bladder, and from whence, as there is Occasion, it may be supplied for the nourishing the whole Body of the *Worm* again; for I am apt to believe, this Bladder is but the *Stomach* of the *Worm*; which will appear less unreasonable, if we consider in some Insects how prodigiously large the *Stomach* is in Proportion to the other Parts of the Body; in a *Leech* you may observe not a single, but above 20 *Stomachs*, emptying out of one into another, and running the whole Length of the Body. And what *Malpighius* observes of the *Silk Worm*, that it would devour in one Day as much as the Weight of its whole Body, a *Leech* will do far more at a Meal.

Some, it may be, will be more inclined to think, that the Whole is but an Egg, or *Embryo* of another Insect a forming, and that this Bladder is as it were the *Amnion*, and the outward Coat that includes it in the *Chorion*. But formerly, in dissecting a rotten Sheep, wherein I found many of these *Hydatides*, and opening several of them, I could not observe but the same Structure exactly in all; and doubtless, had they been indeed *Embrios*, I should have met with some nearer to Perfection. These *Hydatides*, therefore, I cannot but think, are a Sort of *Worms* or Insects *sui generis*; and because they contain so much Water in them, and are usually to be met with in rotten Sheep, which are *Hydropical*, I call them *Lumbrici Hydropici*.

But I do not think that all those *Cysts*, to be met with in morbid Bodies, are of this Sort; for in some I have not observed this *Neck* and Structure of Parts, but only a transparent Bladder filled with a *Lympha*. Thus, about 10 Years ago, I opened the Right Side of a Patient, a little below her short Ribs, and there issued out Abundance of limpid Water, and together with it a great many *Hydatides*; that first and last, as we guessed, there might come out about 500 of these Bladders: Most were entire and filled with limpid Water; of others, that were too large for the *Orifice*, the Films were broke; but in none of them could I observe the *Neck*, though I was inquisitive to find it; which makes me think them to be different from our present Subject, as are likewise those I have frequently met with in the *Ovaria*, or Testicles of Women, who have died *Hydropical*, which I take to be only the *Eggs* contained there, which by an extravagant Flux of Humours into them, are often swelled to that prodigious Bigness, that I have taken sometimes several Gallons of Liquor out of them. And those Bladders of Water found in the Urine-Bladder of Mr. *Smith* of *Highbate*, will come into the same Number, having observed no *Neck* in any of them.

I shall only add, That these *Lumbrici Hydropici* I have always found hanging to the membranous Parts, rather than included in the Body of any of the the *Viscera*, as to the *Omentum Peritonæum*, or the outward Membranes that cover the *Diaphragm*, *Stomach*, *Liver*, *Colon*, or other *Intestines*.

A Worm
voided by
Urine; by
Mr. Matthew
Milford.
n. 140. p. 1009.
By Mr. Ent. ib.

XLIV. 1. The *Worm*, when I voided it, which was at the second Urine, was then alive: It was Snake-headed, of indifferent Substance in the Middle, and small at the Tail; in Length above Half a Yard. I was very ill before it came from me, and have ever since unrined a Kind of Blood.

2. It is most probable, that he had a Suppression of Urine for some Time, at the first making whereof, the *Worm* was voided from one of the *Kidneys* (wherein it was bred) into the *Bladder*; and at the second, from thence into the Pot. It was (being dead and dry) of a dull red Colour, and in Thickness about the 12th of an Inch.

Animals vomited by a Child at Sheffield; by Mr. Jessop. n. 117. p. 393.

XLV. 1. A Girl in *Sheffield*, about 8 Months old, was surprized with violent vomiting Fits, which held her for about a Week, and made her so weak, that her Parents began to despair of her Recovery. They at length sent for Mr. *Fisher*, who chanced to say, *Wormwood* was good for the Stomach. He going Home to fetch Things proper on that Occasion, they, in the mean Time, offered her some *Wormwood-Ale*, which she took so greedily, that she swallowed down a Pint of it. And at his Return, she vomited up in his Presence 3 *Hexapodes*, all very active and nimble. The Girl, in a short Time recovered, and was well. Mr. *Fisher*, in the Afternoon, brought the *Hexapodes* to me; we killed one of them with trying Experiments upon it; but gave either of the other two the Head of a shining *Atricapilla*, which, in about 5 Weeks Time, they eat up, Bones, Feathers, and all, except the Extremities of the Feathers, and the Beaks. I then gave them a Piece of *Laurus*; but that, it seems, agreed not so well with them, for they died within 2 Days.

By a Child near Rippon; by Dr. Lister. ib. p. 394.

2. A Son of Mr. *B.* living not far off *Rippon*, about 9 Years of Age, in Feb. 167 $\frac{1}{2}$, was afflicted with a great Pain in his Stomach, and continual Vomiting. A Powder was given, wherein was a small Quantity of *Mercurius Dulcis*. He thereupon vomited up several strange *Worms*, two of which were brought to me at *York*, the one dead, the other alive, and which lived many Days, till I put it into Spirit of Wine, to preserve it in its true Shape. These *Worms* were very *Caterpillars*, with 14 Legs, viz. 6 small, pointed; the 8 Middle, Stumps; and the two hind, Claspers; something more than an Inch long, and of the Thickness of a Duck's Quill, thin haired, or rather naked, with brown *Annuli*, and a black Head; the very same, for Kind, that I have many times seen on Plants; and, no doubt, these (as those others) would, in due Time (if the Place had not hindered) have shrunk into *Chrysalis's*, and changed into *Moths*. As also those, mentioned by Mr. *Jessop*, would have changed to *Beetles*.

By a Man at York; by Dr. M. Lister. Ph. Col. n. 6. p. 164.

3. A Baker at *York*, in March 168 $\frac{1}{2}$, vomited up a *Worm*: I found it in the Blood which came up with it, having caused it to be washed, for the more careful Examination of it, much of the Blood being Clods of a Kind of Skinny and fleshy Substance, *haud aliter quam in Mulierum Molis excernendis accidere solet*. Of this Kind of Blood there was about 2 Pound Weight saved in the Washing, and this odd Animal amongst it. It was a dark green Colour, like a Horse-Leech, and spotted not unlike some of them: I could perceive

Fig. 16.

ceive (when I found it) no Life or Motion it had; the Girl that washed the Blood having almost beaten off a Fin, and Part of one of the Forks of the Tail, and burst the Belly of it; yet it was curiously and regularly shaped in all its Members. The honest Man imagined he drank it the Summer before in pond-water, of which he was used to drink after sore Labour in his Calling. This is certain, he had about his Stomach and Right Side a most exquisite and tormenting Pain for at least 4 Months, which many times threw him into Horrors and Chilness, Ague-like; and, indeed, when he vomited this up, he was the sickest Man I ever saw, not to die. He also voided Blood by Stool several Days.

I am at a Loss where to place this Animal; for that it is not like any Thing I ever yet saw in Nature. It was about 4 Inches long, and in the thickest Place 3 Inches about; it had 3 Fins of a Side, all near the Head, and all of them were thick and fleshy; but the forked Tail was finny and transparent, and to be extended: It was placed horizontally, not as that of most (if not all) small Fish, and even *Neuts* and *Tadpoles*, or Frogs in Disguise, in which Particular it differs from them all, as well as in the Fleshiness of the Fins.

Besides this odd Animal, I found the Head of another of a different Shape, but of the like dark green Colour.

I am apt to think, that we often drink and eat what is alive; and it is certain some Things will live on in our Stomachs, in despite of Concoction; not to instance in the many Sorts of *Gut-worms* natural to us, and which are bred within us, perhaps in some Children even before they are born: These *Worms*, I say, do freely wander up and down the *Guts* and *Stomachs* at their Pleasure, and receive no prejudice from the concoctive Faculty of them. And for this Reason we see *insectivorous Birds* so sollicitous to kill *Worms*, and all other Sorts of *Insects*, by drawing them again and again through their Bills, as Canes through a Sugar-Mill, that they may be verily dead before they swallow them. And yet I am of the Mind, that what was accidentally swallowed by us alive, and that shall have the Power to live on within us (especially if it shall be young and tender, and yet growing) may have its designed Form and Shape monstrously perverted, so as to appear to us quite another Thing than naturally and really it is; and this I take to be the Case of this odd Creature, which might have been the Spawn or *Embrio* of a Toad or Neut.

The skinny Lumps of Blood, vomited up with it, I think may be easily accounted for. For this Spawn or *Embrio* of a Toad or Neut might well venom the *Stomach* or Gut, in which Part soever, or Wrinkle thereof, it chanced first to rest or stick, and cause an Inflammation there, and so have itself swelled or closed up within a Tumour of its own making, which, in Process of Time, might gather to this Bigness; and at length, bursting in Pieces, come up together. Familiar and infinite Instances of this Nature we see in *By-fruits*, or Wens, which Insects raise upon Vegetables; which, by natural Instinct, know how to invenom a Plant, and so compendiously to provide both Food and Housing for their Young.

An Account
of Worms
found in several
Parts of
the Body; by
Mr. Tho.
Dent. n. 213.
p. 213.
Mem. for the
Ingenious.
July, 1693.

XLi.VI. The chief Cause of those rising Tumours fixed upon my Tongue, is at last discovered to proceed from the Disease of Worms. *M. de la Croix*, in his *Memoirs*, having mentioned some Cures of this Disease of Worms, by one *Sarah Hastings*, who was very famous in the Discovery of them in the Face, Gums, Tongue, and which she managed with such dexterous Art in the Operation, that she took them out of any Part affected with a Goose-Quill; one of which being in some Respects like to my Case, I was the more curious and sollicitous to enquire out, if there were any of the Worm-Doctresses now in being; and hearing of one famous at *Leicester*, I was resolved to write to her, describing all the Symptoms as plain as I could explain them; to which I had a Return, that she believed my Disease to be Worms: And being resolved to try the Experiment, I took Coach for *Leicester*, where being come, my *Doctress* (*Mrs. French* by Name) no sooner inspected the Place, but instantly declared her Opinion that the Distemper proceeded from Worms. The next Day she fell upon her Operation, which was performed in the Presence of two Aldermen of the Town, *Mr. Gibbs*, my Lord of *Derby's* Chaplain, and several others, when piercing the Parts affected with a Lancet, she drew some Blood, and soon after, with a small Spatula, and another Instrument with which she opened the Orifices, she picked out 5 or 6 Worms at a Time, some of which I have here sent to you for your more curious Observation. She plainly shewed them to the Spectators as they came out of the Flesh; they were all alive, and moved their Heads, somewhat lesser than ordinary Maggots. I can tell you, that in less than 8 Days she took out of my Tongue more than an hundred Worms, all almost of the same Bigness, except two very large ones, which (she told me) were of a *cankerous* Production. She took more than 30 out of my Gums, which last Operation is her ordinary or daily Practice; Persons of good Note resorting to her from all Parts of the Country thereabouts. I was very curious to enquire out what Cures she had done of this Nature; and I found a very satisfactory Account from Persons of some Quality and Note. And, to be short, though the Operation was very surprizing, and so will, I suppose, seem to you incredible; yet neither I, nor any one present could discover any Fallacy, but all the plain Dealing that ocular Demonstration can admit of, to prove the Reality of the Operation; which I myself saw her perform upon several Patients while I was at *Leicester*. I shall not enter upon a philosophical Reasoning about the Nature or Production of these Animals; but I think the Cures this Woman performs, in picking out these Worms from all putrefactive Ulcers, Tumours and Sores, whether in the Faces, Noses, Gums, or Tongues of several Persons, prove that such Animals are generated in those Parts. I have received some sensible Good, and hope to have more Relief by her next Operation.

Further confirmed; by
Mr. Mark Lewis. ibid.
p. 122.

2. She put the Case beyond all Dispute: (1.) By shewing me the Head of the Worm in the Orifice before she extracted it. (2.) He was still sensible of their Approach before she could see them. (3.) She designed, what he intended to have done, that an Incision shall, when he comes to Town, be made

made in the Place, that if Worms be not then found, she may then be well spoken of.

To me she gave a Catalogue of several Cures she had done in the Town and Country, one was my own Relation, I know to be a Truth.

Thus far we went over Night; she took 15 or 16 Worms out next Morning. I found Mr. *Newton* desirous to see the Operation: He was a Stranger to us both; but we complied with his Desire: Were extreme glad of his Company, when he told us it was on your Account.

He took the same Care I had done, saw the same Effects I had done over Night, only now there was not above 10 Worms; they came by two at a Time, once, as I remember, three.

I designed to have sent you some to compare with yours; told her of the Fraud my Friend, Mr. *Popple*, had detected in the *Stamford-Worm*.

I had provided some soft Cotton in a small Box, but why, I know not; they now all died the same Day before I was got Home, when as formerly I had kept them 14 or 15 Days; they had fasted three Days before I had them.

I had the Curiosity to try whether I could find any Blood in them, but did not; which makes me think they feed of the same Humour they are bred of.

XLVII. A few Days after my Arrival at *Fort St. George* in the *East-Indies*, the Fruits of my *Gomroon* Journey shewed themselves; for a little below the Instep of my Left Foot, a Worm put out his Head, which afterwards cost me much Trouble. These Worms are bred by the Water, between *Gomroon* and *Schiraz*, especially that about *Laur*; they come out in any Part of the Body, and are very troublesome and dangerous; for I have known those who have kept their Bed for them, some 6, some 10 Months, and some there are, who have lost sometimes their Legs, sometimes their Lives by them; they come out sometimes to the Length of 6 or 7 Yards. When they first come out, they are small, like a Thread, and afterwards grow bigger and stronger by Degrees; they wrap them up upon a little Bit of Stick or Cotton, and put upon them Onions and Flower of Rice boiled in Milk. The chief Care is to be taken not to break them, for then it is that they do Mischief. When mine first came out, for about 40 or 50 Days it came out every Day by little and little, without putting me to much Pain, but that I could go up and down till it was come out about a Yard and a Quarter; but afterwards, one Day stirring too much, I hurt the Worm and enraged him, so that he broke off of himself, and going in, caused my Foot and Leg (up to the Calf) to swell till the Skin was ready to burst, which kept me sleepless, and cast me into a *Fever*. I had a Chirurgeon, and kept my Bed for about 20 Days, in which time I had several Fits of the said *Fever*; the Worm was broke to Pieces, and came out in several Parts of my Foot; but the Chirurgeon applied such Things as killed the Worm, and turned it to Matter; he then lanced my Leg a little above the Ankle, and another Place of my Foot, and so with Drawing-Plaisters drew it all out.

*The Long
Worm in the
Flesh in the
East-Indies;
by — n. 225.
p. 417.*

Observations
on a Man
who died of a
Dropfy; by
Dr. Nath.
Fairfax. n. 29.
p. 548.

XLVIII. A certain *Serving-Man*, about 27 Years of Age, died *Hydropical*; which Disease he was molested with 4 Years before his Death. He was ever a *listless*, dull, and melancholy Fellow, never cheerful nor smiling, especially for 10 Years before he died. His Words came from him as if forced, and speaking but a little, he would end with a Sigh. When opened, he was found to have the Left *Lobe* of the *Lungs* almost quite wasted; but no Ulcer, or ought preternatural, appearing in the remaining Part, except wasting. The Heads of the Vessels and Branches of the *Wind-pipe* as big as in the other *Lobe*. That *Lobe* of the *Liver*, which butts on the *Midriff*, was black outwardly for about a Hand's breadth, and about a Thumb's breadth within the *Parenchyma*.

A Dropfy
mistaken for
Gravidation;
by Dr. ———
n. 106, p. 113.

XLIX. Some Years since, there came to a Physician in *Holland* a young Woman of about 17 Years of Age, unmarried, and reputed a Maid, of a florid Countenance and strong Body, having a good Stomach, *periodicè Menstruata*, and wanting none of her due Evacuations, nor troubled with Head-ach nor Sleepiness, nor Difficulty of Breathing, nor Drought, nor any of the Symptoms incident to *Hydropical* Persons. This young Woman having her Belly swollen to excess in 3 Months time, was much suspected by the Physicians, as if she had been deflowered, which yet with many Imprecations she denied. And indeed the *Tumour* of her *Belly* being felt, afforded some considerable Signs to dispossess him of the Opinion he had of her; seeing it was not a prominent nor roundish *Tumour*, nor any such as is usual in *Women with Child*; besides that, she made not such a coloured and crass Urine as *Child-bearing* Women are wont to do; yet there appearing no Symptoms of a *Dropfy*, no Complaints of the *Stomach*, *Liver*, *Spleen*, *Kidneys*, no Swelling of the Loins or inferior Limbs, no Leanness in the Body or superior Parts, no flaccid or discoloured Breasts, but all being thus far in a good Constitution, he sent her away without prescribing her any Physick. After more than 6 Months, having consulted with other Physicians and some Mountebanks in vain, she returned to him. He now found her Body dried and bloodless, her Breath short, her Temples fallen in, her Nose sharp, her Eyes hollow, her Skin wan and ill-favoured, her Pulse creeping, her Appetite prostrate, her Tongue dry, her Voice weak, her Evacuations sparing, and all her Strength dejected; in a word, liker a *Skeleton* than a living Body. He being now sufficiently convinced of the Nature of her Distemper, though the Case was desperate, resolved upon the Use of a *Paracentesis*, or Incision. But the Patient abhorring this Operation, she was left to herself, and died three Months after. Her Body being opened, there soon appeared a great Lake of Water; whence at first it seemed to be a common *Ascites*, a *Tumour* of Waters stagnating in the *Abdomen*. Then the *Liver* being looked after, it was no where seen; the *Mesentery*, *Pancreas*, *Spleen*, and *Kidneys* did not appear: The *Peritonæum* was turned into a Bag, by a Separation made of its interior Membrane from its exterior, and so enclosing within it the whole Bulk of that restagnant Water, that not a Drop of it had been able to get out into the *Abdomen*. This cost no small
Trouble

Trouble to render it conspicuous, by emptying this Sack of all the *Serum*, and so discovering both Sides of the Bag, made up of the double *Peritonæum*, whose inner Skin had been sever'd from the outer, sticking to the transverse Muscles of the *Epigastrium*, the *hydropical* Waters having forced the inner Membrane inwards into the Hollow of the *Abdomen*, and so forming it into the Shape of a Bag, whose Compass reached from the *Pubes* into the *Diaphragm*, and from the Left Region of the Loins to the Right; so that the nervous Body of the *Peritonæum*, which is naturally as thin as a silken Web, being here thicker and closer than any Ox Hide, was, by little and little, expanded, as the Capacity of the Womb in *Gravidation* is still more and more enlarged. This Bag of the *Peritonæum* being removed, the *Viscera* came to view, which were not gravelly, nor tartareous, nor chalky (as they often are in *hydropical* Bodies) but only decayed and colourless: Which Decay, by the timely Use of an *Incision*, might have been prevented.

L. As the Body lay along, we perforated the *Abdomen* in the most prominent Part, by a *Paracentesis*, and extracted the contained Liquor through a small *Cannula*, to the Quantity of 3 Gallons: Afterwards we laid the Corps upon a Table, in the same Posture, where we made Incision, beginning between the *Umbilicus* and the *Cartilago Ensiformis*, dilating still as we emptied, till we had made room for a Quart Pot, with which we drew out, to the Number of 76 good measured Quarts (including the 3 Gallons extracted before) of a subsaline, and somewhat austere *Serum*, besides what was imbibed with our Spunges, not improbably 2 Quarts more. After the Drying up the Residue of this Humour (which in Colour and Consistence did somewhat resemble Water, wherein Flesh newly killed had been washed, saving that it was of a somewhat deeper Red, and had a more crass *Hypostasis*) we plainly perceived that the whole Bulk of this so ponderous a Deluge, was bore up and sustained between the *Cutis* and *Peritonæum*; whereby there was made a very great Compression of the *Intestines*, and other *Viscera* to the *Vertebræ Lumborum* and *Os Sacrum*. The *Musculi Recti* of the *Abdomen* were to my Apprehension quite obliterated, or, at best, not to be distinguished from the *carnous Pannicle*, or common Tegument of the Body; when at the same time the outward Covering or *Cutis* itself (notwithstanding so vast and powerful a Dilatation) was full as thick as in a sound Body, in some Places much thicker. In the *hypogastrick* Region, the *Membrana Adiposa* was observed to be above 2 Inches thick, and seemed to be no other than a *Congeries* of little *Bladders*, each of them contained in its proper *Capsula*, and implete with a coagulated *lymphatick* Juice. The grumous Part of the Blood in the *abdominal Vessels* had been thrown forth in many Places, and adhered in great Clots to the Membranes. The Thighs, Legs, and Feet, were *anasarcous*, and so extremely elevated with a watry Humour, that, upon a strict Impress, I could have buried 3 or 4 Fingers: And yet her upper Parts, as the Neck, Face, Arms, and Hands, were wonderfully emaciated.

Observations
on a Maid
who died of an
Ascites; by
Mr. J. Turner.
n. 207. p. 15.

The

The *Omentum*, or *Kell*, was wholly and absolutely wasted away; the *Intestines* were only vitiated in their Colour, which was somewhat pallid, as if they had been seethed: Also the *Ventricle*, *Pancreas*, *Liver*, *Spleen*, *Kidneys*, &c. looked all of them like Flesh half boiled, and the Blood absorbed: For although none of these *Bowels* did swim in, or communicate with the *Serum*, being separated by the aforesaid Membrane, yet the great Nearness of the superincumbent Liquids, had polluted and tinged the external Coats of the *Viscera* with their preternatural as well as putrefactive Heat.

The *Intestines* were all of them distended with *Flatus's*, particularly the *Cæcum* was blown up to a very considerable Bigness. In the *Colon* and *Rectum*, some of the Excrements were contracted like little Balls, and as hard to bear any Impression, through the Coats of the Gut, as a Stone. The *Liver* was no more faulty than the rest of the *Bowels*. The whole Body of the *Spleen* adhered to the *Peritoneum*, but easily to be separated from it. We could not discover in the *Kidneys* any Impediment or Let to the Secretion of the *Serum Sanguinis*, in case any Attempt had been made upon those Parts by a *Crisis*. The *Vesica Urinaria* was empty, and of a more than ordinary Smallness. The *Ventricle* was filled only with Wind, like to a blown Bladder.

The *Diaphragm* was so forcibly impelled upwards into the Chest, that its *Diastole* must needs be very obscurely assistant to *Respiration*: It was indeed so far contracted, that its convex Part bore hard against the *Lobes* of the *Lungs*, whose Substance, as I have seen in some that have died *tabid*, was very much decayed and perished, and looked just like parboiled Flesh. In cutting open the *Heart*, I did not perceive the least Drop of Water to fall from it: By which it may be justly thought, that the *Pericardium*, or *Capsule* of the *Heart*, being altogether destitute of its refrigerating Liquor, clung immediately to the proper Tunick of the *Heart* itself; upon cutting through whose *Ventricles*, we could not perceive one Drop of Blood, no more than in the rest of the *Bowels*; and the *Liver* itself was destitute of so much Blood, as might be thought necessary for its own proper Nourishment, and yet its salino-sulphureous Particles, which constitute the *Gall*, were deposited into the *Vesica Biliaria*, to the Quantity of about a Spoonful. I observed a very large Protuberance of the *Costæ* and *Sternum*; which perhaps might be occasioned from the rarified Effluvia of the Waters, pent up within the Breast, or rather a necessary Consequence of the *Diaphragm's* being so excessively pressed upwards.

I shall not take upon me to determine, whether the contained Liquor happened from any Rupture in the *lacteal* or *lymphatick Vessels*, according to Dr. *Willis*, or (as more probable to me) if it were not pure *Serum* (the Blood being dissolved into its constituent Parts) breaking forth of the little Mouths of the *Cæliac*, and other *Arteries*.

Observation
on a Woman
who died of a
Dropfy, after
the Paracentesis;
by Dr. Ch. Preston.

LI. In the Dissection of Madam *Vaillant* by M. *Du Linier*, the *Liver* was found very white without, but red enough within; the *Epiploon* extremely dried; the *Stomach* much bigger than ordinary; the Winding of the
Colon,

Colon, which passes under the *Stomach*, extremely drawn together by 3 Threads. In the *Umbilical Region*, the Intestines, *Jejunum* and *Ileon*, much inflamed, and their Tunicks much more thick than ordinary. In the *Hypogastrick Region*, all the inferior Part of the Intestine *Ileon*, on that Side near the *Bladder*, and all the Bottom of the *Matrix*, as also the inferior Part of the *Rectum*, much inflamed and ulcerated; in the Bottom of the *Matrix* there was an Abscess, and the internal Orifice extremely dilated, about the Largeness of a Crown; the Extremity of the inferior Part of the *Ureter* cartilaginous; the Extremity of the *Tubæ Fallopianæ* went so high as the second *Vertebre* of the *Lumbar Region*; in the interior Part it was dilated 6 Lines, and near the Bottom of the *Matrix*, about 2 Inches, and was tied to all the inferior Part of the *Kidney*; that of the Left Side was dilated about 4 Lines in the upper Part, and 6 in the inferior. The right *Testicle*, or *Ovarium*, which ordinarily does not exceed the Bigness of a Pidgeon's Egg, was here 3 Inches long, and 2 of Breadth; and in the inferior Part there was found an Egg hanging by its Ligament, out of the *Tuba Fallopiana*, about the Bigness of the Yolk of a common Hen's Egg; which, for Experiment, I caused to be boiled, and it hardened as an ordinary Egg. The Right *Kidney* went up as far as the last of the true Ribs, and descended below the *Umbilical Region*; the *Pelvis* was dilated about 3 Inches in Breadth, and 7 in Length. The greatest Part of the Water had run out in the *Operation*.

The *Lungs* were of a livid Colour, as in all *Chronical Diseases*; and on the Right Side were adherent to the Membrane *Pleura*; and on the Left Side was an Adherence of the inferior *Lobe* to the *Diaphragm*. In the *Pericard* was little or no *Serum*, and what we found, of a bloody Colour. In dissecting the *Heart*, we found a great *Polypus* in the Right *Ventricle*, taking up almost all the Cavity, about 5 or 6 Lines in Thickness, and Half a Foot in Length.

From what has been said, it appears impossible that this Patient could have recovered, though the *Operation* had been performed; only this is to be remarked, that where the *Dropsy* is of a long Continuance, and the Persons much debilitated, and of Age, in that Case the *Operation* ought not to be performed, for generally the *Viscera* are corrupted. But when you find it convenient to perform this *Operation*, extract the Water by degrees, and not all at once, else you endanger the Person; for scarce one escapes of a hundred that is done otherwise.

The true Cause of the *Dropsy* I take to be from the mechanick Structure of the Parts, and the Disposition of the Blood; which are first the Relaxation of the Fibres and Pores of the *Vessels*, or the *Vesiculæ*, which are between the Arteries and the Veins; or, secondly, a Compression of the *Vessels*; for the *Lymphaticks* take their Origin from the Membranes which cover the *Muscles*, *Viscera*, and *Glands*; therefore, when the *Vesiculæ* are too much straitned with *Serosity*, their Fibres lose their natural Force, and become incapable to expel the too great Quantity of Water; but the *Vesiculæ* are enlarged from Day to Day, until their Fibres suffer so great an Extension even as to break; from hence is the Source of those Waters. It happens also sometimes, that the

*The Cause of
the Dropsy.*

Pores of the said *Vesiculæ* are so widened, that the *Lymph* runs into the *Cavity* of the *Belly*, or the Interstices of the *Muscles*: The Cause, from the Disposition of the Blood, is either when it is too thin, or too viscid; too thin, that it passes easily through the Pores of the *Vesicles*; too viscid, that it cannot pass through the *Capillary Vessels*, and, by Consequence, compresses the adjacent Parts, so causes *Obstructions*.

*A Cure for
the Dropsy;
by Sir Theo-
dore May-
erne, n. 211.
p. 166.*

LII. *Pontæus* (the famous *Mountebank*) says, that for the *Dropsy*, after all other Things, one of the best Remedies in the World, is to take *Morsus Diaboli*, and put it over the Fire in a dry Kettle, that it may wet it only with its own Juice, and of this to apply a Quantity to the Belly and Reins of the Patient, covering him up warm, and so provoke Sweat; which will come away in great Quantity, and may be maintained according to the Strength of the Patient, and Exigency of the Case.

*A large dis-
eased Kidney;
by Mr. Will.
Cowper.
n. 122. p. 301.*

LIII. A young Gentlewoman, not married, about 8 Years before her Death, found some small Pains in the *Lumbal* Regions, and sometimes made blackish Urine. If she at any time used any Motion, the Pain would increase; commonly finding most Ease when her Body was sedate. In this Indisposition her Physicians in the Country prescribed astringent Medicines. About 2 Years after, the *Lumbal* Pain increased on the left-side; and a great Weakness, Loss of Appetite, and ill Digestion followed; of these Indispositions she recovered again, and was, in all Appearance, healthful, and so continued near two Years and a Half; about which Time they returned again, together with black Urine, and frequent Incitations to vomit; but of these Disorders she had some Intermissions, and so she continued about 2 Years. About *Christmas* 1695, she began to be afflicted with violent Pains, and her Urine appeared very black: Of these extravagant Pains she was much eased with the Use of common Clysters, but nevertheless continued much debilitated. The Beginning of *May* the Pains increased about the Regions of the *Loins* and *Pubes*, and she was once or twice surprized with the falling down of a Weight within her (as she expressed it.) When thus tormented, she took large Doses of *Opium*, which did somewhat alleviate the Extravagancy of Pain. The ordinary Position of the Trunk of her Body was more inclining to be erect than bending forwards, contrary to what we find in those troubled with the *Stone* in their *Kidneys* or *Ureters*, except those in whom the *Kidneys* are intumefied. She complained of a *Stupor* or Numbness in the left Region of the *Loins*, whilst very acute Pains affected the *Viscera* of the lower Belly, especially those placed in the *Hypochondria*. The Pains on her *Pubes* increased near the Time of her Death, and a great *Stupor* affected the left Thigh, which she was scarce able to draw after her, much less to put forwards in walking.

The Day after her Death I was called to dissect her Body, which was very much emaciated. A large *Tumor* appeared in the left *Iliæ*, extending it self to the left Part of the *Epigastrium*, even to the *Hypochondrium* of that Side. The *Omentum* appeared very thin and membranous, cleaving to the left *Kid-*

ney; which was very much intumefied, and caused that Appearance of a large *Tumour* before Dissection. This *Kidney* had taken place of the *Spleen*, and touched the Bottom of the *Stomach*, and in such Manner pressed one Part of the *Colon*, as very much lessened the Diameter of that Gut. The *Stomach* and *small Guts* were somewhat distended with Wind; the former appeared very loose, as if its proper Tone was much relaxed. The *Pancreas* appeared a little indurated. The left *Spermatick Vein* was very much extended, between the *Kidney* and the *Ovarium*; the upper Part of that *Vein* being compressed by the Superincumbency of the lower Part of that *Kidney*; insomuch that the Trunk of this *Spermatick Vein* was very much lessened, immediately before it enters into the left *Emulgent Vein*. In freeing this diseased *Kidney* from its many Adhesions to the neighbouring Parts, its outward Membrane happened to burst in two or three Places, whence issued a large Quantity of grumous Blood. This *Kidney* weighed 5 Pounds, and the other but 5 Ounces, which was of a common Size, and no ways disordered. By the Distension of the membranous Parts of the *Kidney* itself, its Veins were, in a great Measure, compressed. Its *Ureter F F*, was large through the Intumescence, or thickening of its Sides, whereby its Cavity was streightened. In a Division made by cutting into the Body of this swelled *Kidney*, its Inside appeared like that of a *schirrons* or boiled *Liver*. I found 2 or 3 large Cells *B*, filled with grumous Blood, which proceeded from an Eruption of some Blood-Vessels before Death, which I am apt to think might alarm the Patient with the Apprehensions of some Weight falling down (as she expressed it.) In the *Vagina Uteri*, near the *Meatus Urinarius*, was an ulcerous Appearance, attended with a Mortification. The left *Psoas* Muscle was very much lessened by the Compression of the lower Part of that *Kidney*; and the Nerves, distributed to some Parts of the Thigh, which pass through that Muscle, were exposed to View.

Nothing disordered appeared in the *Thorax*, but what is commonly observed after Death in all *Chronical* Diseases, viz. a *Polypus* in each *Ventricle* of the *Heart*, and great Blood-Vessels; of which I have commonly observed the right *Ventricle*, and the Veins, to be furnish'd with the largest *Polypus's*, especially the *Vena Cava* and right *Auricle*; the latter of which I very lately found compleatly distended with a *Polypus*, or Coagulation of *Serum*, in the Body of a Boy who died with a *Hydrops Thoracis*; in which Case, the Symptoms of Sighing and Difficulty of Inspiration I have always found remarkable. I cannot but think the slow Return of the Blood by the Veins, is the immediate Cause of the Coagulation of the serous Part of the Blood, which frames these Bodies, which from the Figure (which they acquire from the Parts they are lodged in) are called *Polypi*. Hence it is the *Systole* of the *Heart* prevents their being framed so large in the left *Ventricle* and Arteries, as in the Right and the Veins; the Blood being carried through the former with much greater Force than the latter.

Blackish Urine, I believe, is commonly observed in many *feverish* Indispositions; where the Blood is either partially obstructed in its Return by the Veins of the *Kidneys*, or through its great Velocity in passing the *Kidneys*;

when some Part of the Globules of the Blood also pass out at the *urinary Pores* in the Sides of the Blood-Vessels, and those Globules being broken, exhibit those blackish Bodies, which appear in the Sediment of the Urine. In these Cases, the *Serum* of the Blood passes off with the Urine; for by evaporating such Urine by Heat, as in a Spoon over a Candle, it will lactesce, and become thick, like the true *Serum* of the Blood. have

Obstructions commonly begin in the most *capillary Vessels* first; as I frequently observed in viewing the transparent Fins of divers living Fishes with my *Microscope*: And though it has been hitherto commonly supposed, that Veins and Arteries are all equally lessened at their Extremities, yet I am of Opinion (and I believe can give ocular Demonstration of it too) that the Extremities of divers Blood-Vessels are much larger than their Companions. Hence an Account may be given of the partial Circulation of the Blood, and yet Mortifications not necessarily succeed, as in the present Case: For the *Kidney* here being vastly extended, which proceeded from a Retardation of the reflux Blood and *Lympha*, it is conceivable that the Obstructions began in the Membranes which compose the Parities of the Trunks of the Veins and *Lympha-Ducts*, whence an Intumescence necessarily follows, and the Cavities of those Vessels are lessened; consequently the reflux Blood or *Lympha* not being duly discharged, those larger Vessels are necessarily distended between their intumefied Sides with compressed Cavities, and their Extremities at the Arteries. Thus we may apprehend how a Part remains intumefied, under a partial Circulation, and may (when no ill Juices are joined with the Blood and *Lympha*) continue so for some Months, nay Years, as in the present Case, without any Disorder to the Patient, but on such Motions of the Body, as accelerate the Motions of the Blood at the Extremities of the Vessels, when there is a greater Quantity of Blood imported than can be discharged by the Veins; whence a sudden Intumescence arises, and Pains necessarily follow. What astringent Medicines avail, in such like Cases, is difficult to conceive, but Aperitives might be serviceable. Loss of Appetite, ill Digestion, &c. attend *Nephritical* Cases, by the nervous Communications of those of the *Kidney* with the *Stomach*, &c. whence the *Tone* of that Part, as well as the *Intestines*, especially the *Colon*, becomes vitiated, and subject to frequent Disorders, especially Vomiting and *Cholick* Pains. By *Tone* of that Part, I mean, that proper Distribution of the *nervous* Ramifications within the Part when extended, as in this Case, and *intestinal* Ruptures (as they are called) and the like; or when the *nervous* Ramifications are relaxed, as in *paralytical* Cases, &c. the *Tone* of the Part necessarily becomes vitiated, in as much as its *nervous* Distributions are disordered. The Contents of the *Stomach* and *Guts* not being duly carried on, are apt to ferment; the contained Air being rarified by the natural Heat, the *Intestines* or *Stomach* (not being able to resist the Enlargement of that rarified Air) gives way, and becomes very much distended; whence *Cholick* Pains, and Disturbances in those Parts sometimes arise, as I am apt to think in these Cases. Hence, by procuring the Evacuation of this contained Wind, the Afflicted are eased, as by giving of *Clysters*,

fers, &c. To discover the Operation of *Opium*, and how it procures Ease in this and such like Cases, I examined a Solution of *Opium* with my *Microscope*; the Particles of the dissolved *Opium* appeared like fringed Globules. These Particles we were inclined to think (if so conveyed to the Mass of Blood) might so entangle in its *Serum*, and thicken it, as to occasion a Retardation of the Globules of the Blood, and hinder their progressive Motion at the Extremities of the Blood-Vessels: Hence the Blood not passing with its wonted Velocity, does not so suddenly extend those enlarged Vessels, which have a considerable Share in the Intumescence of the Part; but by making the Globules of the Blood pass more calmly, might prevent their sudden Efforts or Intrusions into those distended Vessels.

The intumesced *Kidney* not only compressed the Left *Spermatick* Vein, whereby the reflux Blood of the *Uterus*, *Vagina*, and Parts adjacent, was in some measure retarded, but some of the Nerves of the *Vagina*, and those of the *Pudendum*, were also compressed thereby; hence Pain arising from Inflammation, through a Retardation of the Blood at the Extremities of the vast Number of Blood-Vessels about the *Meatus Urinarius*, at its Egress in the *Vagina*; whence Exulceration and Mortification followed. The Magnitude of this *Kidney* prevented the bending forwards of the Trunk of the Body; whence it was, she was obliged to keep it erect. The lower Part of the Left *Kidney* had so prest on the Left *Musculus Psoas*, as scarce a 3d Part of its proper Bulk remained: Whence necessarily followed a great Indebilitation in the drawing the Thigh forwards. She had a great *Stupor* in that Thigh, through a Compression of the *Lumbal* Nerves, which lay exposed immediately under the intumesced *Kidney*.

I am apt to think, that Cases like this are often taken to proceed from Stones in the *Kidneys* or *Ureters*; but I conceive, that unusual Posture of keeping the Body erect, may distinguish it, together with an Indebilitation of drawing the Thigh and Leg forwards. If these Symptoms do not conjunctly occur, yet by this we may be admonished, that *nephritical* Disorders are not, as is commonly thought, owing to *Stones*, whether in the *Kidneys* or *Ureters*.

A, The upper Part of the *Kidney*, which touched the Bottom of the *Stomach* and *Spleen*. B, The lower Part, consisting of divers Protuberances; the Insides of which were distended with extravasated Blood. CC, The *Blood-Vessels* of the proper Membrane of the *Kidney* distended. D, The *Fat* placed at the Entrance of the *Vessels* into the *Kidney*. EE, The *emulgent* Arteries and Veins cut off. FF, The *Ureter* very much thickened in its Sides, and cleaving to the lower Part of the *Kidney*.

Explanation of
the Figure.
Fig. 31.

LIV. May 23, 1697, Upon opening an Infant, I found the *Ureters* double to both *Kidneys*; their Origination from the *Kidneys* being at some distance from each other, but afterwards both of the same Side, were inclosed in a *Capsula*, or Membrane, even to the *Bladder*, where those of the Right Side were inserted severally, yet near each other; but on the Left they seemed to enter at the same Orifice.

Four Ureters
in an Infant
by Dr. Edw.
Tyson.
n. 142. p. 1039.
Fig. 32, 33.

The Glandule
Renales.

Fig. 34.

I have given a *Cut* of the Right *Kidney*, and of both the *Glandule Renales*, as well to shew their just Magnitude and Figure (as they appeared in this Body) as also their Proportion to each other. As far as I have hitherto observed, the *Glandule Renales* in *Embryo's* and *Infants* are greater, at least proportionably, than in *Adults*. They have a large Cavity, which, by blowing into them, I found emptied themselves into two *Veins*; whereof the Right immediately passed into the *Vena Cava*, the Left into the *Emulgent*. Besides these, they had other lesser ones from the neighbouring *Vessels*.

Explication of
the Figures.

Fig. 32. *A*, The Right *Kidney*, whose Superfice seemed to be variously divided. *B*, The *Emulgent Vein*. *C*, The *Emulgent Artery*. *d d*, Two *Ureters* belonging to this *Kidney*.

Fig. 33. Represents the two *Ureters* of the Left *Kidney*, which a little below the *Kidney* are both enclosed in a common *Capsula*, or *Case*, and so continued to the *Bladder*.

Fig. 34. The *Glandula Renalis* of the Right Side. *B*, That of the Left. *C*, The *Vena Cava*. *d*, A *Vein*, or *Ductus*, opening from the Cavity of this *Gland*, and entring the *Vena Cava*. *e*, A *Vein* from the Left *Glandula Renalis*, and is inserted into a Branch of the Left *Emulgent*.

A Passage of
Urine to the
Bladder, di-
stinct from the
Ureters; by
M————
n.65. p. 2084.
n.67. p. 2049.

LV. I made a *Dog* drink a good Quantity of *Water*, and thereupon caused his *Ureters* to be well tied about, and emptied his *Bladder*. After two Hours I found the *Bladder* empty, and the *Ureters* were not tumid above the *Ligature*. Being surprized thereat, I believed that the Cause might be the too much cooling of the inward Parts, that had all this while been exposed to the open Air. To avoid this Inconvenience, I caused a small Opening to be made on each Side another *Dog*, sufficient to find and to tie the *Ureters*, and to squeeze the *Urine* out of the *Bladder*, by pressing it with one's Hand. This done, I made these Openings to be sowed up again; and then having made the *Dog* drink good Store of *Water*, I left him for near three Hours in the least violent Posture that his *Ligatures* would permit. Afterwards having opened both the Holes, and the *Bladder* being pressed with the Hand, there issued out of it a pretty Quantity of *Urine*, and the *Ureters* seemed to be a little swelled above the *Ligature*.

A Schirrous
Bladder, con-
taining in its
Bags a Serous
Matter; by
Dr. Edward
Tyson. n. 188.
p. 332.

LVI. On the Dissection of Mr. *Smith* of *Highbgate*, July 8, 1687, we discovered the *Bladder* very *schirrous*, and $\frac{1}{4}$ of an Inch thick, of a preternatural Figure, and distended to the Bigness of a Child's Head; and at the Entrance of the *Ureters* on each Side were two Protuberances, of the Bigness of a Hen's Egg each. The *Ureters* were of the Largeness of the small Guts in Children, so that they could easily admit two Fingers into their Cavity. They were both replete with *Urine*, or a serous Matter; which, upon Pressure, did easily regurgitate into the *Kidneys*, but would not pass at all into the *Bladder*. The *Kidneys* were of their natural Bigness and Figure, but so emaciated, that they were rather large Bags, than of a fleshy Substance: The
Cavity

Cavity of the *Pelvis* being so large, as to contain above three Ounces of Water. In the *Bladder* we found a very strange sort of *Cystes*, or Bags, of the exact Figure of Eggs, of several Dimensions, some larger than Goose-Eggs, others as big as Hen-Eggs, to the Number of twelve in all; and about eight of them whole, and replete with a *limpid Serum*. The Coats of these *Bladders* were some of them considerably thick, others very thin and tender; all of them loose and free, without the least Adhesion either to one another, or to the Coat of the *Bladder*. There was little or no *Urine* in the *Bladder*, but what was contained in these *Bags*: Nor could we imagine that this miserable Patient could possibly make any Water, but what happened upon the Breach of some of these watry Tumours, when the *Bladder* was crowded beyond its Dimensions; for that the Passage by the *Ureters* into the *Bladder* was impervious.

The Liquor contained in these Bags, we did conjecture to be of the nutritious Juice of the Body; and upon Trial of boiling a small Quanting of it, we found it to thicken, and come to the Consistence of a stiff and glutinous Jelly. These *Vesiculæ* were undoubtedly formed from the Tenacity of the Matter between the Membranes of the *Bladder*, in its oblique Passage through them; for that, being so glutinous, it was here detained till its Superficies was condensed into a firm Coat, and so, by the coming of more Matter, was forced into the Cavity of the *Bladder*. This I suppose, from our finding two of these *Ova* in a distinct *Sinus* from the rest, between the Coats of the *Bladder* at the Entrance of each *Ureter*.

The *Liver* we found very large and hard, of the Colour and Substance of a boiled one. It adhered to the *Peritonæum* on the external Part, and, by its vast Bigness, had so strained the *Thorax*, that there was very little Room for the *Lungs*. The *Lungs* we found of a livid Colour, adhering close to the *Pleura* on the Right-Side; upon Incision we found them wholly replete with a purulent Matter, and a Stone, of the Bigness of a Cherry-stone in one *Lobe*. Dividing the *Pericardium*, we found a fungous Substance covering the *Heart* all over, and Fibres from it that ran to the *Pericardium* in a great Number, so that they were by these Fibres every where united. The *Heart* was very large, the Right *Auricle* and *Ventricle* were one large undivided Cavity, and therein a large *Polypus*, which ran up the *descending* Branch of the *Vena Cava* to the very *Jugular*, another Part being distributed to the *Pulmonary Artery*. In the Left *Ventricle* was another *Polypus*, not so large as the former; it had two Branches, one in the *Pulmonary Vein*, another in the *Arteria Magna*, or *Aorta*. One of the *Vesiculæ* being opened, had a large Cluster of small *Ova*, as big as Grapes, all replete with Liquor; all the rest contained nothing but *Serum*.

LVII. A Servant of Mr. *Banister's* had laboured 7 or 8 Days under a total *Suppression* of *Urine*. Mr. *Cb. Bernard* tried his *Catbeter*, but found not the least Appearance of any *Stone* there, nor a Drop of Water in his *Bladder*. Whereupon Dr. *Baynard*, supposing it might be the same Case of which that most learned Prelate Dr. *Wilkins*, late Bishop of *Chester*, died,

Suppressions of Urine (not caused by a Stone) cured with Acids; by Dr. Edw. Baynard. n. caused 215. p. 20.

caused the Patient to take a Quantity of *Acids* in a convenient Vehicle, upon which, Secretion being presently made, he immediately *urined* in great Quantity, and was thereby restored to his Health.

A *Member of Parliament*, being found in the like Condition, was, by the Use of *Acids*, restored to his Health. And in several Cases since, he has found it to answer with great Success.

In another like *Suppression of Urine*, and after many Medicines given in vain, Mr. *Banister* proposed Dr. *Baynard's* Method, which caused the Patient to *urine* presently.

A Stone taken from a Woman; by Dr. Beal. n. 18. p. 320.

LVIII. A Stone was taken out of the Womb of a Woman, near *Trent* in *Somersetshire*, by Incision, in *Easter* 1666. I have seen the Stone, and weighed it in Gold Scales, where it wanted somewhat of 4 Ounces; but it had lost of the Weight it formerly had, being now very light for a Stone of that Bulk. It is of a whitish Colour, lighter than Ash-colour: It had no deep Asperities; and had somewhat of an oval Figure, but less at one End than a Hen-Egg, and bigger and blunter at the other End than a Goose-Egg.

Many Stones taken from one Bladder; by Dr. Nath. Fairfax n. 26. p. 482.

LIX. 1. Mr. *Goodrick* (a Chirurgeon of *Bury St. Edmund's*) affirmed to me, himself cutting a Lad of the *Stone*, took out thence, at one Time, 96 small *Stones*, all of them of unlike Shape, Size, Corners, Sides; some of which were so bestowed, as to slide upon others, and had thereby worn their Flats to a wonderful Slickness. He assured me also, that in the same Place, another, when dead, had a *Stone* taken from him, almost as big as a new-born Child's Head, and much of that Shape.

By M. Casparus Wendland. n. 99. p. 6156.

2. Mr. *Jo. Braun*, of *Dantzick*, a Gentleman of 71 Years of Age, being dead, I opened his Body, to find the Cause of the excessive Pains he had endured for two Years and a Half in his *Penis*, with a continual cutting, burning, and pressing of his *Urine*, coming from him Dropwise, until at last it came to a constant Endeavour of going to Stool, and of making Water; which, a few Weeks before his Death, ended in a continual Running of *Urine*, with very sharp Pain; after which, about 4 Days before his Death, to my Knowledge, the Water was totally stopped. We found the *Bladder* quite full of *Stones*, of which the biggest was of the Bigness of a Pidgeon's Egg, and somewhat larger. Of the bigger Sort there were 16, yet differing in Size; the rest were very small, to the Number of 22. We found not a Drop of *Urine* in the *Bladder*; but it had already made, on the Side of the Orifice of the *Bladder*, an Opening of a considerable Bigness; upon which, Death necessarily ensued. In the *Kidneys* and *Ureters* there could not be found the least Grain or Mark of *Sand*.

By Mr. Chr. Kirkby. lb. p. 6155.

3. Several of the lesser Sort of these *Stones* were triangular and quadrangular; their Flats worn to a great Smoothness, and their Corners blunted. The greatest *Stone* weighed 206 Gr. the least 3 Gr. all the 38 weighed 4.7 Ounces. The Matter of the *Stones* is exceeding compact, and like white Clay;

Clay; and though the several Coats may be discerned in one of them which I broke, yet they are not easily separable.

LX. A Woman near *Dantzick*, of 56 Years of Age, unmarried, whose whole Course of Life had been extremely sedentary, was troubled, some Years before her Death, with great Pains in her Back, especially towards her Right Side, and a continual Inclination to, and effective Vomiting; whose *Urine*, for some time before, was turbid, and, as it were, mingled with Blood; yet totally void of sanguinous Matter. Her Physicians adjudged that Symptom of bloody Water to have proceeded, *ex præmatura Cessatione Mensium* (which left her in the 40th Year of her Age;) thereby perhaps deceived, because there was never either *Stone* or *Gravel* voided by her. But her last Doctor (from whom I have this Relation) adjudged it to proceed *ab affectu Nephritico & quidem gravissimo*. When she was opened, he found the Left *Kidney* filled with large *Stones*, but the Right wholly petrified, covered with the ordinary Skin, without any Flesh: It was both massy and ponderous, so concreted by the close Coalition of minute *Sand*, which might be rubbed off by your Finger.

Stones in the Kidneys; by M. Chr. Kirkby. n. 71. p. 2158.

LXI. A poor Woman, near *Aberdeen*, who hath been of a Time sadly afflicted with the *Gravel*, hath lately passed 4 *Stones* of an unusual Bigness; of which I have one by me, which, though it be not the greatest of the 4, is yet more than 5 Inches about the one Way, and 4 the other: They are all oval; the first, and Part of the second, were smooth; but the other two very *rough*; and the last, the biggest, which being come away about *Christmas 1676*, was bloody on one Side when I saw it.

Large Stones voided by a Woman; by Dr. George Garden. n. 134. p. 843.

A *Stone* was also found, the same Year, in a Gentleman's *Bladder* in this Country, after his Decease, weighing 32 *Ounces*.

A Stone of 32 Ounces.

LXII. 1. I here give you the *Figure* of a *Stone*, somewhat resembling the *Kidney*; for that was quite worn away, and this *Stone* filled up the Place: It weighed, when I took it out of the Body, $7\frac{1}{2}$ *Ounces*; but not so much now. I measured 7 Inches upon the Round. I find it consists of several *Lamine* laid over one another, as that of the *Bladder* does.

Two large and oddly shaped Stones in the Kidneys; by Dr. Fred. Slare. n. 157. p. 534. Fig. 35.

2. I had Leave of Sir *Theodore de Vaux* to take the *Figure* of that *Stone* which was taken out of the Body of the late Duke of *Norfolk's* Father. It seems to have spread some of its Branches into the great Vessels. It weighs $4\frac{1}{2}$ *Ounces*; and measures longwise, from one Extream to the other, 4 Inches compleat; and the Extension of the Branches, from one to the other, measured crosswise or transversely, $3\frac{1}{2}$ Inches.

Fig. 36.

LXIII. This *Stone* was taken out of the *Bladder* of one *Fr. Dugood*, of *Auchenhove* in *Aberdeen*. The Man who bred it, lived till he was 50 Years old. The Length of it is $5\frac{1}{10}$ Inches, the Diameter, $3\frac{1}{10}$; the Weight, 2 Pound 3 *Ounces* and 6 *Drams*.

A very great Stone of the Bladder; by ——— n. 171. p. 1015.

LXIV.

Stones voided
per Penem; by
Dr. Cole. n.
175. p. 1162.
Fig. 37, 38.

LXIV. Two Stones, of the Shape and Bigness of the *Figures*, were voided by the *Penis*, without any considerable Pain, by a Person about *Worcester* 1684. The Person that voided them told me, he was for many Years subject to great Pain, first in the *Kidneys*, and afterwards in the *Bladder*, when that in the *Kidneys* ceased: But after their Exclusion he was free from Pain.

A large Stone
voided by a
Woman; by
" "
178. p. 1271.

LXV. A Stone came from the Bladder of a Gentlewoman of *Wallingford*, at the Age of 63 Years. The Compass of it was $5 \frac{1}{2}$ Inches, the Length $4 \frac{3}{4}$ Inches; the Weight 3 Ounces *Avoirdupois*. This Stone was, at its coming off, taken out by her Husband, without the Help or Instrument of Physician or Chirurgeon, and without Effusion of Blood; since its coming off, she has been troubled with *Urinæ Incontinentia*.

A large Stone
voided by a
Woman; by
Dr. Tho.
Molineux. n.
202. p. 818.
Fig. 39.

LXVI. Mrs. *Margaret Plunket* of *Dublin*, May 29, 1691, voided through her *urinary Passage*, by the Help of Nature alone, without the Use of Remedies, or any forcible Means whatever, a Stone somewhat resembling a hard Pear a little prest or flatted. Its Circumference measured, the longest way, $7 \frac{1}{2}$ Inches; round about, where it was largest, $5 \frac{3}{4}$ Inches; its Weight at present, according to *Troy Pound* $\text{z} \text{ij}$, $\text{z} \text{ij}$, $\text{z} \text{ij}$, *gr.* 6. It has lost considerably both of its first Bulk and Weight, by many little Fragments breaking off from the smaller End *A*, where it is much softer, smoother, whiter, its Parts more porous, and so incoherent, that the least Force severs them: Whereas the bigger End *B*, as far as the Stroak *ccc*, is of very different Texture, much more close and compact, covered with a yellowish shining Crust, rough, granulated, and as hard as the best *Portland Stone*. For these 3 Months past, whilst it was sticking in the *urinary Passage*, and coming away, she has suffered great Pains, and a perpetual *Sirangury*, or an involuntary dropping of her Water from her; and this Infirmity still continues, by reason the Largeness of the Stone has over-stretched the Fibres that compose the *Sphincter* of the *Bladder* in its Passage through it; whence their Tone is so relaxed, that they have lost all Power of Retention; and for this Reason, I find all Women that void Stones this Way, of any considerable Bigness, are constantly attended with this Weakness. But since the Stone came away, her Pains are so abated, that she can walk about.

An extraordinary Stone in
the Kidney;
by Dr. Rob.
Witty. n. 207.
p. 30.

LXVII. A Gentlewoman of 31 Years of Age, had been long troubled with a Loathing in her Stomach, and Indigestion, so that she had little or no Appetite, and almost every Thing she swallowed she vomited immediately. She had likewise a plentiful Discharge of green Bile by Stool. Being called to her, I ordered her a great many Medicines proper to recover the Tone of the Stomach and Bowels, whereby she found herself better for some Time, and went abroad every Day for some Months. But the Snake lay only concealed for a while; she relapsed into the same Symptoms, and the fatal Disease was altogether incurable, those Symptoms being owing, as I then observed, to a Stone lodged in the left *Kidney*. In the Month of *July*, as she was very desirous to drink the *Epsom Waters*, and at the same Time

Time had a spurious Tertian upon her, I advised her to pass some Weeks there for the Benefit of the Air and the Company, but to drink sparingly of the Waters, for fear of irritating the Nephritick Symptoms. Returning after two Months, she found herself worse in every Respect, could receive no Benefit neither from Cordials nor Aliments, nor could she lie upon either Side for the Pain. At last, that best of Women, crushed with innumerable violent Symptoms, died very easily, *January 28, 1672.*

We opened her Body the Day following, and found the *Lungs* of a bad Colour, and the right Lobe seemingly inclined to putrify; so that had she lived longer, she would have been in Danger of a Consumption of that Viscus. The *Stomach* appeared next very much distended, like a Bladder filled with Air, so that its Fibres being thereby weakned and stretched beyond their natural Tone, no Wonder if the Aliments were either immediately thrown up again, or sent down into the Intestines without being digested. We next examined the *Heart*, which was very small, thin and limber, like an empty Purse; for its *Parenchyma*, by the continued Heat of the above mentioned Fever, and the consequent Hectick, was melted as it were in its own Liquor, and had contracted a Softness. And hence it was, that she had always an undulating Pulse, so that at last, towards the End of the Disease, you could scarce feel that she had any Pulse at all. The *Liver* indeed was found, but immoderately large, and not only filled the right Side, but likewise the left, so that the *Spleen* was thereby impoverished, and very small and slender. It adhered likewise so firmly on both Sides, but especially the right, to the neighbouring Parts, that it required a good deal of Force in the Surgeon to separate it. And upon this Account it was, that for some Months she could sleep upon neither Side; nay, she could not lean to one Side without Pain: For in this Posture the *Liver* pressing heavier upon the *Peritoneum*, which is a Membrane of exquisite Sense, occasioned a painful Distention of it, and the *Stomach* being too much compressed, was forced to throw up its Contents. In the concave Part of each *Liver* (if I may be allowed so to speak, seeing there could only be one filling up both Sides) lay concealed a *Gall-Bladder*, so that there were plainly two of them, separated from one another the Length of my Hand at least, and turgid with Bile; but that on the left Side was smaller and blacker than the other.

We came at last to examine the *Kidneys*, the Right of which we found every Way in a natural State, nor had she any Complaint on that Side, as far as I know. But from the Left *Kidney* where I had always said the Cause of the Disease lay, and which killed her at last, we took out a Stone, not very large indeed, nor heavy (for it did not exceed Half an Ounce) but surprisingly tortuous, much like Chalk, and divaricated like a Kind of Root into three Slips tied together in the Middle, the Breadth of three Inches. 'Tis inexpressible what Pain that good Woman suffered from the Figure of this Stone, which compressed the *Kidney* with its three Points in such a Manner, as to distort the *Parenchyma* into its own Figure.

Two Stones
lodged 20 Years
in the Meatus
Urinarius; by
Mr. Charles
Bernard. n.
220. p. 250.

LXVIII. In Sept. 1695, I was carried to one Mr. *Blondel*, who was lately recovered from a feverish Indisposition. He complained of a very hard Swelling a little behind the *Scrotum*, which had remained there many Years, and created great Uneasiness to him. Upon examining it with my Fingers, I immediately declared it to be a *Stone* of a very odd and irregular Figure. He had about 20 Years before, while a Lad, been cut by Mr. *Hollier* for the *Stone* of the *Bladder*; and he had not long recovered from under Mr. *Hollier's* Care, before he began to complain of Pain, which resembled his old Pain of the *Stone*; and this continued upon him for 4 or 5 Years, before he was sensible of any Fullness or Swelling in *Perinæo*, which you are to suppose at first but small. I am inclined to believe that Mr. *Hollier* left either a couple of little *Stones*, or Pieces of *Stone*, at the Time of Extraction, which were by Degrees protruded into the *Urethra*; but being too big to be voided, there lodged themselves, and so, by perpetual Accretion, arrived to that Magnitude which you see. He constantly complained of Pain in making Water, which ordinarily flowed *Guttatim*, and involuntarily, for several Years past. Nor was he longer at Ease, than while his *Bladder* was full and distended with Urine; which Distention was continued all along the Neck and the *Urethra*, as far as where the *Stones* were bedded; for his only Way of procuring Ease to himself, was by frequent drinking very large Quantities of Small Beer or Water, and as soon as the Separation could be made of the Urine into the *Bladder*, and while that continued full, he was sensible of some Ease. He has been likewise exceeding liable to Vomiting of late, and generally molested with a *Diarrhœa* for some Years past; both which had lately so increased upon him, as very much to have impaired his Health, and weakened his Constitution.

After the Evacuations that are proper to precede such an Operation, I cut upon the most protuberant Part of the *Stone* (which I then supposed to be but one) and making my Incision pretty large, the upper Part, which proved a distinct *Stone*, and had formed itself a Socket in the lowermost, slipped out with little or no Difficulty; the other, which was forked, and was as it were bound in, as if it had adhered to the *Urethra*, was removed with more Trouble, and broke in the taking out, they being neither of them very hard. To facilitate the Removal of this *Stone*, I put two of my Fingers up his Fundament, to secure it from retiring towards his *Bladder*, and to my great Surprize I found, that one of the Angles had perforated into the *Anus*. There was not an Ounce of Blood lost in the Operation; the *Stones* having lodged long there, you must imagine had made a very great Distention of the *Urethra*, so that it was become so callous, that I seemed to cut through a Cartilage.

Fig. 40.

A, The Point which tended towards the *Glands*. *B*, That Part which lay in the *Acetabulum*. *C*, The Part upon which I made Incision. *D*, The *Acetabulum*. *E*, The Point which lay toward the Neck of the *Bladder*. *F*, That which had perforated into the *Anus*.

LXIX. In the Hospital at *Paris*, called *L'Hospital de la Charité*, there is preserved a *Stone* of a prodigious Bigness, weighing about 51 Ounces. It was taken from one of the Religious Brothers in *June* 1690, but he died in the Operation.

A prodigious Stone in the Bladder; by Dr. Charles Preston. n. 222. p. 310.

LXX. In *June* 1696, while I was at *Ghent*, *M. Parfaima*, Lithotomist, found a *Stone* adherent to the Bottom of the *Bladder*. When he made the Operation he could not extract the *Stone*, so that he was obliged to leave his Patient in that Case; there followed an Imposthume, and 8 Days after, he extracted it with great Ease. The next Day he shewed me the *Stone*, to which the Fibres by which it was tied were yet adherent, and could easily be observed by the naked Eye, without the Help of a *Microscope*, so that I could not question any thing as to the Matter of Fact.

A Stone cut from the Bladder which adhered to it; by Dr. Charles Preston. Ib.

LXXI. I. In *May* 1698, a Boy, in the 13th Year of his Age, had the Misfortune to fall backwards with his Head upon a Stone, and lay $\frac{1}{4}$ of an Hour without Sense. The next Day he vomited some Blood; felt a Pain and Weight in the hinder Part of his Head and Neck; and lost Appetite. Above a Fortnight after, as he was coming out of the Country, he had a frequent Desire to piss, and lighted from the Horse several times, but could make no *Urine*; he vomited in this Time; the Suppression had continued more than 24 Hours when I came to visit him. He had a great Pain in his Head, a Pain in his Back and Groins, and in the Region of the *Bladder*, which was swelled, and he could not suffer it to be touched. I caused some mild Diureticks to be given to him presently, and anointed his Groins and the *Regio Pubis*, with the usual Ointment, and caused a Clyster to be injected; upon which, that Night he passed first some *Sand*, and then some *Urine* by Spoonfuls. I caused him afterwards to be put in an half Bath of appropriate Simples. He was the Days following let Blood and purged; and because the Pain and Weight in his Head troubled him much, a large Veficatory was applied to the *Nucha*, which discharged much Humour from it. While this was a doing, he passed very much *Sand* of a greyish and whitish Colour; and after the first Purge, began to pass *Stones* by the Yard of a considerable Bigness, with Pain in the Back sometime before they fell down, then in the Groins, or along the *Ureters*, and most in the Right Side, yet sometimes in the Left also. He found the Yard much dilated while they passed it, and he had a smarting Pain then, and while the *Urine* flowed; the *Stones* came in with the first of the *Urine*: He got several Emulsions, which had good Effect. Some of the *Stones* were round, some oval, some triangular, some of a pyramidal Form, some cubical. The Colours were different, some whitish, some brown, some blueish, some black, or of a dark Colour; the Consistence of a sandy Stone: They are not made up of several Coats upon other (as many confirmed *Stones* are) but look like Bricks, and may easily be mouldered to Powder; some in Thickness the 12th, some the 10th, some more than the 6th Part of an Inch, and some half an

Several Stones voided by a Boy in Scotland; by Sir Rob. Sibbald. n. 242. p. 264.

Inch long; most of them approached to a triangular Form. He found a Weight in the *Bladder* when they fell down; and he told me, he was sensible they came down the *Ureters*. He leaped, and ran sometimes to hasten their Descent. In a Fortnight's Time he hath passed above 60 of them by the Yard. Upon the 20th and 21st of *June*, he passed 3 by the *Fundament*; since which he passed none by the Yard. Two of them were triangular, pretty big; and one as big as a little Plum, but of the Shape of a Pear; of the same sandy Consistence as the former, and of a greyish Colour. His Parents told me, that for some Years, that they lived near to the Shore of the *Firth of Forth*, the Boy ran often after the Women that caught the Sand-Eels (*Ammodites*) and brought Home his Pockets full of them, which oftentimes he boiled without taking Pains (as he ought) to free them of the Sand that stuck to them: This, with the glutinous Juice of that Fish, and the Sand mixed with the Bread, and other Aliments he used, hath furnished abundant Matter for these *Stones*. It is like (since he never had any Symptom of this before the Fall he got of late) the Hurt in the Hinder-Part of the Head might have occasioned some *Torpor* in the Nerves, so that the *Fibrillæ* in the *Kidneys* could not act so vigorously (as need was) in the Separation and Expulsion of the *Sand*; and thus it came to gather and form into *Stones*.

*The Cheat de-
scribed; by
Dr. Jo. Wal-
lis. n. 266.*

3. I had the Discovery of the *Cheat* of these *Stones* from Dr. *Pitcairn*, who was at the Pains to find it out. This roguish Boy, to be kept from School, had so much Cunning as to impose upon a fond Mother, and other People.

*Broken Stones
voided; by
Sir Rob. Sib-
bald. n. 241.
p. 267.*

LXXII. A Divine, about 70 Years of Age, after he had these 10 Years suffered much from a confirmed *Stone* he had in his *Bladder*, in 1697, past a vast Number of *Slices* of several Figures, many of them cornered and pointed; much of the Thickness of a Shilling *Sterling*; white within, and smooth; but without of a dark Colour; with Pain, and sometimes a *Suppression of Urine*, for several Hours, preceded them: He maketh Use of the usual Remedies. In the Intervals he hath tolerable good Health.

I am also told, by an expert Physician, of two Patients of his; the one yet alive, who, after passing an incredible Number of these *Slices*, is now in perfect Health, and free of that Disease. The other, who died long ago, after passing for a long Time such *Slices*, became free of the Disease; and when his Body was opened at his Death, no *Stone* or *Slices* were found in his *Bladder*.

*A Stone cut
out from un-
der the Tongue;
by Dr. M.
Lifter. n. 83.
p. 4062.*

LXXIII. 1. The Patient, from whom this *Stone* was cut, told me, That about 8 Years before it was taken from him, he suffered an exceeding Cold in a Winter Sea-Voyage, which lasted much longer than he expected; and that, not long after his Landing, he found a certain *Nodus* or hard Lump in the very Place whence this *Stone* was cut. From that Time, upon all fresh Cold-taking, he suffered much Pain, in that Part especially, and yet, that Cold being once over, that Part was no more painful than the rest of his Mouth.

Mouth. In the 7th and 8th Years, it often caused sudden Swellings in all the *Glandules* about the Mouth and Throat, upon the first Draught of Beer at Meals, which yet would in a short time fall again: But at last it began its Work with a sudden *Vertigo*; which vertiginous Disposition continued more or less from Spring till *August*, in which Month, without any previous Cause, save riding, the Place where it was lodged suddenly swelled, and ran purulent Matter at the Aperture of the *Ductus Whartonianus*; but it suddenly stopped of its running (which he cannot attribute to any thing but Cold) and swelled with a great Inflammation, and very great danger of choaking, it being scarce credible, what Pain he suffered in endeavouring to swallow even Beer, or any liquid Thing. This Extremity lasted 5 Days, in all which Time the Party had so vast a Flux of Spittle running from him, that it was not possible for him to repose his Head to sleep, without wetting all the Bed about him; insomuch as that it was very much questioned by some friendly Visitants, whether he had not of himself, or by Mistake, made use of some mercurial Medicine. The first Day the *Saliva* ran thin and transparent, almost like Water without any Bubbles; the second Day, it ran frothy, it tasted salt (which yet he is apt to think hot rather than really salt, because that Day the Inflammation was at the height.) The 3d Day it roped exceedingly. On this Day a small Pin-hole broke directly over the Place of the *Stone*, and ran with purulent Matter as formerly; the 4th Day the *Saliva* ran insipid, sensibly cold in the Mouth (which again confirms me in that Opinion, that the former sharp Taste was the Effect of Heat, and not the immediate Quality of salt Humour) very little frothy; the 5th Day (which was the Day of the Incision) it ran as on the 4th, but left an extream Clamminess on the Teeth, insomuch that they often clave together as though they had been joined together with Glue.

Upon the Incision, which proved not wide enough, the Membranes or Bags, wherein the *Stone* lay, came away first. The *Stone* itself was so hard as to endure the *Forcipes* in drawing it forth. It was covered over with grass green Matter, which soon dried, and left the *Stone* of a whitish Colour. It is but light in proportion to its Bulk, weighing about 7 Grains; and it is much of the Shape of our ordinary Horse-beans. There are visible Impressions upon it of some capillary and small Vessels it was bred amongst. Lastly, It is scabrous or rough, sand-like, although the Substance is *Tophaceous*.

2. *Tho. Wood* of *Wrotbam*, was so troubled with a *Quinsey*, that he could hardly swallow any Liquid. I found the *Tumour* tend to Suppuration inwardly, about the Root of his Tongue on the Right Side; but without any Sign of Suppuration outwardly, though it appeared there almost as big as an Egg. I ordered him maturing Gargles; and the next Day he broke it with his Finger, and brought out of his Mouth near $\frac{1}{4}$ of a Pint of Matter, and with it at last a *Stone*. He had likewise a *Ranula*, and before he had broke the *Tumour*, and spit out the Corruption, he could hardly speak. I believe this *Stone* to be of the same Nature as those generated in the *Kidneys* and *Bladder*.

A Stone bred at the Root of the Tongue; by M. Bonavent. n. 247. p. 440.

3. The

By — *Ib.*

3. The Weight of this *Stone* in Air is 7 *Gr.* in Water $3\frac{1}{4}$; and therefore its *specifick* Weight, compared with Water, is as 1931 to 1000.

A Stone in
the Glandulæ
Pineales; by
Sir Edmund
King. n. 1
p. 228.

LXXIV. Mr. *Robert Bacon* of *Windsor*, above 75 Years old, sanguine and chearful in his natural Temper, about 12 Years before his Death was observed by his Friends, at his return Home from walking, to bend double to his Right Side, infomuch that he would be ready to fall, and has been brought home in Coaches and Sedans, yet was always temperate, and never observed to be disordered with Drink in his Life. He would often say, That he feared Fatuity or Distraction, and would pray that God would keep him in his right Mind. In his latter Years, his Appetite to all sorts of Food inclined to *Canine*, and his Thirst very great; he often complained of Pain in his Bowels; he was always desirous to have his Head rubbed many times in the Day; his Urine and Excrement came away always involuntary, at Bed, Board, &c. of which he did not seem at all to be sensible. Of late he would always hang down his Head in a prone sleeping Posture, and his Head was very hot; he did sweat very much every Night, and wet his Linen extraordinarily; and, in the whole, his rational Faculties seemed to be quite lost for a great while before he died; for he would usually take up Tongs, Fire-shovel, Brooms (many times all together) to walk by, though he had a Staff of his own; he would also hale the Chairs about the House and up the Stairs, and grasp at any Thing with his Hands; he would often tumble on the Ground, and seldom rise without help; he did rather creep along by Walls and Chairs than go, though formerly he went very upright; of late it was 2 or 3 Folks work to support him to his Bed; he would put 2 or 3 Hats at a time upon his Head, like an Antick; he would many times strike those that attended him. He died of a Fever, *Nov. 4, 1686.*

Upon Dissection, we found the *Liver* indifferently well coloured and firm; the *Spleen* shrivelled; the *Omentum* whole, but ill coloured; the Right *Kidney* sound, with a few small *Stones*; the Left *Kidney* two Parts of three wasted, and some coarse *Gravel*, but both *Kidneys* very fat; the *Bladder of Gall* filled with one *Stone* only, and that no bigger than a long Nutmeg; some little coarse *Gravel* and small *Stones* in the *Bladder of Urine*; the *Lungs* well enough, only, by the Stagnation of Blood, discoloured and filled in several Places with *ichorous* spumy Matter; the *Pericardium* very thin, and too tender, and too little Water in it; very little Blood in the *Ventricles* of the *Heart*; the *Auricles* of the *Heart* perfectly sound and strong, as of any sound Man of 20 Years old; those, and the Strength of the Muscles of the *Heart*, I admired.

The *Dura Mater* was extremely hard, thin, and white, a slender Embroidery of Vessels; the *Pia Mater* all full of seeming turgid *Glands*, and a great Distention of *Lymphæducts* full of coagulated *Lympha*; the Substance of the Brain loose and shrunk, very white, very little of the *cineritious* Colour to be seen; the *Corpus Callosum* very flaccid; the whole Body of the Brain was shrunk about a third Part; between the two *Meninges* of the *Brain*, was near a Pint of extravasated *Serum*, that must needs oppress

the *Brain* very much; the *Ventricles* of the *Brain* full of *Serum*; the *Plexus Choroides* extremely large, in Length as well as Breadth and Thickness; the *Nates* and *Testes* very small and shrunk; the *Thalami Nervorum Opticorum* plump and fair; the *Corpora Striata* large and fair, full of large *Striæ* as I have seen.

The *Glandula Pinealis* was firm and fair, well coloured to look on, of the exact Figure and ordinary Size: Feeling of it, and finding it harder than ordinary, I prest it, and found in it a *Stone* in a Film, or rather a petrified *Gland* in a Film. I do not remember I ever heard of such a thing before; I am sure, of all the *Brains* I have dissected (and I may say I have dissected more than an hundred) I never saw such a one. The *Glandula Pituitaria* was half wasted; that Part that was left, was very hard and brittle, had not the Tone of a true *Gland*, nor Substance, according to my Observations, unless of a vitiated *Gland*; the *Cerebellum* seemed well enough, and all down the *Cauda Medulle Oblongatæ*.

Before he became so mopish, he would say, he felt a certain Kind of Fierceness within him, which (it is probable) made him to utter some Kind of Vociferation when he was displeas'd at any thing.

LXXV. The *Belly* of the *Earl of Balcarres* being opened, the *Omentum* was found lean and small; his *Liver* very big; the *Spleen* big also, filled with a black and thick Humour; his *Stomach* and Entrails all empty, of a Saffron Colour, distended with Wind only; the *Bladder* of *Gall* swelled with a black Humour; the *Kidneys* filled with a kind of grumous Blood. In the *Thorax*, the *Lobes* of the *Lungs* were all entire, but of a bad Colour; on the Left Side somewhat black and blue, and on the Right whitish; with a yellowish Knob under one of the *Lobes*.

Stones found
in the Heart;
by _____
n. 5. p. 86.

The *Pericardium* being opened, there appeared none of that Water in which the *Heart* uses to swim; and the external Surface of it, from the Base to the Tip, was not smooth, but very rough. It being cut asunder, a Quantity of thick and inspissate Liquor ran out: And beneath the Base, between the Left and Right *Ventricle*, two *Stones* were found, whereof the one was as big as an Almond; the other, two Inches long and one broad, having three Auricles or crisped Angles: And in the Orifice of the Right *Ventricle*, there was a fleshy fattish Matter.

The whole Body was bloodless, thin, and emaciated, of a black and bluish Colour. The *Skull* being opened, both the *Cerebrum* and *Cerebellum* were big in proportion to the Body; and out of it ran much more Blood than was seen in both the other Regions together.

LXXVI. A Boy near *Dantzick*, about 19 Years old, who had been from his Cradle dispos'd to a *Consumption*, accompanied with a continual Coughing, great Emaciation, and continual Heat, and labouring under this Distemper, died. Being opened, a great Quantity of watry Matter ran out of the *Abdomen*, of a chylous Consistence; almost all the *Glandules* of the *Mesentery*, through which pass the *Venæ Lactææ*, were extraordinary great
and

Stones found
in the Lungs;
by Mr. Ch.
Kirkby. n. 7.
p. 2159.

and hardened beyond the Hardness of a *Schirrus*. The *Lungs* were grown to the Breast round about, almost inseparable, full of purulent Ulcers, but more especially the left Side, obstructed and filled with much *Gravel* and small *Stones*; yea, whole Pieces of the *Lungs*, especially the *Extremities*, about the Thickness of a Finger and more, were hardened into a *stony Matter*.

Stones found
in the Gall-
Bladder; by
Mr. J. T.
n. 209. p. 111.

LXXVII. After throwing up the *Sternum* of a Woman, I found the *Lobes* of the *Lungs* extremely turgid, and its *Vesicles* implete with a grumous Blood. Their investing Membrane in the upper Part adhered firmly to the *Pleura*; the Right *Ventricle* of the *Heart* was filled with a large Quantity of coagulated Blood; but the Left seemed exsanguinous; and I observed a Stagnation, and great Extravasation of Blood upon the Right Side of the *Pleura*. Beneath the *Diaphragm* I found the *Ventricle* and *Intestines* much inflamed: The *Omentum* fair and large: The *Spleen*, to Admiration, so augmented in Bulk, that I supposed it weighed not less than 2 or 3 Physical Pounds: Upon cutting through its Body, there was discharged several Ounces of a very foetid and putrified Blood. The *Liver* also was much larger than usual, but its *Parenchyma* firm and sound.

The *Vesica Biliaria* seemed full of *Bile*: But more curiously examining of it, I found a *Stone* very beautifully crusted over with *chrystalized Salts* of various Figures, conical, cubical, pyramidal, &c. The one half of it lay immersed in *Bile*, whose Quantity was inconsiderable; for indeed this *lapidious* Concretion took up the whole Cavity of the *Bladder*, and weighed, immediately after it was taken from its Receptacle, 2 Dr. 15 Gr.

We discovered in one of the *Kidneys* a large *Abscess*, and discharged a great Quantity of wheyish Matter.

Stones found
in the Sto-
mach, Kid-
ney and Gall-
Bladder; by
Mr. William
Clerk. n. 250.
p. 95.
Fig. 41.

LXXVIII. An. 1690, A Lady, who had been drinking the Waters at *Moffet-Wells* in *Annandale*, in *Scotland*, by Advice of her Physicians, for a continual Vomiting, and the *Dolor Nephriticus*, died there in a Fit of Vomiting. Upon dissecting the *Stomach*, I found a *Stone* of the Bigness and Form as in the *Figure*. The Corner *a*, was almost fixed in the *Pylorus*, so that the Passage from the *Stomach* to the *Intestines* was near quite shut up. The Substance of this *Stone* is a little spongy, weighing about $8 \frac{1}{2}$ Dr. In the Left *Kidney* I found also a *Stone* of the same Substance, weighing about 5 Dr. and in the *Gall-Bladder* I found several *Stones*, weighing 2 *Drams*.

I am apt to believe, that some extraneous Body gave Origin to that in the *Stomach*, as it frequently happens even in those extracted from the *Vesica Urinaria*: Thus an Iron Tag, a Leaden Bullet, &c. have been found the *Kernels* of several *Stones*. And that several extraneous Bodies are oft-times found in the *Stomach*, being swallowed over, either wilfully, or by accident, we have the Authority of *Sennertus* and others. And one Mr. *Cameron*, who some Years ago, in a Frolick, swallowed Half a Crown, is alive to this Day, and finds no great Inconvenience thereby.

These *Stones*, generated in the *Stomach*, excite horrid Pains; but there are scarce any clear Signs by which they can be distinguished from others,

except the Continuance of the Pain; sometimes they are ejected by Vomit; and sometimes they adhere to the Bottom of the *Stomach*, of which we have a notable Instance in *Horstius*.

Lib. Infit.

But *Stones* are also formed in all other Parts of the Body, of which we are assured by manifold Observations and Experience; as in the *Brain*, *Kidneys*, *Ureters*, *Gall-Bladder*, *Tongue*, &c. and some are voided *per Anum*: But more ordinarily *Stones* are formed in the *Kidneys* and *Bladder*; because these Vessels are more properly designed to separate and contain the *Serum* of the Blood; and for that Reason *Stones* in the *Reins*, and *Vesica Urinaria*, are more troublesome to Persons afflicted therewith, than in any other Part of the Body: 1. Because the Parts are more sensible; 2. Because they stop the Passage for evacuating the *Serum*, that is continually separating from the Blood, and, by Consequence, distend the Vessels, and so cause horrid Pains.

p. 141.

Vid. Sup.

LXXIX. A Carpenter near *Hallifax*, about 40 Years old, of a strong Habit of Body, and very laborious in his Calling, made a great Complaint to me of the sad Torture he had suffered by reason of two *Stones* he had voided by *Stool*, about *Christmas* 1684. He perceived no Disorder in his Body till within 5 or 6 Days that the first came away; then he began to complain very much of a Pain in the Belly, much resembling the *Cbolick*, and of a Stoppage in the *Intestines*, not much unlike that in a *Tenesmus*, having frequent Provocations to go to *Stool*, but to no Purpose upon Trial. He took little or no Rest in all that Time; his *Stomach* retained scarce any Meat or Drink it received; till, in the Conclusion, one of the *Stones* came into the *Intestinum Rectum*, where it lodged for a Day's Time; then coming within the Reach of his Finger, he drew it out by Force, and then he was presently very well. A Fortnight after that the other began to move; which occasioned a Pain beyond the former, in Proportion to its Bulk, and kept him upon the Rack about 8 Days; during which Time there was an absolute Suppression of *Excrements*; and when the *Stone* came into the *Rectum*, it continued near two Days within the Reach of his Finger, with which he could not draw it out by any Means; till at length he bent a small Piece of Iron into the Form of a Hook, with which rude Instrument his Servant drew it forth with much ado, and not without wounding the rugous Coat of that Part. After that was gone, he soon recovered his former Condition.

Stones voided by Siege; by Sam. Threapland. n. 170. p. 961.

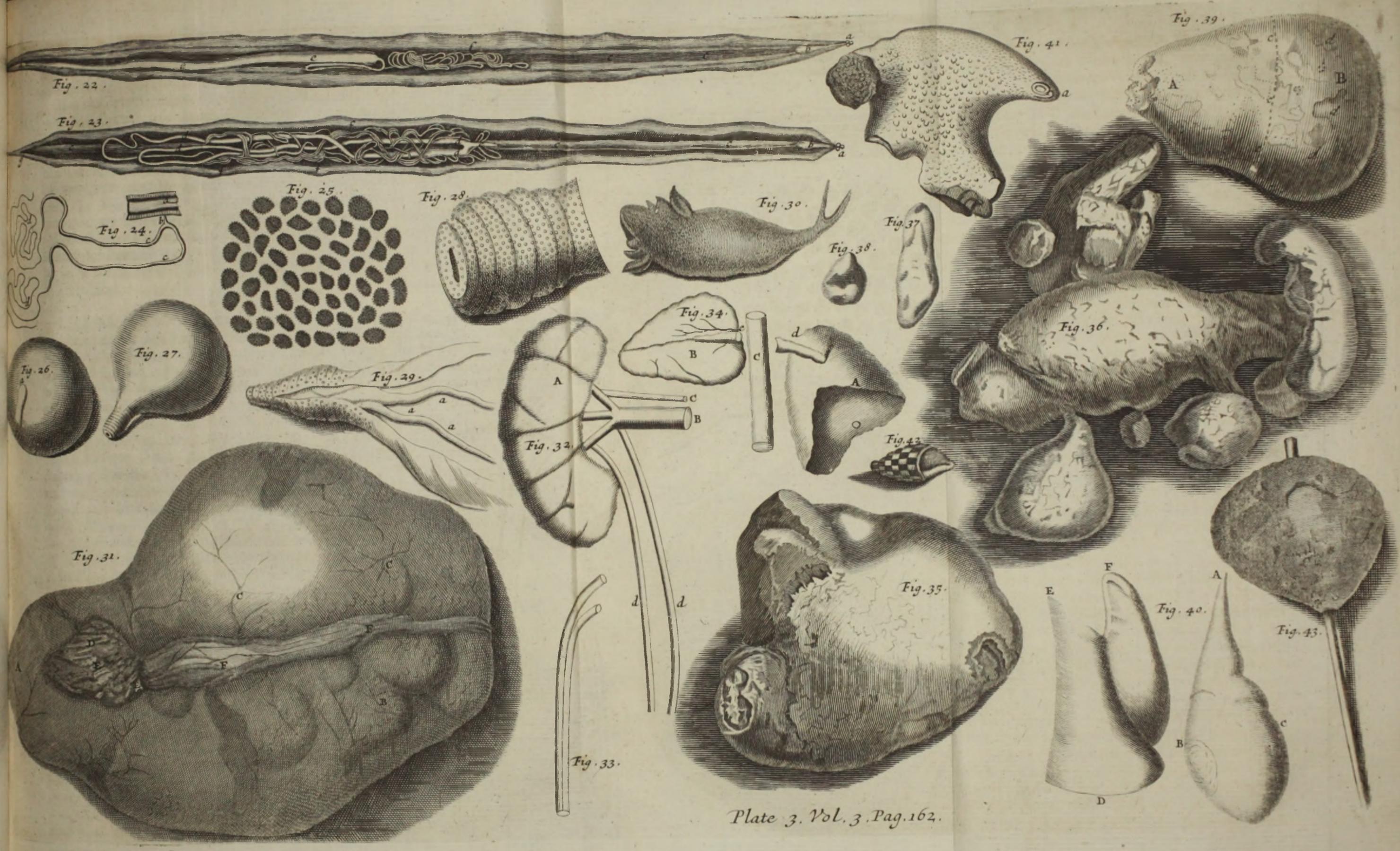
About 7 Years before, the very like Case had befallen him, voiding two *Stones* after the same Manner, and about equal Bigness.

LXXX. G. Elliot of *Mendlesham* in *Suffolk*, a pale, middle-aged, full-bodied Woman, sorely afflicted for some Years with a Torment of the Bowels, was prevailed with by a Neighbour, who had suffered much in the like Case, to swallow two fit *Bullets*; whereupon she found (as he had done before her) present Ease. But afterwards her Pains returned, and increased, and she having many Conflicts for about 15 Years, then applied herself to my Apothecary, Mr. Gibson of *Stow-market*, who administred to her, in the Fit, a

A Bullet voided by Urine; by Dr. Nath. Fairfax. n. 40. p. 803.

Dose of Lady *Holland's* Powder, which she took in Posset-drink in the Morning, was moved gently by it in the Afternoon, spent that Night in Torture of Body with Vomitings, and next Morning, during the Use of the Chamber pot, together with the *Urine* there came something from her, which gave a twang against the Sides of the Vessel. The *Urine* being poured off warily, there was left in it a heavy (and to appearance) gravelly *Stone*, of a Colour between yellow and red, near as big as one's Thumb's End (as she confidently asserts to me) but making use of an Hammer, and knocking off the outer Parts of its Crust, they came at a *Bullet* enclosed in it, of a kind of brazen Colour on the Outside; but cutting a little with a Knife, it proved *Lead* within; which being discovered could easily be accounted for. Asking her, If no Enquiry had been made for such a *Bullet's* coming from her before? She told me, That some Days after she took them, the Stools had been slightly examined, but finding neither, they gave over search. She being further asked about the Bigness of the *Bullet*? She told me, it was apparently bigger when she took it, than when she voided it. The State of her Body, in reference to the *Stone*, being enquired into, she said, That she had, before and since that befel her, been a Voider of abundance of red *Gravel*, and particularly about three Years after she took them, she voided a considerable reddish *Stone*. When I asked her about the Manner of affecting her Body at the coming forth? She answered, It was much like a common Fit of the *Stone*, only it held her longer (lasting some Weeks) bowed her sadly forward, as a *Stone* often does in the *Ureters*, provoked to Vomitings, and particularly she felt it croud lower and lower from the *Kidney* to the *Bladder* in the Left *Ureter*. Asking her farther, Whether she was sure, it came by the Passage of *Urine*, and not by *Siege*? She assured me she was not mistaken as to that. And indeed, the gravelly Coat, which the *Bullet* hath, shews sufficiently whereabouts it was lodged. Inquiring also, Whether the other *Bullet* was come from her? She said, No; for ought she knew it was still in her Body. And as to her State since this Evacuation, she saith, That she hath had ever since more *Stone-Cholick* Pains, but none in so high a Degree as before.

The main Use I would make of this Instance, is to strengthen a Conjecture I have had a long time, of some other Passage from the *Stomack* to the *Bladder*, besides what Anatomists have hitherto given Accounts of: For that this *Bullet* never came at the *Ureters* through the Veins, Arteries, Nerves, *Lympe-Ducts* (the only Vessels that can be charged with it) is, I think, beyond Dispute. If it shall be said, That Nature, when put to Shifts, finds out strange Conveyances to rid the Body of what is extraneous and offensive to it, because many Instances are known making that good; yet I think it not so pertinently urged, forasmuch as some other Instances seem to side with it, which cannot be taken off by the same Evasion; viz. Many do find, that drinking 4 or 5 Glasses of *Rhenish* (for Instance) within less than a quarter of an Hour, they shall have a strong List to make Water, especially if the Body hath been agitated. Now that it should pass through the *Lacteals*, Veins, Heart, and Arteries, and



be strained from the Blood in so short a time, it is, to me, scarce conceivable.

But surely this shorter Passage (wherever it is) is as natural as that by which it should have gone, had it staid longer in the Body: Not to say how little it favours of the Rankness of the *Kidneys*, and how much it resembles that which it was before it was taken into the Body. And, methinks, the Conveyance of the *Milk* into the *Breast*, hath much Affinity with this of the *Urine* into the *Bladder*; the sudden pressing whereof into the Paps after the Nurses drinking ordinary Milk, could no more be explained by the ordinary Doctrine of *Circulation*, than this of the *Urine* into the *Bladder*, till the shorter Cut was hit upon by the *Ductus Thoracici*; though ordinarily it may be strained from the Arteries, as the *Serum* also in the *Kidneys*; only in a Milk-flood Nature finds some other Channel there, as here in a Water-flood.

LXXXI. A Gentlewoman (at *Bath*) about 28 Years of Age, very fat, and corpulent, after having been long troubled with frequent, and sometimes violent Vomiting, fell at length into a *Fever*, and died in few Days, and on a sudden. I opened the Body, and quickly found what might account for her long Vomiting (and perhaps her *Fever* and Death too) scilicet an Ulcer in the *Pancreas*, which had sphacelated some Part of the *Stomach* and Bowels that lay nearest to it. Her *Kidneys* were covered with a prodigious Quantity of Fat; which removing with my Hand, and reaching one of the *Kidneys*, I felt something prick my Finger in the lower Part of the *Kidney* where the *Ureter* is inserted. I presently concluded it to be a *Stone*, and took it out, with an abundance of mucous bloody Matter about it. I found not so much as *Gravel* (much less any *Stone*) in either of the *Kidneys*. When I had washed off the Mucus that was about the supposed *Stone*, I found it to be a small *Shell*, very finely wrought; in the Hollow of it, there was a mucous slimy Matter, not at all unlike the Substance of a *Snail*, as to Consistence, but of a bloody Colour.

Fig. 42, represents this *Shell* somewhat magnified. Those indented Checquers, are every other a little depressed and elated; and very exactly wrought. There are 6 or 7 Spiral Lines, or Rounds, in the *Turban*.

LXXXII. This *Stone* was cut out of the *Bladder* of a Boy at *Paris*; by M. *Colo*. The *Iron-Bodkin*, to which the *Stone* grew, and which passes through the Middle of it, had been thrust up into the *Bladder* by the Boy himself, about 2 Years before the Incision.

LXXXIII. *Dorcas Blake* (in *Dublin*) a full-bodied sanguine Maid, about 20 Years old, was much troubled with a Hoarseness last Winter, for which she was very desirous to take a Vomit; but her Friends not consenting to it, she endeavoured to provoke one, Jan. 5, 1694, by thrusting her Finger into her Throat; which not answering her Desires, she drew an *Ivory Bodkin*, of 4 Inches long, out of her Hair, and thrust the small End for-

A Shell found in the Kidney; by Dr. Rob. Pierce. n. 171. p. 1018.

Fig. 42.

A Stone grown to an Iron Bodkin in the Bladder; by Dr. M. Lister. n. 168. p. 882.

Fig. 43. *A Bodkin cut out of the Bladder of a Woman; by Mr. Proby. n. 260. p. 455.*

ward into her Throat, upon which she heaved so often, as to put her out of Breath, and obliged her to stand upright to draw some Air, which she did without taking the *Bodkin* out of her Throat, and at that Instant it slipt out of her Fingers, and passed into her Stomach. She found no immediate Inconvenience; but the next Day about Noon, she felt a sharp pricking Pain in the Right Side of her Belly, lower than the Navel; and towards Evening she felt the Pain nearer her Right Groin than before, which obliged her to go to Bed, where she lay restless all that Night, by reason of the excessive Pain. *Jan. 7.* A Midwife searched her, and said, she felt the End of the *Bodkin*, but thought it was in a Gut. *Jan. 8.* At Night she sent for me. In searching her by the *Anus*, I could not find it; but putting my Finger into the *Vagina Uteri*, I felt the *Bodkin*: And because she complained of a Difficulty in voiding her *Urine*, I made use of my *Catheter*, and felt it, as I conceive, in the *Bladder*; but immediately trying a second time, I could not find it. Within a Fortnight after, it was very plainly to be felt: And about 10 Days after this (her Body being duly prepared for the Operation) I attempted to extract it, after the same Manner as I do *Stones* from Women. But having introduced my *Forceps* into the Neck of the *Bladder*, and very readily taken hold of the *Bodkin*, I could not move it. I then passed in my Finger through the Dilatation into the *Bladder*, and tried to bring the whole *Bodkin* into the *Bladder*, but could not; nor could I turn it one way or another, but round like a Spindle; the smaller End (as I imagine) resting upon the *Ischium*. Finding all my Attempts to be fruitless, I despaired ever to effect it this Way, which made me desist from farther Trial. But after some time her Pains increasing, she prevailed upon me, by her daily Importunity, to attempt the extracting of it in the Manner of the *Higher Operation* for the *Stone*, which was as follows, Dr. *Maddin*, Dr. *Molineux*, and Dr. *Smith* being present. Having placed her in a convenient Posture, I put my Finger into the *Vagina Uteri*, and felt the *Bodkin* lying close to it on the outside; whilst I held my Finger there, I pressed with my Left Hand above the *Os Pubis*, where I felt the Head, or thickest End of the *Bodkin*. I then removed my Right-Hand, and desired Dr. *Smith* to put his Finger into the *Vagina*, as I had done before, and press hard against the *Bodkin*; which he did, and held it very firm and steady, whilst I made an Incision about an Inch and half in Length, on the Outside of the Right *Musculus Rectus*, till I came to the *Bladder*. I then passed my Fore-Finger and Thumb into the Wound, and got hold of the Head of the *Bodkin* (the Substance of the *Bladder* only being between) upon which, with a small crooked *Bistoury*, I cut the *Bladder*, and by gently pressing my Finger and Thumb, the *Bodkin* slipt out of the *Bladder* between them, by which I very easily extracted it. I dressed the Wound, and put her into Bed, and in less than a Month, by God's great Blessing, she was perfectly cured.

June 10, 1695, The young Woman went before the *Lord Mayor*, and made Oath, That the above Relation is true in Substance, and that she did swallow the *Bodkin* therein mentioned.

The *Bodkin* was cut out of her *Bladder* that Day nine Weeks that she swallowed it. There was but half of the *Bodkin* in the *Bladder*, which was incruftated with a gravelley *calculous* Matter; the other Half was out of the *Bladder* in the *Pelvis*, the Point resting upon the *Ifchium*.

LXXXIV. A Boy of 5 or 6 Years of Age, near *Aberdeen*, was cut for a *Stone*; which being by Accident broke a little, there was feen within it a *Flint-stone* shaped like to that of a *Pistol*, with the *Calculus* crufted about it. I faw this *Gravel-stone* with my Eyes, having the *Flint* in one Side of it; but crufted above. That the *Flint* has not been formed in the *Bladder*, but that this might have been occasioned by the Boy's swallowing of the *Flint-stone*, feems probable from another ftrange Instance of a Man, in the fame Country, his voiding with his *Urine* a small *Pistol-bullet* crufted over with *calculous* Matter, after the fame Manner.

A Stone from the *Bladder*, with a *Flint* in it; by Dr. Geo. Garden. n. 266. p. 689.

A *Pistol* Bullet crufted over, voided by *Urine*.

LXXXV. I had an Account of Sir *William Elliot's* piffing *Hair*, from Sir *Archibald Stevenfon* and Dr. *Pitcairn*, his *Physicians*; and after his Death I faw the *Stone* that was taken out of his *Bladder*, which was about the Bignefs of a *Goose-Egg*; the *Stone* was hard and heavy, and for the moft Part covered over with a *Scurf*, not unlike the *Lime-mortar* of *Walls*, and in the Chinks of the *Scurf* there were fome *Hairs* grown out. It was thought the other *Hairs* he piffed in his *Life-time*, which were a great many, and fome of an extraordinary Length, did grow out of that *Stone*; becaufe when the *Hairs* would hang out of his *Penis*, as they did frequently to his great Torment, they were obliged to pull them out, which was always with that Resistance as if plucked out by the *Root*.

A Stone from the *Bladder*, with *Hair* growing on it; by Dr. Jo. Wallace. n. 266. p. 688.

LXXXVI. A pretty *Spaniel* (in *Italy*) 2 Palms and a half high, and an excellent *Setter* for *Quails*, being kept tied, as fuch *Dogs* are wont to be, would rather have burfted than urine or dung in the Place where he was kept. By reason of his aptnefs to bite, he was cut when he was 5 Years old; and 2 Years after that he began to urine with much Difficulty. Whereupon, as often as he was let loofe, he ran prefently into the *Garden*, and fell to eat of *Pellitory of the Wall*, and *Fig-leaves*; which *Matthiolus* and others obferve, to provoke *Urine*, and cleanse the *Reins*. This *Difeafe* continued upon him for 5 Years together, fometimes with that Violence, that his *Master* had him fyringed, and anointed with *Oil of Scorpions*, and ufed other Remedies to help the poor Creature. At length he died, at 12 Years of Age; and being opened, there was found in his *Bladder* a *Stone* weighing an Ounce, of an irregular Figure, white, yet here and there with fome reddifh Specks; and in the Bottom of the *Bladder* was found Store of fmall white *Gravel*; and in the Mouth of the *Urinal-Passage*, a *Stone* as big as a great *Pine-Kernel*, white and tender. The reft of the *Body* was all fwelled.

A Stone in the *Bladder* of a *Dog*; by S ——— n. 84. p. 4094.

LXXXVII. There was lately a *Stone* of a very extraordinary Bignefs found in the *Body* of a *Spanish Gelding*, about 13 or 14 Years old, which died in the *Academy* of *M. de Bernarday*, the Weight of it being 4 Pounds, of a roundifh

A Stone faftened to the *Back-bone* of an *Horse*; by S—ib. & P. Col. n. 7. p. 4.

roundish Figure, a little flatted; its longest Diameter was 5 Inches, and its shortest 4: It was of the Colour of an Olive, but a little inclining to a brown, marked with several red Spots resembling coagulated Blood; radiated circularly with black and white Veins and Waves; but for the rest of it, so delicately polished, that it reflected the Images of the Objects about it. It was found invelliped in a Membrane of Fat, and fastened by two Ends to the *Spine* of the *Back*, near the *Kidneys*: It was more than 12 Hours after the *Horse* was dead before it was taken out of his Body, when it was found very hot, though the Body of the *Horse* was quite cold; and it retained a considerable Heat about 6 Hours after it was taken out.

A Stone taken out of the Belly of a Horse; by Dr. H. P. Ph. Col. n. 7. p. 191.

LXXXVIII. Not long ago, there was a *Stone* of a very large Size taken out of the *Belly* of a *Horse* at *Lambeth*, which weighed four Pounds four Ounces, about the Bigness of a Man's Head, and something of its Shape, but oblong, and more flat than round. The Person who took out the Stone, and I believe was ignorant of the Parts and their Situation, affirmed to me, that he found it between the *Bladder* and *Rectum*, and it is possible he might be right. For the *Stone* on one Side was plain and smooth, occasioned by the *Urine* passing continually that Way, not without some Difficulty upon Account of the Straitness of the Passage; on the other Side, where it adhered to the *Bladder*, it was rough and unequal like a *Pumice Stone*, which increasing daily in its Size and Bulk, like a *Millstone*, had wore out the tender Coat of the *Bladder*, so that nothing remained of it. And perhaps, if they had adverted to it, they might have observed the *Dung* voided with some Difficulty upon Account of the incumbent Weight compressing the *Rectum* into an unusual Figure. The Master who kept him twelve Years, says he was fifteen Hands high, and his Labour was to carry Cloth, dyed and undyed, backwards and forwards. It is a common Case, when we cannot account for a Disease, to suspect every Thing, as in the present Case. In dying of Cloth a great many Minerals are used, as *Copperas*, *Alum*, and different Kinds of *Salts*, together with other Things of a like Nature taken out of the Animal and Vegetable Kingdoms. The Cloth stained with these Things, is taken while it is warm out of the *Coppers*, and heaped upon the poor *Horse*, who groans under the Burthen and is quite fatigued. Here perhaps it might not be impertinent to enquire, whether from the Folds of the Cloth, pressed and sticking as it were together, there may not transpire subtle *Effluvia*, which being attracted filily in *Inspiration*, contribute at least in Part to the Concretion of the *Calculus*, and collect and unite the saline Particles like a Kind of *Glue*. What contributes not a little to confirm this Conjecture is that, that *Liquor* which *Dyers* frequently use, promotes Concretion very much by its *vitriolick Spirit*. This may be seen in many Places of *England* where that Spirit obtains, which lays hold of whatever comes in its Way, as *Wood*, *Shells*, *Chaff*, &c. and involves them in a stony Crust. Great Things are frequently made out of the least, especially if continued for a long while, or frequently repeated. If that Opinion, which continued long a favourite with the *Antients*, was not now grown quite

quite obsolete, that the Heat of the *Kidneys* has the same Hand in making the *Calculus*, as the Fire has in burning of Bricks, it would be confirmed strongly here, as the Horse was daily oppressed with a great Heap of Cloth, laid upon his Back.

The Antients were so careful to prevent the *Kidneys* from suffering by too much Heat, that they defended their Loins only with loose Linen, so that the Back with them was exposed to the cool Air, and not the Breast. *Salmosius* affirms, that the most Part of those whom he had observed troubled with a *Stone* in the *Kidneys* only, used to sit at Table with their Back opposite to the Fire. Very hot Weather indeed is hurtful to the *Kidneys* in another Respect, but conduces nothing towards producing a *Calculus*, unless it meets with Matter there that is apt to concrete. They had left off riding him for some Years, for it was with the greatest Difficulty that he would admit either a Saddle, or Rider, upon his Back, as if his usual and daily Load sat lighter and more commodious; whereas a new Burthen irritated the Parts; or he had Sagacity enough to foresee that, if he was put upon a Journey, the Load which, while he walked slow, lay quiet as on a Pillow, would occasion far greater Pain, if he was obliged to go faster. Something similar to this is frequently seen in Men, who will carry a *Calculus* a long while suspended in *aequilibrio* by certain Filaments, without suffering any great Inconveniency from it; but if these Filaments happen to break by any violent Motion or Straining, so that the *Calculus* falls down to the Neck of the *Bladder*, it raises such acute Pains in that tender sensible Part, as to kill the Patient. The Horse was fed constantly upon dry Hay, and for some Years had seldom or never enjoyed the Liberty of grazing in the Fields, where he might possibly have found some common, or even some particular Remedy, whose Strength and Virtue were discovered by the Sense and Experience. For why should we not allow them the same Sagacity as other Animals? A *Dog*, for Instance, when he finds he has eat too much, runs about, till he finds a particular Kind of *Grass*, which sets him a vomiting, and so relieves the Stomach of its Load. The *Stag*, as soon as he is wounded, flies to the *Dittany*, a powerful *Vulnerary*. And *Cats* when they are ailing, have Recourse to the *wild Penny-royal*, which hence has obtained the Name of *Catwort* or *Cat-Mint*. This Horse likewise used to fall away twice a Year, *viz.* *Spring* and *Autumn*, and his hind Legs especially used to be so stiff and lazy, that he could scarce draw them after him; the Spirits quite sinking under the Load. So you will frequently see a Limb from a violent Contusion, destitute of Spirits, grow withered as it were, and become an useless Load. For eight or ten Days before his Death, he made no Water, the Stone filling up the Cavity so much, that there was no Passage left for the Urine. He threw himself upon the Ground, tossed and tumbled about; kicking himself and the Ground with his Feet, and shewing all the Tokens of the most violent acute Pain. But what was most surprizing of all, during the whole Time that the Stoppage of Water held him, he would not drink a Drop of Water that was offered him;

him; as if he understood by Instinct, that if the Water did not pass, it must be heaped up in the Belly, and so increase the Pain.

*A Stone in
the Bladder
of an Ox; by
Dr. Johnston.
n. 101. p. 9.*

LXXXIX. 1. *An.* 1671, the *Bladder* of a fat Ox being blown by a Butcher's Servant in *Pomfret*, there was something observed sticking to the Inside with a dusky Froth. Keeping the *Bladder* half blown, the Butcher's Son, who first discovered it, knocked with his Hand on the Side, and the Bottom of the *Bladder*, to make it settle to the Neck; and by shaking and squeezing it, got out the Froth, and about 200 little globular *Stones* of several Sizes. He rubbed the slimy Froth from them, and they appeared of a dusky yellow Colour, and smooth. When dry, they were like *Seed-Pearl*, but more smooth, and of a perfect Gold Colour, and so continued. Viewed in a *Microscope*, they appeared polished, and without any Rugosities. The Figure in most was spherical; in some a little compressed; the Colour like *burnished Gold*. I broke one or two of them with some Difficulty; and I found by the *Microscope*, that it was only a thin Shell that was so orient and bright; the inner Side of which Shell was like unpolished Gold. The inmost Substance was like brown Sugar-candy to the naked Eye, but not so transparent: The Taste was not discernable. In *Spirit of Vitriol* they shrunk much and wasted, but continued their Colour (possibly by reason of the outward Skin, which, it seems, in these was as difficult to dissolve as in true *Pearls*.) Likewise *Aqua-fortis* would corrode and dissolve them tumultuously.

*By Dr. M.
Litter. Ibid.*

2. I did persuade myself at first, that these *Stones* were some Insects Eggs; but afterwards, when I had read that Account of several *Stones* found in other Animals, which Dr. *Wedelius* has published in the *German Ephe-merides*, *An.* 1672, I was induced to believe them *Stones* indeed.

*A prodigious
Number of
Stones voided
by a Woman
at Bern, in
Switzerland;
by Dr. Sigism.
Konig. Ph.
Col. n. 3.
p. 68.*

XC. *Margaret Lawer*, my Townswoman, and a Woman of a good Character, in the *Spring*, 1678, when she was twenty-one Years of Age, the menstrual Discharge leaving her, was seized with various Complaints, and very acute Pains, in all Parts of her Body, with several Blisters breaking out suddenly, of the Breadth of one's Palm. They were filled with a clear Lymph, and burnt violently, so that you would have taken them for *St. Anthony's Fire*, and if they were not opened immediately, the Pain became insufferable, so as to make her light-headed. And it was no sooner healed in one Part, but it broke out in another. In order to be cured, she was received into the Hospital (called the *Island*) where we tried all the Methods we could think of to remove the Cause of the Disease, which we took to be a particular Acrimony of the Lymph, attended with a kind of Stypticity in it, whereby it stagnated in the Subcutaneous Glands, and could not get through them; attempting by all Means to mitigate, resolve, and evacuate that Humour, or give it another Course, but all to very little Purpose. At last however, we were led by Reason and Analogy to try a Salivation, which had the desired Effect; so that, after a Cure of eight Months, she was dismissed the Hospital quite recovered, in the Month of *March*, 1679, and advised to drink the chalybeated Goat's Whey.

From

From this Time she continued well in every Respect till the 3d of *January*, 1680, when the Blisters began to appear again, and she applied to the Magistrates to get in again to the Hospital, where she was admitted the fifth, and we thought of nothing but repeating the former Method of a Salivation. But in the first Place it was necessary to prepare the Body for that Course, which we had set about, but had not yet begun to purge her, when, the 15th of the said Month, there was a sudden Revulsion made of the Humours from the Skin to the Bowels, the Blisters immediately disappeared, and the Cuticle adhered so close to the Skin, that there did not the least Mark of the Eruption remain. Although the Patient continued extremely easy for five Days, and thanked God for being so suddenly relieved from her Pains, yet I presaged no Good from this sudden Revulsion, suspecting the sharp Humours might fall upon some of the *Viscera*, and therefore I still plied her with Resolvents mixed with Diaphoreticks, for fear of a Relapse, or perhaps a worse Disease.

On the twentieth of *January* a Group of Symptoms appeared, which mocked all Prognosticks, *viz.* a Pain in the Loins, Bladder, Perinæum and Groins, Weakness, Want of Appetite, Nausea, the Blood much inflamed, a Retention of Urine, the Pulse quick and irregular, from all which we could conclude nothing but a *Nephritis*. Wherefore after bleeding, she had an Emulsion of the cold Seeds mixed with Nephriticks, and a Clyster of cold emollient Paregoricks was immediately injected, which was vomited up within a Quarter of an Hour, to the Amazement of every Body. The Clyster was repeated and vomited up as before, together with a Quantity of Gravel Stones to about Half an Ounce, but without any Excrement. We tried bathing her, the *Semicupium*, applied Blisters to her Joints to make a Revulsion of the Humours, and Anodynes and Resolvents to the Loins and *Pubis*. The Bleeding was repeated on Account of the Heat in her Bowels, and the Blood appeared florid, insipid, mixed with a little yellowish *Serum*, and soon coagulated. The Fever at last remitted, she drank laxative Decoctions of Pulps, but threw them all up again together with the Broth or whatever else she eat, mixed with a Quantity of Stones as hard as Flints, and little Crusts or Fragments, very hard, like white Marble. Clysters were tried again with the same Success as before, except that a greater Quantity of Stones was thrown up; and whereas before they were only about the Bigness of Peas, they were now as large as Filberds, and soon there came up larger. Her Bladder pained her excessively, and she had a violent Inclination to make Water; upon introducing the *Catheter* not a Drop of Urine followed, and the Instrument stuck as if it was glued in a Manner so that it required some Force to pull it out again; and upon handling it we found the Bladder to be full of *Mucus*. We suspected, not without Reason, that there were Stones bred in the Kidneys, Bladder and Glands of the Mesentery, as we saw them plainly voided from the Stomach and Intestines. Her Belly was somewhat swelled, but not much, together with an Oppression about the *Præcordia*, and Difficulty of Breathing, an acute, pungent, darting Pain in the Region of the right Kidney and the

left *Hypochondrium*, and you might hear the Noise of the Stones rubbing against one another, either upon pressing the Belly with the Hand, or in the Time of vomiting, and you might frequently observe Stones broke off by straining from those that were left behind in the Body. But what was most surprizing of all, the Patient, during the whole Course of the Disease, remained in a good Habit of Body, and of a fresh, florid Complexion. We endeavoured all we could to hinder the Concretion of the Humours, searching after various *Menstrua* in the volatile Preparations of Steel, and of the urinous Tribe; but except the Spirit of Nitre, which we used, there was none of them able to produce the Solution. And after using these and other Remedies, as Injections into the Bladder of various Decoctions, both of Minerals and the expressed Juice of Plants, as *Arsmart*, &c. she found no Relief; but was obliged to have Recourse to Anodynes, to relieve the exquisite Pain occasioned by the *Mucus*. At last, on the *second* and *twelfth* of *February*, there were about four Ounces of green, thick Urine drawn by the *Catheter*; after which she eat a little, and had no Thirst. From the *twelfth* to the *fourteenth*, upon swallowing a Spoonful or two of Broth or Barley Gruel, or some liquid Medicine, she vomited two or three Times a Day, from Half an Ounce to six Drachms of small Stones. From this to the *sixteenth* of *June*, viz. for four Months, she neither eat nor drank; but as soon as she offered to sip only a single Spoonful of Broth, she was presently taken with a vomiting of Blood, and a greater Quantity of Stones than before, so that we were obliged to restrain her both from eating and drinking contrary to her Inclination, for fear of stirring up those violent Symptoms. Thus she continued for the Space of four Months, without eating or drinking, or taking any Kind of Medicine, only every fifth or sixth Day a small Spoonful of the Oil of sweet Almonds mixed with the Spirit of Nitre, which we found to be the best Resolvent in this Case, and most agreeable to the Patient, so that in that Time she took between nine and ten Ounces of it. As she remained costive all this while, she had several Clysters given her, all which she vomited up, and with them Stones of different Kinds, whitish, red, grey, rough, smooth, soft, hard and large, sometimes homogeneous, or of one Substance, sandy, flinty, or like Marble; sometimes heterogeneous, composed of a Cement and Flint; some of them besmeared with Blood, others with a chyly *Mucus*, and others free of both. She had a Difficulty in making Water, but only every tenth Day, altho' once in three Days there were two or three Ounces at most of a green *mucous* Urine drawn off by the Help of the *Catheter*; whereas there was no Supply for it but by Clysters. By Means of these, however, the *sixth* of *April*, the Urine seemed to be attenuated, and she made about three Ounces of a bluish, thin, saturated Urine; but on the *seventeenth* again the Pot was filled with it of a greenish Colour, and one Half of it a greyish Sand dissolved in it. Hence we concluded the Tartar to be dissolved, but we were soon undeceived, when we saw the Pain and Symptoms so increase, as to bring on a *Delirium*, *Stupor*, Laughing and Singing, with a Fever she was not sensible of, and very soon a violent Pain in the Loins, so that she would have thrust a Knife into it herself, if she could

could have come by it. At last, observing the Head so afflicted with these Symptoms, I resolv'd by all Means to strike at the Root of the Disease, and move this Load if possible; for which Purpose, I gave her two Grains of *Mercurius Vitæ* dissolved in cold Spring Water, the *twenty second* of *April*, and three Grains the *second* of *May*, but without any Success, only that it made her throw up about seven Drachms of Stones at two Motions. As her Belly was so constipated, and in order to dissolve the tartareous Matter, and promote a Spitting, the *eighth* of *May*, I ordered her four Ounces of crude Mercury, and the *tenth* six Ounces; but it pass'd again by the *Anus*, partly in the Bed, and partly in the Room: A Quantity of it that was gathered up, I keep still by me. In this State of perfect Abstinence she remained till the *sixteenth* of *June*, when I resolv'd to drench the *Intestines* with a large Quantity of cold Water, with *Sal Polychrest* dissolved in it: I sat by her on the Bed for two Hours, and made her drink six Ounces every Quarter of an Hour, till she had swallowed three Pints of Spring Water; and by holding her Mouth close shut, and restraining the Vomiting, in the Evening she voided a Quantity of very gross hard *Fæces*, which distended the *Anus* so much as to endanger a Laceration. Thus that Solution, which had been tried in vain for four whole Months by various Medicines, was brought about by simple Spring Water only. The *Delirium* now went off, and her Appetite returned; so we continued to use the Water, together with gentle Acids and bathing, but left off the third Day, Nature refusing them. On the *fifth* and *sixth* of *November* she was taken with a Looseness, but not at all violent, attended with Vomiting between whiles, so that she voided Stones both Ways, several of which I have by me, weighing more than two Drachms; and you may easily believe, that those rough, pointed Stones, could not be voided without Blood and a great deal of Pain. In the intermediate Time, that is, in the Month of *September*, as I plied her from the Time that she began to eat a little with Aperients, Diureticks, Emmenagogues and Diaphoreticks, the *Menses* and the same Kind of Blisters as before broke out afresh; whence I should have had some Hopes of a Solution, or *Metastasis* of the Morbifick Matter, if the Symptoms had not hitherto been altogether unaccountable; and as from that Time till the *fifth* of *November*, the Disease continued the same, the Belly was again constipated, the Heart oppressed, every Thing inverted, and the Excrements for the first Time began to be voided upward, all Hopes of a Recovery vanish'd. However, by Means of a laxative Decoction of *Pulps*, this inverted Motion of the *Intestines* was removed, and she was purged the *fifth*, *ninth* and *fifteenth* of *November*. Having recovered her Belly to its usual State, but the Suppression of Urine still continuing, on the *fourth* of *February*, in the Year 1681, Necessity oblig'd us to introduce the *Catheter*, which brought nothing along with it; but immediately after calling for the Pot, she voided, to the Surprise of every Body, eight Pints of a greenish, feculent Urine, with a straining like that in Labour, but without any Stones. Although the Bladder was thus opened, yet instead of making Water in the ordinary Way, she threw up three or four Ounces of fetid

Urine every second or third Day till the *sixteenth* of *May*, from which till the *thirteenth* of *September*, (during which Time she used Baths and drank largely of Water with Spirit of Nitre) she so far recovered as to look florid, eat moderately, and make about three or four Ounces at a Time of a clear yellowish Water, with a thin Sediment, and sometimes mucous and bloody. She went to Stool every fourth Day, but the Excrement was hard and small in Quantity, and she now and then vomited, but did not throw up near such a Quantity of Stones. In the mean Time that Burthen, which hitherto had layen upon the *Oesophagus*, the Bladder now took its Share of, sharp little Stones being frequently voided that Way. The Belly was a little swelled, with a painful Hardness in the left *Hypochondrium*, and right Region of the Loins, and when handled you could hear the Stones rubbing against one another.

From that Time the Patient lived tolerably easy, Nature performing all her Functions pretty well, till the *eighteenth* of *August*, 1682, when she began to be troubled with Pains, Loathings, and Hiccups, but without any vomiting. Upon giving her a Cordial with sweet Spirit of Nitre, the Symptoms ceased till the *twenty-ninth* of the said Month, when she was taken with violent Pains all over her Belly, tossed and tumbled upon one Side and the other, had a Difficulty of Breathing, and hysterick Paroxysms, attended with Belchings, Palpitations and Yawning. I ordered her Anodynes and Antispasmodicks, omitting Clysters, which she had a strong Aversion at, upon Account of the Inversion of the Motion of the Guts. To these Symptoms succeeded next Day Stretchings and Starting of the Limbs, convulsive Motions of the whole *Abdomen*, a Constriction of the Muscles of the *Larynx* and *Fauces*, with Loss of Speech, and at last a Labour Pain expressed with a loud Kind of Hiss, whereby all her Limbs being contracted, she voided a Stone by the *Anus*, belmeared with Blood, which was followed next Day by two more a good deal smaller, attended with a Hemorrhoidal Discharge from the lacerated Blood-Vessels. After this she was, like a Woman lying-in, restored with Broths, assisted with proper Cordials, and the Disease being seemingly overcome, she got healthy and strong again in a few Weeks.

But this Condition of the Patient, more tolerable than the preceding, was changed into a more painful one; for Stones not only heavier, but of a harder Substance and very angular, not bred singly neither, but coming as it were from a Quarry, were voided downwards intirely every three or four Weeks. Her Belly, which before was moderately loose, began to be costive again, and one or two Days afterwards she voided a Stone. She made but little Water, not at all answering to the Quantity she drank, different in its Kinds, sometimes very thick and turbid which seldom was suppressed, and before she made Water after a Suppression, there came away an angular Stone, of the Size of a large Bean, of the same Kind with the others in every Respect. Another Symptom, which before happened only at certain Intervals, now appeared daily, *viz.* in the Morning when she found an Inclination to make Water, presently after a Quantity of it had passed

off by the Bladder, she vomited the rest with great Loathing, to about three or four Ounces, of the same Colour, Consistence, urinous Smell, and even Taste, as she said, with that voided by the *Urethra*; all which was confirmed by a chemical Examination of it. Her Belly swelled, and the Hardness and Noise of the Stones rubbing against one another, were to be observed not only in the left *Hypochondrium* as before, but in all the right Region of the Belly, sometimes however deeper on Account of the Laxness of the Muscles, and a great Pain about the Pit of the Stomach; she eat and drank moderately, but what she took chiefly, was prepared of Liquorice, Grass Roots and Barley, and sometimes a little weak Wine. She started in her Sleep, had the *Menses* seldom and in small Quantity, but they did not quite leave her; her Pulse was languid, quick, and starting as it were, differing according to the different Symptoms; the Respiration free, not strong, but scarce perceivable; and she continued sensible all the while. At last, the *twelfth* of *December* in the Year 1685, she was seized with a Mortification the Length of a Hand-breadth in the right Leg, which was cured by scarifying and other proper Remedies. At present she is troubled with a Bastard Quinsy, owing to an Inflammation of the *Tonsils*, and a good deal of arterial Blood flows from the *Fauces*, perhaps the Fore-runner of some large Stone that is to come away. After trying to bring about a Revulsion by Bleeding in the Feet, and Clysters, there followed, the *twentieth* of *February*, an Evacuation of natural *Feces* by the *Anus*; but the *twenty-third*, they were voided upwards mixed with oily Clysters and a very bad Smell, but without any Stones; whence being afraid of a Suffocation, this Method was left off.

This surprising singular Case has employed a good many Heads to account for it. Analysis teaches us that Stones are generated in the human Body, according to the Laws of the *Macrocosm* or greater World, from active Principles, a connecting Salt, and a Mother Earth and Phlegm, combined variously together. And that they are generated sometimes in the Glandular Parts and *Ducts*, is no new Discovery, as Authors of great Veracity testify, and I myself had Occasion to observe in the Year 1677, in the Case of *Katharine Scartenleib*, a young Girl, who besides Stones, which she had in the Bladder and Kidneys, coughed up a great Number of small *Gravel Stones*, and died of a *Consumption of the Lungs* in our Hospital. On the other Hand, *Katharine Blaser*, in the Year 1680, after voiding a great deal of Sand and Concretions like Lime mixed with *Mucus* by Stool, was perfectly recovered in the same Hospital. Mr. *Jo. W.* one of the chief Magistrates, subject to the Gout, in the Month of *July*, 1683, had both the *Ureters* obstructed with Stones, whereby the Urine being pent up, he died of an Apoplexy, the *seventeenth Day*, of the Disease, neither Bleeding, various Hydragogues, nor Lithonriptick Medicines giving him any Relief. Those Stones I extracted, and found them of quite a different Substance from those of my female Patient, and so impregnated with Oil as not to be dissolved by any acid Spirit. The left Kidney was twice, and the right one three Times larger than the ordinary Size, the Coats being dilated; they were

were distended with *Serum*, and had a great many small, brown, rough Stones sticking in them, which when cut out had a round Point, perhaps made smooth in the Duct, and of the Figure of a small Acorn. And Mr. *Albert Baurenkoningius*, a very expert Surgeon in Town, cut lately from the *Tonsils* of a young Girl, *Mary Haffner*, to the Number of thirty-two Gravel Stones. Besides, there is a History communicated by the celebrated Dr. *Selarey*, of *Gall Stones*, very large considering the Straitness of the *Ductus Choledochus*; and another of a *Jew's Son*, of eleven Years of Age, at *Weinheim* in the *Palatinate*, who passed small Stones of different Kinds, and some of them flinty, both by the *Anus* and *Urethra*. This History was communicated to me in a Letter from Secretary *Zweifelio*, at *Heidelberg*.

But though to outward Appearance they resembled one another very much, yet as they differed greatly in Substance, I examined them physically.

1. By *Solution*: And having poured upon them *Spirit of Sulphur*, *Vitriol* and *Vinegar*, there began a Kind of *Effervescence*, especially in those thrown up from the *Stomach*, which were of a looser Texture and more friable Substance; but it stopt as soon as the acid Particles had entered the crooked Pores of the Stone, and did not dissolve it. The *Spirit of Sal Armoniack* made no Manner of Impression upon it, and in whatever Shape it was tried, remained quite at Rest with it: But the strong *Spirit of Nitre* soon overcame it.

2. By *Distillation* by the *Retort*: These thrown up in Vomiting had a little *Volatile Salt*, *Spirit* and *Phlegm*, a great deal of *Earth*, and almost no fixed Salt; but those voided by the *Anus*, which were of the same Figure and Substance with those which came from the *Bladder*, had more of a *Volatile Salt*, with a little sub-acid *Phlegm*, but a strong urinous *Spirit*, a moderate Quantity of a fixed Salt, and a great deal of *Earth*. Six Ounces of these Stones gave five Ounces and two Drachms of *Caput Mortuum*, hardly half a Drachm of *Lixivial Salt*, five Drachms and an Half of *Phlegm* and *Spirit* mixed with *Volatile Salt*, some Parts of them adhering to the Sides of the Receiver. This Liquor taken all together, and mixed with a like Quantity of *alcalized Spirit of Wine*, and distilled in an *Alembick* with a small Degree of Heat, left two Scruples and an Half of urinous *Volatile Salt* in the Head of the Vessel.

3. By *Precipitation*: The distilled Liquor, by adding *Spirit of Vitriol* to it, was turned into a red Tincture, and at last growing thicker, deposited a Kind of Sediment. But the same *Spirit of Vitriol*, added to the *Caput Mortuum* left after Distillation, or to the *Lixivial Salt*, raised the same Kind of impetuous *Effervescence*, as when it is mixed with Salt and Oil of *Tartar*.

Thus these Stones were composed of a great deal of *Earth*, a small Quantity of a *Volatile Salt*, with a very little acid, which was subdued and elaborated with the *urinous Salt* and *Spirit*, as is plain from the *Spirit of Sal Armoniack*, which is of the same Nature, and being mixed with acid Particles, blunts, sweetens, and combines them, so as they cannot be resolved again.

Hence we may conclude, that the *Lixivial Salts* in this Patient were of the same Nature with the *Salt of Tartar*, and a *Matrix* being found, and an incorporating Acid meeting with it, they formed these after the *Effervescence* was quieted, in the same Manner as the *Spirit of Vitriol* by penetrating the *Salt of Tartar* with its sharp and flexible Particles, destroys it, but at the same Time combines and converts it into something of its own Nature. It had no Effect upon these Stones, as they were already concreted; but a fixed Salt, which has its combining Particles carried off by the Fire, it reduces to its own Nature, and makes it concrete. On the other Hand, the *Spirit of Nitre*, though it is likewise acid, yet being combined with a very subtile Salt composed of very rigid, penetrating and inseparable Particles, not only dissolved all by one Quality, but hardened the Reunion by another; because its rigid Particles, which were continually in Action, would not become pliable, so as to combine the Salts that were divided into another Nature.

But the urinous Spirit of *Sal Armoniack*, which is very like these Volatile Salts, but produced from fixed ones, not only remained quiet with the Matter of the *Calculus*, but united closely with it.

Hence we see, that these *Calculi* differ very much from the Stones sent from the Kidneys, not only in the Place, but in the Manner that they are generated; those of the Kidneys being formed from the Particles of *Serum* being either too rigid, or too large with Relation to the Pores of the Kidneys, and so by Degrees obstructing these Pores in such a Manner, as to allow only the slippery watery Particles to slide off, while the Volatile Salts swimming with the *Serum* are insensibly involved in it, and at last form a Stone. The first of which is confirmed by Experience in old Men, who having the Humours more thick, and the Vessels less pervious, are very subject to this Complaint. The last again is confirmed by Distillation; for by diminishing these Stones so as to make them enter the tight Neck of a Retort, there comes off an urinous Spirit with much Volatile Salt and some Oil, and the Stones remain in the Bottom of the Retort unchanged in their Figure, but by being moved, they easily fall down into Ashes, and are again easily converted into *Calculi* by pouring upon them the Liquor that was distilled from them. From which the Quantity of the *Volatile Salts*, and how they combine the other Parts of the Stone together, very plainly appears.

But where, and after what Manner, the small Stones and tartareous Gravel are generated in our Patient, as she is still alive, can scarce be guessed at here, unless some Allowances be made for Conjecture.

The *Blisters* under the Scarf-Skin, full of a *limpid Serum*, collected there from the cutaneous Pores being obstructed, and the subcutaneous Glands not allowing it to go backwards, were owing to the Impulses of the Blood, and not to its being at Rest; for as soon as it appeared to be coagulated, it no longer produced any Blisters, and besides that Concretion must hinder its Motion. But that sharp corrosive Quality and usual Inspissation of the Humours, is an Argument of an Acid predominating in the Body. And

the Nature of this Acid is very difficult to find out, seeing by the least Addition, Diminution or Motion the Humours are altered, as is evidently seen from the Blood being generated from Chyle, *Lymph* from *Serum*, and *Aqua Regia* from *Aqua Fortis*, and from other natural Mixtures. Those Humours being variously and vitiously altered in their glandular Receptacles, and Places where they are secreted, produce Coagulations, when by stagnating the spirituous *Alkali* is exhaled, whereby they are inspissated and become acefcent: In the same Manner as Wine, which is analogous to Blood, after the sulphureous Particles which were incorporated with the Acid fly off, is presently converted into an *Acor*. And certainly what constitutes Sweet or Acid, is nothing else, than a smaller or greater Proportion of acute Particles mixed with the others, and a Retarding of their Action, as in *Sugar*, *Honey*, &c. Hence the Blood, although it is inspissated, tastes sweet upon the Tongue. Nay, they even affect the Touch as they are more or less in Quantity, there being but a small Difference between Titillation and Pain. The Glands therefore, especially those of the lower Belly, the Receptacles of the *Lymphatick Serum*, or of its Acid in this Case, are deservedly to be blamed for that Fault, whereby the Humour, already heterogenous, hardly passes through its *Ducts*, and being thick passes slowly from the *Pancreas* to the *Duodenum*, and is rendered more acid. Hence the Cause of the Disease is rather to be attributed to these than to the *Uterus* (for naturally without Impregnation, the *Menses* are not suppressed before old Age comes on) which in this Patient betrayed the first latent Effects, whence the Blood stagnating contracted a greater Taint, and nourished greater Commotions; for subordinate Causes are not to be blamed here.

But the sudden Disappearing of the Blisters may very well be attributed to the Resolvent Volatile Medicines, by which we endeavoured to remove the Obstructions. For by these Remedies there was not only a free Reflux allowed to the resolved Humours by the *Duct* of the *Glands* now cleared from Obstructions, but the *Pancreas*, the great *Receptacle* of *Pblegm* or *Pituita*, poured out its contained acid Humour with Force into the *Intestines*, there to be mixed with the viscid *Chyle*, and afterwards with the whole Mass of Blood, and so produced a morbid Disposition in the Humours, which has continued till now. And indeed the Chyle can scarce be otherwise, considering its Principles, seeing the Patient is obstinately given to drinking large Quantities of Water, in order to suppress the violent Heat of her Bowels. For though the Waters here are very wholesome, yet when taken in too great Quantity they may produce Obstructions in the *Glands* and *Ducts*. But how much the Bile contributes to this Putrefaction, or whether it has any Hand in it at all, can hardly be discovered, seeing it abounds with a Lixivial Salt, which was not to be found in the Stones. From what has been said, it appears that the *Stomach*, *Intestines* and *Glands*, were the principal original Places where these Stones were formed, though they were formed in the *Bladder* too, but not originally generated there. For the Urine, thus infected by the Taint of the first Digestion, and being an Excrement of the second, impregnated with a great deal of Acid Salt
and

and thick Phlegm, by stagnating in the Bladder, produced Concretions there; whence both the *Mucus* and *Calculi*, without Admittance for any Thing besides, or the Hope of resolving them.

But whereas formerly she vomited up small *Flints* and various Kinds of *Cement*, and has thrown up nothing at all since, the Cause of this Phenomenon lies concealed in the Body; but the Force of Waters in producing and incorporating Stones is different, according to the Diversity of the Subject that it occupies.

The *Weight* of them is known from our having preserved them; for the Cause continuing still to act, and the Subject still disposed to be acted upon, of Consequence the Effects must be continued, so that at present they exceed ten Pounds. Those which were first thrown up in vomiting, which were of a different Substance from the *Tophi* in gouty People, and less compact in their Texture, the Air did not dissolve, as it does such as have subtile Salts, by its Moisture, but by moving their slender and less implicated Angles, insensibly reduced them to a very fine Powder: The same as we see happen to white Vitriol, dry rotten Wood, and other Bodies, from the Air. But on the other Hand, rectified Spirit of Wine, easily entering the slender Pores, and not vibrating like Air, supported the undisturbed Fibres or Particles.

As to the *retrograde vermicular Motion of the Intestines*, this plainly must be owing to some of the larger Stones sticking in the narrow Passage of the *Cæcum*, between the Extremity of the *Ileum* and the Beginning of the *Colon*; whence the muscular Fibres of the Intestines being retracted, their Peristaltick Motion must necessarily be inverted, and by such a violent Cause as that of *Calculi*, the *Valve* of the *Cæcum* might either be pushed back or entirely broke. This Passage then being laid open, why might not the stimulated Intestines push the Clysters upwards without any hard Excrements? As you sometimes see in cholicky Patients, the *feces* sticking in the Cells of the Intestines so much hardened, as that after they are voided they can hardly be dissolved by boiling, far less by Clysters. It is equally surprizing indeed, that this should have happened, and continues so to do in the Intestines crammed as it were with Stones; but if you only observe the Variety of Figures in those Stones; you will see that they are not conformed to the Cavity of the Intestines, but every where laterally, and even through the very *Foramina* with which some of them are perforated, there is a Passage left both for the Descent of the Chyle, and the Ascent of the Clysters.

Daily Experience teaches us, that the Colour and Composition of the Urine vary, according as it is more or less in Quantity; but it is not easy to account for that bluish Pellucidity of the Urine, contrary to the Order of Nature, still increasing; for the Urine, is more or less tinged according as it is more or less saturated with Bile, or it is thickened by the Admittance of various heterogeneous Particles, or from the spirituous being exhaled, whereby it is rendered opaque and virulent.

The Excretion of the Urine was hindered by the *Mucus* in the Bladder, glewing as it were the Neck of it, but we are not to imagine that the Bladder could contain eight Pounds if it had not been preternaturally distended, as I observed in a Girl, *Johanna Heuschler*, in the Year 1672. I was called to her as an *Ascitick* Patient, but inquiring into the Cause of the Disease, I found the Cause to be an Inflammation in the Neck of the Bladder; wherefore I ordered, some *Anodynes*, and afterwards the *Catheter* to be introduced, whereby an incredible Quantity of Urine, *viz.* more than nine Pounds, was drawn gradually off, and the Swelling of the Belly subsiding, she recovered very well. But that too great a Quantity of Water may be collected not only in the Bladder, but in the Kidneys and elsewhere, is plain from the Case of *J. W.* above related. Hence it might possibly happen, that the redundant Urine might make its Way through the Mouth of the *Calciack* Vessels into the Cavity of the Stomach, but to those who examined the Thing more narrowly it appeared, that even when the Urine was not exuberant, it was thrown up that way sometimes quite pure, and sometimes mixed with a Portion of Chyle and Aliment. And if any Body will but seriously examine the above Case, he will find that even before that Symptom of vomiting Urine first appeared, there was nothing given to the Patient that could communicate an urinous Taste to the Contents of the Stomach, and much less afterwards; nor in a Redundancy of Urine does Part of it always make its Way through the Blood Vessels. From all which, something may be conjectured to have happened in this Patient contrary to the Laws of Nature, and perhaps the Cause of the Generation of the *Calculi* being still continued is not yet discovered, seeing the Stomach is daily clogged with new Gravel and a perverse Ferment of the Humours; otherwise it must have been altered long ago by Medicines. This brings to my Mind a Case, which fell under my Care in the Year 1677, *viz.* *Eve Luber* a Citizen of *Bern*, forty Years of Age, in a violent straining in Labour, while the Bladder was distended with Urine, and strongly compressed by the *Fætus* making its Way out, had the *Urachus* burst, so that she voided the most Part of the Urine by the Navel during the whole Time of her lying-in; but at last it cicatrized, and the Urine passed again in the natural Way. But from those *Phenomena* which are natural and quite evident, there is nothing to be concluded with respect to such as are preternatural and occult.

As to the Affair of *Abstinence*, our *Lentulus* has treated on it in a Treatise which he dedicated to *James I. King of England*; but as neither the Cause of Perspiration nor the Circulation of the Blood was known at that Time, he reasoned variously about it. But reflecting upon this, that Men transpire, and that in Proportion to what is lost, fresh Nourishment must be supplied, it was found out by *Staticks*, that there is more sent off from the Body by *Perspiration*, than by all the other sensible *Emunctories* taken together. As a strong labouring Man in constant Exercise, takes every Day, for Example, *eight Pounds* of Aliment, *three* of which, or at most *four*, he voids by *Stool* and *Urine*, and yet after the Digestion is finished he

weighs no more than before he had breakfasted; hence it appears, that by Digestion the Aliments are attenuated so as partly to be converted into animal Spirits, and partly to fly off by Perspiration. And the great Waste even of the nutritive Particles sometimes this Way, appears from the daily decaying of hectic Patients. In this Case therefore, as the Perspiration was stopt from the *Epidermis* being obstructed, there was no Need of Nourishment. On the other Hand, there was a Necessity for the Air's being received into the Lungs to recruit the animal Spirits, that it might be sent out again, and thereby preserved in Motion. And this same Air taken into the Lungs in Inspiration, being there thickened, and turned into *Serum* in the Vessels, afforded a Supply for the Urine during the Time of Abstinence; as we frequently see *Hydropick* People increase in their Bulk from the Air only, that is, from the watery Particles contained in it.

2. Two of these *Stones* being sent to the *Royal Society* by Dr. Sig. Konig from *Bern*, in order to the better Inquiry into the Nature of this *Helvetian Concretion*, I made it my first Attempt to compare it with its *relative Pondus* to *Water*, having satisfied myself that there is a *Standard of Gravity* so competent to all real *Stones*, that where they decline from this *Standard*, we have good Reason to question those *Concretions*, whether they are *Stones* or no. The *Standard of Gravity* for real *Stones*, I find to be generally about 2 to 1 of *Water* and a little more. This *Concretion* was very hard, and seemingly heavy, but it was really very spongy; for when it lay under *Water*, there passed a good while before I could clear it of the lurking Bubbles, so that it grew heavier from time to time as the Bubbles were expelled, and at last arrived near the *Standard* of a true stony *Concretion*, or rather somewhat beyond it. It weighed in the Air 12 *Dr.* 36 *Gr.* In *Water* 6 *Dr.* 48 *Gr.* The Difference 5 *Dr.* 48 *Gr.* Therefore the Proportion betwixt this *Concrete* and *Water* proves to be as 217 to 100. This extraordinary *Pondus* gives Reason to suspect, that there may be some metallick Ingredient in it.

*An Examen
of these
Stones; by
Dr. Fred.
Slare. lb,
p. 103. n. 182.
p. 140.*

Whilst I was making these Trials, I was willing to compare this Matter with common *Chalk*, which I found *specifically* lighter, bearing only the Proportion to *Water* of 180 to 100. Wherefore this Substance being so much heavier than *Chalk*, can scarce be thought a *Concretion* of such a Matter.

I then compared it with *petrified Water*, being an *Icicle* that was broken off a *Grotto*, where a petrifying Spring did furnish enough. A Piece of which, of 5 *Dr.* discovered its Weight to bear the Proportion of 219 to 100, to that of *Water*. Our anomalous Substance being so near the Weight of *petrified Water*, would almost incline a Man to believe it a real *Stone*, and the rather, because we are informed the Patient drank much *Water*. Moreover, the following Experiments upon this Matter do seem to give Proof of its being rather of the ordinary stony Constitution, than of that which is proper to *Animal Concretions*. For Instance, we first of all poured upon it ordinary *Vinegar*, and it presently wrought upon it with a hissing Noise, as it did on the *petrified Water* when powdered. We

poured on it *Spirit of Vitriol*, and that also wrought upon it, and dissolved it, but let it fall again, as *Aqua Fortis* does *Tin* when it has corroded it. *Spirit of Salt* wrought upon it very vigorously, and presently dissolved it, and kept it so without any *Precipitation*. These Experiments do also distinguish this Concrete (whatever it be) from the ordinary *animal* ones, as the *Stone* in the *Bladder*, *Kidney*, the *Tophi*, &c. for these will not be dissolved, or in the least corroded by any of the mentioned *Acids*; though *Spirit of Nitre* be a general *Menstruum*, that dissolves them all readily. And there are some Things yet very strange, which makes this Case peculiar; namely, that those *Stones* which are generated in the Habit of the Body, I mean, in the very ferous Part of the Blood, and those that passed the *Bladder*, have just the same Nature with those that are *extra Habitum*, even those evacuated *ex Stomacho* and *ex Ano*; for one as well as the other will be presently corroded by so mild an *Acid* as plain *Vinegar*.

The Relator, in his *Analysis* of these *Stones*, gives an Account of so great a Quantity of *volatile* and *fixed Salt* obtained by his *Distillation*, that those Trials do necessarily make it an *animal* Substance; but that Experiment so far failed us, that I am not satisfied as to the Matter of Fact: For that those Concretions generated *extra Habitum*, in the *Stomach* and *Guts*, should abound with *volatile Salt*, is strange, for I have tried the *Bezcar Stone*, said to be generated in the *Stomachs* of some *Animals*, and could obtain no *volatile Salts* from that Substance; though it herein agrees with this Substance, that it is easily wrought on by many *Acids*.

We may in some measure question that Principle, or rather *Hypothesis*, of *Acidum*, our Correspondent trusts to, for the Combination or Coagulation of the Humours in the Body, in order to this *Petrefaction*, it being supposed, not proved. We may also question whether the *fixed* or *alkalizable Salt*, found in the *Caput Mortuum* after *Distillation*, were really pre-existent in that Form in the Blood, or other Humours, and not rather a Product of the Fire.

3. We brought this *Stone* to a gross Powder, and conveyed it into a coated *Retort*, which coated *Retort* was kept for some Hours in a naked Fire, so hot that the Glass melted. The Quantity we put into the *Retort* amounted to $\frac{1}{2}$ Ounce and 20 Grains. The Liquor that came over seems scarce to afford 3 or 4 Drops, which looks like *Spirit of Harts-Horn* rectified, and smells much like the same; which plainly discovers it an *animal* Substance, though it affords much less than the *Calculus Humanus* does; and by Consequence gives us a much larger Proportion of *Caput Mortuum*, or *Residuum*, in the *Retort*: All which is very consentaneous to the Nature of the *Stone*, for its *specifick Gravity* was much heavier than the *Stones* are we usually find in the human Body; and therefore the Parts may be supposed more fixed, or to consist of fewer *volatile* Parts, such as are carried over by *Distillation*. We weighed the Remainder in the *Retort*, and it came to 3 Dr. and 50 Gr. 10 Gr. of which seemed to hang about the Neck of the *Retort* in the Form of a dirty hard-baked Oil. The other 20 Gr. are partly gone off in Vapour through the *Lute*, and what we find in the *Receiver* in a liquid Form.

A further
Trial; by Dr.
Fred. Slare.
ib. p. 145.

We

We tried part of this *Caput Mortuum*, by applying Mr. Haak's strong Magnet, to enquire whether it contained any Iron Particles, but did not find any would adhere. But since Dr. Lister has found them in much lighter Concretions, than those of the Kidneys are; and many Bodies, though not till after Reverberation, or a strong Calcination, have detected an Iron Con-
 texture; and even the *Marchasite* itself, though very pregnant with Iron, shews it not, till it has been calcined; there remains yet one Trial to be made, and that is to give it a much stronger Reverberation in the Fire, and then to see whether some Particles will not prove martial.

Ib. p. 143.

Ib. p. 145.

XCI. I. It is generally observed by those that have been subject to the Stone in the Bladder, that Pains in the Kidneys were antecedent, which intimates the Foundation was first laid there, and afterwards by the Ureters, and a Gush of Urine conveyed into the Bladder. The Manner of its Growth in the Bladder is obvious; the Urine (by some called *Lotion*) being too highly satiated or impregnated with a ponderous Matter (which we here design to examine) precipitates the same at certain times upon the mentioned Basis, and also on the inward Superficies or Coat of the Bladder, which upon a Relaxation of their distended *Fibræ*, do strictly embrace that preternatural Substance it finds there, as to overlay it or cloath it with whatever Sediment subsided there.

The Production of Stones in Animals; by Dr. Fred. Stare. n. 157. p. 523.

That the Urine, only at some Intervals, is disposed to let fall this Matter, seems probable from this Observation, That the Concrete consists of several spherical Superficies, or round Incrustations, which, like so many distinct Shells, may be parted from each other. Moreover, these Incrustations are observed to be very unequal, some much thicker than the other: An Argument that the Urine continued much longer disposed to depose this calculous Matter at one time than at another; or else that it was much more satiated or abounded with this ponderous Precipitate at one time than at another, and so laid it over with a thicker Crust in as short a Time.

If we examine the Causes that have been assigned to the Production of this Concrete, I think we cannot well grant Heat in the Kidneys to be a probable efficient Cause; a much more intense Heat than is possible to be found here, being necessary to make Bricks, or bake Sand and Earth into Stone. Nor is it necessary to derive the material Cause from such a slimy and ropy, or mucilaginous Indisposition of the Humours, that may perhaps coagulate and harden into a Stone; such a viscous Urine being less apt to precipitate this gritty Matter than more thin and limpid Urine. For I have found in more than one, where the Urine has often been so ropy and stringy, that it would draw out into Threads upon the Application of a Stick; but yet we never discovered Symptoms of the Stone in the Kidneys or Bladder of such Persons. Nor do I believe that an Acid meeting with some Alkalies may be reasonably concluded to constitute this so firm and solid a Concrete, since nothing that I know of but Acids will make the least Solution. We may also except against the Experiment of Coagulation, upon the Mixtures of highly rectified Spirit of Urine and Wine, which, if warily managed, will make a Coagulum with such Expedition as seems very strange and

and

and surprizing; for this *Concretion* will easily be dissolved by Water. In like manner, if either of the *Spirits* be very *phlegmatick*, there will follow no *Coagulation*; infomuch that the Humours of the *human* Body contain too much Water in them to admit such an Effect, even in those Constitutions that have used themselves to very highly rectified *Spirits*. Moreover *Horses*, *Dogs*, and other *Animals*, that drink no *Wine*, are not free from this gritty *Cementation*. Nor could I ever discover any Drop of *vinous* *Spirits* afforded upon our *Distillation* of this Matter. We may also question the *Hypothesis* of the Production of the *Stone* by *Petrefaction*. Stones are such fixed Bodies, that they yield nothing upon *Distillation*, except a small Quantity of insipid Water chance to rise; nor will they *exhale* very much in an open Fire; whereas we can *volatilize* 6 Parts of 8 of our *calculous* Matter, and obtain *Salts* and *Oils*.

The *Chymists* describe the *Concretions* of the Body, and particularly this morbid one, by calling them *Tartareous*; who conclude they have sufficiently accounted for the Nature of a Body, if they can but call it *Tartar*, which must be acknowledged to consist of *acid* and *fixed* *Salts*, called *Alkalizate*, and of some *Terra Dammata*, though it be very little in Proportion to the other *Salts*. But there is little Reason to eclipse its Nature by that Denomination, as appears by these following *Analyses*. We *distilled* an Ounce of *Calculus Humanus*, that was recently cut out of a Body, which afforded about 2 *Dr.* of a brown *Spirit*, nearer to that of *Harts-Horn* than *Urine*. We put the *Caput Mortuum* upon the *Cuppel*, and reduced it to near a *Dram*; the rest burning and smoaking away. Another time, we *distilled* in a naked Fire a *Stone* that weighed 2 *Ounces*; the Vapour came over upon a good *Strefs* of Fire, and settled in the Form of *Salt*, without any *Liquor*, of which we preserved only a *Dram*; it appeared very brown, and tasted bitter, as the *fætid* *Oil* of *Harts-Horn* and other *empyreumatical* *Oils* do. We examined by *boiling* and *evaporating* Water from the *Caput Mortuum*, whether it held any *fixed* *Salt*, but found none. The *Caput Mortuum* weighed 1 *Ounce* and 6 *Dr.* so that it lost only 2 *Dr.* in the *Distillation*; that is, only 2 *Dr.* came over the *Helm*. We proceeded farther, and placed this *Caput Mortuum* upon a *Test* in an open Fire, where it burnt away to 2 *Dr.* 44 *Gr.* This we also *boiled* in Water, to see what *Salt* it held; but it scarce afforded a Taste of *Salt*, scarce surmounting that we usually find in the like Quantity of common Water. In this *fery* *Trial*, an *Ounce* and 3 *Dr.* of the 2 *Ounces*, *evaporated* in the open Fire (a material Circumstance which *Chymists* rarely enquire after) of which we have no Account. I endeavoured to save some of it, by placing a taper Chimney or Tunnel to receive the Smoak, as the Fire and a Pair of Bellows raised it, which so far succeeded, that I caught above 2 *Dr.* of this fuliginous Substance, and some Drops of a *Water* of a *fætid saline* Taste. The Smoak of our common Fires gives us a *Sublimate*, whose *Chymical* Principles are no less considerable than the Bodies from whence they ascend; for I lately found them not only to contain *volatile* *Salts*, *Oils*, and *Phlegm*, with other things, but even a *Salt* so near to common *Sea-Salt*, that it shot into cubic Figures, much like to that

we have obtained in *Analysis* of *human Urine*. But, because it may be objected, that that *Salt* might probably be nothing else but the common culinary *Salt* we constantly take in with our Food, I *distilled* the *Urine* of *Horses*, that were fed with Hay and Oats, and have obtained the same sort of *Salt*.

If we now compare this *Concrete* with *Tartar*, we find the one a *vegetable Salt*, wholly dissolvable in Water; the other so stubborn, that several very corrosive *Menstruums*, that will easily dissolve Iron, and Copper, and Silver, and almost any thing, will not make any Impression here. The one affords a little *volatile Salt*, which is *alcalizate*, and no *fixed Salt*; the one affords much more earthy Substance, called *Terra Dammata*, than the Hoofs or Horns of Animals, &c. and the other leaves us scarce any: One abounds with an *acid Salt*, which is sensible to the Palate, and very manifest in the *Spirit* of *Tartar*; but in the other we could discover none upon the narrowest Search.

The Notion of presuming this *calculous Matter tartareus*, has put Men upon using Medicines to destroy *tartareous* Concretions, as well as avoid many Things that seem to have *Tartar* in them; and yet at the same time, perhaps, it may be as inoffensive as some of those Medicines that are substituted, at least, as *Spirit* of *Salt*, or *common Salt*, commended by *Helmont*. In like manner the Notion of *Petrification* (which seems from whence the *Stone* derives its Name) may be no less erroneous; there being no Agreement or Analogy in their Natures, whether we consider them *synthetically* or *analytically*. If we consider *Stones in Composito*, there is a particular Weight or Gravity belonging to their Bulk, in which they *specifically* agree. Several Sorts I have weighed according to the *hydrostatical* Laws, and I find them agree in being twice as heavy as their Bulk of Water, and about a fourth Part more. This I found true in *Wood*, *Bone*, and *Shells*, when *petrified*, and even Water it self, and some other Bodies, though never so light in their former State, as soon as they have obtained the Form of Stone, they all become of the mentioned Weight, or very near it. But this, which is called the *Stone* of the *Bladder*, is much lighter, and several of them agree in being only as heavy as their Bulk of Water, and a fourth Part more. This yields to none but the most potent *Acids*, and particularly to *nitrous* ones alone, the other is dissolved by almost any slight *Corrosive*. The one in our *Analysis* affords various constituent Parts; and the other, upon *Distillation*, only a Drop or two of insipid Water, the rest remaining fixed.

But this *Concrete* may perhaps owe its *Origin* to a very soft and thin Fluid, more remotely to the *Chyle*, strained through the *Guts*; and yet nearer the Matter, to the *Blood* itself; but nearest and immediately to the *Serum* of the *Blood*, which seems to be its proper *Vehicle*. And we shall be less surprized to derive such firm and solid Productions from Fluids, when we consider that there are Particles floating in the *Blood*, always disposed to be converted into *Gristles*, or to make up the solid *Skull*, *Nails*, *Bones*, &c. and that even the *Teeth*, whose Texture is very firm, are made and supplied out of the soft Fluids of the Body. Even some of these solid Parts of the Body may, by a *Disease* of the *Blood*, be abraded, and absorbed by the common Fluid, and precipitated by their own
Weight

Weight upon the *Pelvis*, or else stick in the *Tubules* of the *Kidneys*, and so choak them up, and by degrees extend them to Rupture, or grind them to Pieces by a constant Impulse of this gritty Substance, which may at last convert the greatest Part of the *Kidneys* into this firm *Concrete*. Moreover, without any Respect had to these solid Abrasions, the Blood itself (of which the *Serum* is a great Part, and with which it is intimately mixed) consists of heterogeneous Particles, of so various Forms, Sizes and Shapes, which seems necessary for their accommodating themselves to all Parts, that even these designed to constitute the solid Parts, may suffer such irregular Changes in the Body, which may unfit them to pass the *emulgent Vein*, and so to continue their *Circulation*: Insomuch, that the continued Impulse of this Matter by the *Artery*, may make very considerable Aggregates or *Concretions* in the *Kidneys*: And not only so, but without either respect to *Vein* or *Artery*, the *serous* or watry Part of the Blood, which we said before was the *Vehicle* of the *Stone*, may have imbibed such heterogeneous, gross and ponderous Particles, as may, whilst in Motion and Agitation through the *Veins* and *Arteries*, fluctuate and mix well enough together, but may very easily separate upon the least *Stagnation*. Thus the various Mixtures in a *Torrent* seem to make up one homogeneous Fluid; but if some Part of this Fluid happen to fall into a Pit, or *stagnate* in a quiet Place, we shall find it clear itself of *Sand*, *Mud*, and other differing Parts.

That the *Nature* of this *Concrete* seems rather referable to *Bone*, than to any other consistent or fluid Part of the Body, I concluded, by comparing their *chymical* Products. Having cleared the *Bone* of *Marrow* and *Fat*, by boiling it in Water, I *distilled* it, and obtained about 2 *Drams* and an half from an *Ounce* of *Bone*, of a *volatile* Liquor impregnated with *Salt*, that smelt very much like that I have mentioned; which was very differing from Spirit of *Urine*, and nearer that of *Harts-born*: I found the *Caput Mortuum*, as to Weight, very consonant; and also could extract no manner of *Salt* from it. For which Reason *Refiners* make their *Cuppels* of *calcined Bones*, they being forced to *dulcify*. (which they call washing out the *Salts* of) other *Asbes*, before they can make *Cuppels* of them. Last of all, it herein also agrees with the *Calculus Humanus*, vulgarly so termed, that few *Acids* will dissolve it, excepting those that are *nitrous*, nor do these work on it very vigorously. But herein they must be allowed to differ in their *specific Gravity*; the *Calculus* not having so close and compact a *Texture* as the *Bones* have. For *Bones* I have found twice as heavy as their Bulk of Water.

Several Comparative Experiments made upon Stones, and other things. *Ib.* p. 532.

Several *Stones* of the *Bladder* and *Kidneys* were *distilled*, and all afforded *volatile urinons Salts*, which ferment upon any *Acids*; *Bones* were *distilled* and found to be of agreeable Principles: *Petrified Water* affords only fresh and clear Water upon *Distillation*.

Calculi examined *hydrostatically*, were found, in Proportion to their Bulk of Water, as 5 to 4; *Flint*, *Chrystal*, *Petrified-Water*, *Welsh-Diamonds*, *Petrified-Wood*, almost as heavy again as our *calculous* Matter; and *Bones* twice as heavy as Water.

Bones were not easily wrought on by common *Acids*, only by *nitrous* ones, and that without *Ebullition*. And various unsuccessful Attempts were made to dissolve the *Calculus* by *acid* and *acrimonious Menstruums*, whereof some were *Vegetable*, and some *Mineral*; as *Spirit of Salt*, of *Vinegar*, of *Venus*, *Oil of Vitriol*, &c. also with *Alkalizate Acria*, as *Sal Fraxini* (which corrodes *Glass*) *Lapis Infernalis*; but none would touch it except *Nitrous*.

2. The different *Texture* of Parts in one and the same *Stone*, observable in most of this Kind, if they be of large Size, proceeds, I am apt to think, from the same constant *Bed* or settled *Posture* of the *Stone* in the *Bladder*, whereby some Parts of it are more exposed to imbibe the *Moisture* of the *Urine*, as it falls or settles in the *Bladder*, than others; and by this Sort of *Maceration* are kept soft; whilst those Parts that lie higher, towards the upper Region of the *Bladder*, remain dry, harden, and gather a sort of gritty *Crust*; as we find most soft *Stones* do, that are dug out of the moist *Earth*, when exposed a while to the dry *Air*.

The Generation of the Stone; by Dr. Tho. Molineux, n. 202. p. 818.

It seems to me very probable, that *Stones*, when they come to be of a large Size, keep much one and the same *Posture* in the *Bladder* at all Times, there not being room in so pliant and membranous a *Body*, that always contracts itself to the least Dimensions it can, to allow a *Stone* of any considerable Bulk (for the *Case* is different in those that are small) to tumble or change its *Situation* very much.

But however this *Conjecture* may prove true or false, it is undeniable, that some *Stones*, from their *Way of Generation*, must of Necessity remain fixed and immoveable in the *Bladder*; being closely joined and united to the very Substance of its *Membrane*: Of which Sort there are several Examples recorded by *Schenkius* and other Collectors of Observations. And I am persuaded, that that *Stone* which I described above, may be reckoned amongst them: For about the larger End, where it is marked *d d d*, there still closely adhere several thin *Films* and *carneous Filaments*, which manifestly shew it was formerly united by this Part to the membranous Substance of the *Bladder*, and that lately by its own *Weight*, or some other Accident, it was torn away, and fell into the *Urethra*, through which it was voided; and hence it was that this *Woman*, as she herself told me, never suspected herself, till very lately, at all troubled with the *Stone*.

Vid. Supr. Sect. LXVI. Fig. 39.

XVII. Amongst the two vast Collections of *Stones*, that amount at least to several Thousands, kept together in the Hospitals at *Paris*, *L'Hotel Dieu* and *La Charité*, not one in a Hundred is taken out of a *Woman*. This must certainly proceed from the *Urinary Passage* in this Sex being shorter, larger, and more apt to dilate, than that in *Men*; so that for the most Part, when *Gravel*, or a sort of viscous clay Matter, which I take to be the chief Cause of the *Generation* of the *Stone*, falls into the *Bladder*, it is suddenly and easily discharged, e'er it can cohere together, and form a *Stone* of any large Bulk; which cannot so frequently happen in *Men*, by reason of the *Narrowness*, *Crookedness* and *Length* of the *Passage* of the *Urethra*.

Stones extracted from Women, without Cutting; by Dr. Tho. Molineux, n. 203 p. 817.

ib. p. 820.

Vit. Sup.

ib. p. 821.

However, it sometimes comes to pass, that even in Women, either from a more depending, or less elevated Posture than usual in their *Bladder*; or that the Matter forming the *Stone* adheres to some Part of its Membranes, so that it cannot fall into the *Urinary Passage* till its own Bigness or Gravity forceth it thither, *Stones* of a very considerable Bulk are generated. But the many Instances we meet with of vast *Stones* spontaneously voided, are so many Arguments from whence, I think, one may reasonably infer, that no Woman need to be obliged ever to undergo the painful and hazardous *Section* of the *Stone*. For since Nature, by her own Power, without the Assistance of any Help or Remedies, can disburthen herself, and force away such large *Stones* as those described by several Authors, we may probably conclude, that even those still larger (if there be any such bred in Women) may be brought away, by putting the Body into a convenient Posture, and so by the Hand and Fingers forcing the *Stone* into the *Urinary Passage*, which by Application of relaxing and strongly emollient Remedies, may be so dilated, as to give a free Passage to the *Stone*, without any forcible *Section*.

The Practicableness of this Method hath been successfully demonstrated by Mr. *Thomas Proby*, an ingenious *Chirurgion* of *Dublin*, in three Instances of *Fæct*.

Fig. 44.

1. The first Instance was *Sarah Cook*, a Child about 6 Years old, who for some Years had been so miserably afflicted with the *Stone*, and a perpetual *Incontinency* of her *Urine*, that her Parents, at any Hazard, were willing to attempt relieving her of so violent a Pain, and so foul a Distemper. Whereupon, *June 8, 1693*, the Child being placed in a convenient Posture in a Man's Lap sitting across a Table, with her Arms tied down to her Legs by a Sort of Bandage usual in these Cases, the *Chirurgion* first passed his *Catheter* into the *Neck* of the *Bladder*, that it might empty itself of all *Urine*, before he inserted his *dilatatory* Instrument, or his *Speculum Vesicæ*, as one may call it, with which he extended the *Urethra* as much as possible he might with Safety, and without putting the Child to extraordinary Pain: Afterwards, by Help of a *Director* and *Forceps* gently thrust into the *Bladder*, he brought away the *Stones*, without any manner of *Incision*, in about 3 or 4 Minutes Time from the passing in of his Instrument, and put the Patient to so little Pain during the *Operation*, that when it was over, and she laid quietly a-bed, she slept, without any *Opiate*, 7 or 8 Hours together, as she had not done many Months before; and was in a short Time perfectly well and at ease.

Fig. 45.

2. The second Instance was *Eliz. Mortimer*, about 10 Years of Age, who had been troubled with an *involuntary* distilling of her *Urine*, and other painful Symptoms of the *Stone*, for these 3 or 4 Years past; but on *June 12, 1693*, she was happily relieved by the *Extraction* of a large *Stone*, near as big as a Pigeon's Egg, after the same Manner and Method as before described, and with as good Success, though not altogether with as quick Expedition.

n. 236. p. 11.

3. I have been still more confirmed in my Opinion of the Reasonableness of this Method, by several other successful *Operations* I have seen of the like

Kind ; but more particularly, by one lately performed in *Dublin* on *Sarah Jones*, a Girl between 11 and 12 Years of Age, that for 6 Years had been severely afflicted with all the painful and usual Symptoms of the *Stone* : But *Oct.* 16, 1697, she was happily relieved, by only *dilating* gently the *Neck* of the *Bladder*, and then *extracting* a *Stone* of a very considerable Bulk, without making any *Incision* at all. The whole Operation was performed in 6 or 7 Minutes.

By the extraordinary large Size of this *Stone*, it may seem almost incredible, that a Solid of that Bulk should be forced through the *Urethra* of so small and so young a Child, without any manner of *Section* ; and that the Child should recover so as to be perfectly well, without the least ill Accident succeeding the *Operation*. But we may gather hence, of what vast Extension this *Urinary Passage*, though naturally strait, is capable ; and how much still wider it may be dilated where it is proportionably larger, I mean of those of this Sex of riper Years, or grown up to Woman's Estate ; who may yet more easily and safely be relieved after this Manner, even of *Stones* of a much larger Size than this we here speak of.

Fig. 46.

The *French*, a Nation certainly very subject to the *Stone* in the *Bladder*, and whose *Chirurgions* therefore must of Necessity be very conversant with this Disease, and expert in the *Operations* requisite for the Cure of it, have, I see, lately established this Sort of Practice ; though I must needs own I did not know so much till I had perused a very useful Book of *Chirurgery*, published but this last Year, 1696, at *Paris* in 8vo. by *M. de la Vauguion* ; entituled, *Traité Complet des Operations de Chirurgie*. And I cannot but recommend it to the skilful *Chirurgion* as an *Operation* fit for general Use in these Cases, being both safe, and easily practicable, and also of great Benefit and Relief to no less than the Moiety of Mankind, whenever they are afflicted with this painful Disease. And to say truly, if Women in this Case would but timely seek for Help, before the *Stone* be too much grown, they might with far less Danger and Pain be relieved of this torturing and lasting Evil, than they are delivered of a common *Natural Birth*. But if at any time a *Stone* be found of so large a Bulk as not to admit this Sort of *Operation*, then the *Section*, if the *Chirurgion* be so bold as to venture on it, must be made so wide, as wholly to cut through the short *Neck* of the *Bladder*, and to divide likewise some Part of its thin membranous Substance, which is known to be of the most dangerous Consequence in cutting the *Stone*, and to be avoided as certain Death to the Patient ; according to that Aphorism of *Hippocrates*, *Cui Secta est Vesica, Lethale est*. However, I have Reason to think the Instances of this Kind will be very rarely met with : For Experience justifies what I have observed above, that Women are not capable by Nature of breeding *Stones* in their *Bladders* of so big a Size as Men frequently do ; which is most apparent from those many Histories of stupendious large *Stones* registered by Authors, amongst which the largest I have heard of bred in a *Woman's Bladder*, was not $\frac{1}{3}$ part of what has been produced of this Kind in a *Man's*.

n. 202. p. 823.

n. 236. p. 15.

A large Stone cut from a Woman; by Mr. Bafil Wood. n. 209. p. 103.

XCIII. Nov. 8, 1693, a large *Stone* was taken from Mrs. *Henckman*, a Widow Gentlewoman, of the Age of about 51 Years. Its Shape is not very unlike to a sort of Spring-purse (as they are called) which many People use; and its Surface is indifferently smooth, excepting only that there are 4 Protuberances, each of which is about the Size of a Hazle-Nut: These seem to have been at first lesser *Stones*, which falling into the *Bladder* after that the great *Stone* was almost grown to its full Bigness, they were joined to it, first by Adhesion, and at last became all one Body with it. It is also very probable, that the lesser End of the great *Stone*, was once a distinct *Stone*, and fell into, or was separately formed in the *Bladder* a good while after that the bigger Part had taken Possession there. The Length of the *Stone* is $3 \frac{3}{4}$ Inches. Its Breadth, where largest, is very near $3 \frac{1}{4}$ Inches. Its Thickness $1 \frac{1}{2}$ Inch. Its Weight is 9 Ounces and a half *Avoirdupoise*.

Dr. *Molineux* (that learned Physician of *Dublin*) has mentioned two or three Notions which I suppose this *Operation* does confute.

Vid. Sect. LXVI. and XCII.

1. He thinks that *Women* never breed *Stones* so large as *Men*; the contrary of which seems to be manifest by this *Operation*: For perhaps a *Stone* of so large a Size as this, was never yet taken out of the *Bladder* of a living Man.

2. He seems to conclude it probable that all *Women* may be freed from the *Stone* by Dilatation of the *urinary Passage*, and then forcing away the *Stone* through it: Which Method I think cannot be depended upon, since the *Stones* may prove of so great a Size.

3. He says, That dividing the membranous Substance of the *Bladder*, is to be avoided as certain Death to the Patient; whereas this *Stone*, and many others, have proved too large to be extracted through an Incision made only within the short *Neck* of a *Woman's Bladder*.

The Patient never had the least ill Symptom since her being cut, and is now perfectly well.

A new Way of Cutting for the Stone, by a Hermit in France; by M. Buffiere. n. 250. p. 100.

XCIV. Brother *James*, an *Hermit* in *France*, in his *Extraction* of the *Stone* out of the *Bladder*, maketh Use of a *Steel Staff*, much bigger and shorter than those which are commonly made use of: It is shorter from the Top to the Bending of it, and it bends more than ours. He hath but two, one for Men, and another for Children. His *Conduitor* is slenderer and longer than ours; the Point whereof, which goes into the *Bladder*, being of the Figure of a Lozenge, is wide and open in its Extremity. His *Forceps* have longer Branches than ours; but the Holds of them are shorter and wider, with many large Teeth within. The *Eurethra*, with which he draweth the Sand or Gravel, which remain sometimes in the *Bladder* after the *Stone* is out, is shorter than ours. His *Knife* is much longer and slenderer than ours.

He causeth the Patient to lie flat upon his Back, either upon his Bed, or upon a Table, whereon is a soft Quilt, in such a manner, that the *Fundament* is 3 or 4 Fingers over the Table, some Servants supporting his Thighs and Legs. He useth no Ligature, but only causeth his Legs to be bent against the Thighs, but not the Thighs against the Belly, except
the

the Left, which in his Operation he useth more or less, as he thinks fit. Then he introduceth the *Catheter* or *Staff* into the *Bladder*; which though bigger and shorter than ours, yet seemeth to run in easier: Very often he holdeth it himself with his Left Hand, pressing it close toward the *Fundament*, in order to dilate and extend the Membranes of the *Bladder*. Then he feeleth with the Fingers of his Right Hand, to find out the *Staff* through the Skin; so having felt it, he runneth his *Incision-Knife* at the Bent of the Left Thigh, upon the fat Protuberancy below the *Ischium* Bone, directly upward, by the *Rectum* to the *Bladder*, which he pierceth by its Neck, and sometimes a little above it: When he *cutteth*, the cutting Parts of his *Knife* are turned upward and downward. Having thus pierced the *Bladder* which he knoweth when the *Urine* runneth out; then he turneth his *Knife*, and thrusteth it a little further, in order to open the *Bladder* wide enough, that his Finger may go in easily. Then he withdraweth his *Knife*, and enlargeth the Wound in the outward Parts, of the Length of 2 or 3 Inches; after which he thrusteth his Finger into the *Bladder*, in order to know more precisely the Bigness and Situation of the *Stone*, and make it loose; but chiefly to dilate the Overture of the *Bladder*, by tearing its Membranes. Then he introduceth his *Conduktor* into the *Bladder*, along his Finger which is in it. When the *Conduktor* is in the *Bladder*, he taketh the *Staff* out, and introduceth the *Forceps* by the *Conduktor* into it, with which he gets hold of the *Stone*, and draweth it out. If he find any Difficulty either in getting hold of the *Stone*, or in drawing it out, he useth all the Ways commonly used, raising the Left Thigh more or less, putting his Finger into the *Fundament*, and sometimes into the *Bladder*, to loosen it, in case there be any Adhesion with the Membranes. Having found out and removed the Cause of the Difficulty, he thrusteth the *Forceps* again into the *Bladder*, and gets hold of the *Stone*, and pulls it out.

It is to be observed, That this second Time, nor any other, he useth no *Conduktor*, the *Forceps* running in very easily. He never thrusteth either his Finger or any Instrument into the *Bladder*, without steeping them in *Oil of Roses*. He never useth any *Dilatorium*, or *Cannula*, or *Tents*, in the Wound, except sometimes small Dossils in the Lips of the outward Wound, to keep them open for a little while. He only applies a Pledget, steeped in *Oil of Roses*, upon the Wound. He operateth this Way as dexterously as any of our best *Operators*. Very often he *cutteth* the Patient upon the *Gripe* almost in the same Manner as was used formerly, except that he maketh the *Incision* in the same Place as for the former: This Way he liketh better than the other, and it seemeth to be more favoured by him; and indeed it is surer, though the Pressing upon the *Belly*, which he doth, is a very bad Method.

He *cutteth Women* also upon the *Staff*, and in the same Place as Men. He did perform this Operation in my Presence upon three; one whereof was but a Girl of 11 Years old; which maketh me believe, that he useth the same Way in all, though in them he did cut the internal Neck of the *Uterus*.

But

But in my Opinion, that Way (either in *Men* or in *Women*) is not so sure as the antient, by reason that the Point of his *Knife*, not being directed by the *Staff*, he is always in danger of piercing all the Membranes of the *Bladder* through and through; and besides, the Place whereupon he maketh the *Incision* being full of considerable Vessels, one can hardly avoid the cutting some of them. We have observed in almost all that died in his Hands, that there was a great deal of *Blood* in the *Bladder*, and some in the Cavity of the *Abdomen*. He succeedeth better when the *Stone* is big and large, than when it is small; by reason that a big *Stone* not only extendeth the *Bladder*, but it stoppeth the Point of the *Knife*. He did refuse to cut one, in whose *Bladder* there was but a small *Stone*; which confirmeth me in the Opinion, that the Unsuccessfulness of his *Operations* proceedeth from the Point of his *Knife* not being stopped neither by the *Staff* nor *Stone*; for when there is but a small *Stone*, the *Bladder* being empty, he must necessarily cut the whole *Bladder* throughly, and consequently cut some of its own Vessels, which causeth the *Hemorrhage*, which is the better avoided when the *Stone* is very large.

Observations
and Experi-
ments concern-
ing this Way
of Operation.
Ib. p. 104.

The Observations I have made about this Way of *Operation* are these: I took a Body, in the *Bladder* of which I put a *Stone*; the *Staff* being in the *Bladder*, I did press it downward, hard enough to be felt through the *Teguments*, and made the *Incision* upon it in the Bent of the *Thigh*, in order to know whether it would not be a surer Way, by securing the Point of the *Knife*: By that Way I got my *Conductor* and *Forceps* into the *Bladder*, and drew the *Stone* very easily; but afterward, by the *Dissection* of the Body, I found that the Artery of the *Penis*, and the *Vesiculae Seminales* were cut through and through, which cannot be avoided, because the *Artery* and *Vesiculae* lie immediately under that Part of the *Bladder* which the *Staff* presseth upon.

I took another Body, and having in the *Bladder* a small *Stone*, I made the *Incision* much lower, and pierced the *Bladder* under the *Staff*, by which *Incision* I drew the *Stone*: Then dissecting the Body, I found the *Bladder* cut through, and its *Arteries*, which can hardly be avoided, the *Bladder* being there so much contracted, that both Sides of the *Bladder* are cut before the *Operator* either feels the *Stone*, or sees any *Urine* running out.

I took a third Body, in the *Bladder* of which I put a very large *Stone*; the *Staff* being in it, I made the *Incision* upon the fat Protuberancy, under the *Ischium* Bone, and piercing the *Bladder* below the *Staff*, I found immediately the *Stone* with the Point of the *Knife*, with which I cut the *Bladder* the Length of an Inch: Through which having introduced the *Conductor*, and then the *Forceps*, I got hold of the *Stone*, and drew it out very easily. Then I did dissect the Body; and found that neither the *Vesiculae Seminales*, nor any *Artery* had been cut; by reason that the Weight of the *Stone* pressed the Bottom of the *Bladder* lower than the *Vesiculae* and *Arteries*.

My Opinion is then, That this Way might be made Use of when the *Stone* is very big, and willingly I would prefer it to the old Way; for by this

this Way we avoid that extraordinary and violent *Dilatation* of the *Neck* of the *Bladder*, which the *Stone* causeth when it is very big, and which is the Cause of the Inflammation and Mortification of the *Bladder* that killeth the Patient: But when the *Stone* is small, or of but an indifferent Bigness, the old Way is easier and surer. But I cannot approve of this Way at all, on *Women*; since one cannot avoid cutting the *Neck* of the *Uterus*, the *Cicatrix* of which might prove to be of some ill Consequence, in case the *Woman* should come to be with *Child*: And therefore in *Women*, when the *Stone* is but indifferent big, the old Way is preferable to any other. But if it was very big, then I had rather to thrust my Fingers into the *Vagina*, and bring the *Stone* as near the *Neck* of the *Bladder* as can be, and cut the Membranes of the *Vagina* and *Bladder* upon the *Stone*. I cut a *Woman* in *Hambourgh* by that Way, from whom I drew a *Stone*, weighing 5 Ounces and a half, who recovered very well. By this Way we prevent the *Incontinency* of *Urine*, which followeth always the *Extraction* of great *Stones* in *Women*.

I cannot approve, neither, the *Cutting* upon the *Gripe*, as it is practised by some *Mountebanks*; because in that Way one cutteth through the *Prostates*, which destroyeth the *Parts* of *Generation*. I have observed, that all those which have been cut by that Method, were never fit for *Generation*.

XCV. Mr. *Hobson*, who was *Consul* for the *English* at *Venice*, having been long afflicted with the *Stone* in the *Kidney*, was at length attacked with a Fit of that Duration and Violence, that it reduced him almost to Desperation; and finding no Relief from any Means that had been used, and being under the greatest Extremity of Pain imaginable, he addressed himself to *Dominicus de Marchettis*, a famed and experienced Physician at *Padua*, imploring of him, that he would be pleased to cut the *Stone* out of his *Kidney*, being fixed in his Belief that no other Method remained capable of relieving him; adding, that he was not insensible of the Danger, but that Death itself was infinitely more eligible than a Life in that Misery, under which he had long, and did then groan. *Marchetti* seemed very desirous to have declined it, representing not only the extream Hazard, but as he feared the Impracticableness of the *Operation*, that it was what he had never attempted, and that to proceed to it, was in effect to destroy him. But Mr. *Hobson* persisting, that if he refused it, he would never desist till he found out one who would do it, *Marchetti* was at length, by his Resolution and Importunity, prevailed upon to undertake it: And having prepared him as he thought convenient, he began with his Knife, cutting gradually upon the Region of the *Kidney* affected, so long till the Blood disturbed and blinded his Work, so that he could not finish it at that Attempt. Wherefore dressing up the Wound till the next Day, he then repeated and accomplished it, by cutting into the Body of the *Kidney*; and taking thence two or three small *Stones*, he dressed it up again. From this Instant he was freed from the Severity of his Pain, and in a reasonable Time was able to walk about.

The Way of cutting for the Stone in the Kidney; by Mr. Charles Bernard.
n. 223. p. 333.

about his Chamber, having been in no Danger either from Flux of Blood or Fever. *Marchetti* continued to dress the Wound for a considerable Time, but was not able to close it up, it soon becoming *fistulous* from the continual flowing of the *Urine* through the *Sinus*; but being in all other respects restored to his former Health and Vigour, and the Matter discharged being little, he took leave of the Professor, and returned to *Venice*, under the Care and Management of his Wife; who, one Morning, as she was dressing the Sore, fancied she felt something hard and rugged as she wiped it; upon which, examining a little more carefully with her Bodkin, which served her instead of a *Probe*, she found it to be a *Stone*, of the Figure and Magnitude of a *Date-stone*; which being removed, he never after complained of the least Uneasiness in that Part.

About 10 Years after this he returned to *London*, where the learned Dr. *Tyson* and myself were, by Dr. *Downs*, who had known him formerly in *Venice*, invited to see him. And after we had received this Account from himself, he gave us the Satisfaction of viewing the Sore, which continued open, and permitted me, without any Complaint (the *Callosity* being great) to pass my *Probe* so far into the *Sinus*, that we concluded it reached into the *Kidney*. The Matter it then discharged was but little in Quantity, but always diluted with, and smelt strong of *Urine*. The *Orifice* would sometimes close for 3 or 4 Days together, and then the Matter made its Way through the common Passages with the *Urine*, yet without any Difficulty or Pain. There is no question, but that there was a Coalition of the *Kidney* and the Muscle *Psoas*. When we saw it, he applied nothing to the *Orifice* but a clean linnen Rag, which had a strong *urinous* Scent. He was then as able, in Appearance, to perform all the Functions of Life, and to undergo any Fatigue, as any Man of his Years; being then, I conceive, upwards of 50, and was the next Day to ride Post 40 or 50 Miles.

This, I think, is the first Experiment of this Kind. Some Authors indeed have imagined that *Hippocrates* hath commanded the *Operation*, when enumerating the Diseases of the *Kidneys*, and their Cure, he saith, *Quum autem intumuerit & elevatus fuerit, sub id tempus juxta Renem Secato, & extracto pure, Arenam per Urinam cienti, sanato. Si enim Sectus fuerit, Fugæ spes est, sin minus, Morbus Homini commoritur.* And *Sinibaldus* in particular, upon these Words passionately exhorts the *French* and *Roman* Chirurgeons to make the Experiment upon Brutes, that they might with greater Dexterity and Readiness perform it upon Men. But, with Submission, he seems to infer more from these Words of *Hippocrates* than they can bear: For it is not sufficient (according to these Directions of *Hippocrates*) that we take our Indications from the common Symptoms of the *Stone*, be they never so grievous, and never so evident; but there must be an *ApoSTEM*, and that too is to manifest itself externally by a *Tumour*. And then, indeed, the Necessity and Reason of the *Operation* are so obvious, and the Difficulty so little, that no Man ought to decline it. Nor do we want Instances of *ApoSTEMs* in the *Kidneys*, occasioned originally from the *Stone* there, and manifesting themselves by a *Tumour*, upon opening of which, *Stones* have been discharged with the *Pus*, or have been soon after removed; and this is the very

De Intern.
Affect.
Antiph. Hip-
pocr. 4. Lib. V.

Case which *Hippocrates* supposes, and upon which he justly advises the Practice. But it is my Opinion, that we have no manner of Evidence, that *Nephrotomy* (restraining its Signification to cutting in the *Kidney* for the *Stone*) was practised in his Time, or in many Ages after. For *Celsus*, although he be very particular in his Discourse of cutting for the *Stone* in the *Bladder*, is silent in this Matter; and *Galen*, who is copious enough upon Diseases of the *Kidneys*, especially the *Stone*, mentions it not. And, indeed, there are no Footsteps that I can discover among any of the *Greek* or *Latin* Physicians.

The first Light which I can pretend to discover of the Operation, as practised in our Case, is amongst the *Arabians*. *Serapion*, who is placed by *Wolfgangus Justus* betwixt the 10th and 11th Century, tho' by *Ren. Moreau* 300 Years earlier, gives his Opinion of it thus; *Quidam Antiquorum præceperunt Lapidem Renum extrahi cum Ferro incidente retro super Latus duorum Iliorum in loco Renum; Ego autem video quod hæc Audacia est difficilis vehementer, & Administratio istius Curationis est maxime periculosa & suspecta de Morte.* Who these Antients were that advised it, I confess to be beyond my Conjecture; unless we may be allowed to say, that he also had misunderstood *Hippocrates*, as some have manifestly done since. Betwixt 12 and 1300, *Avicen* had much the same Opinion both of the Practice and Practitioners; *Sunt qui laborant Extrahere ipsum per Incisionem Ilii & per Dorsum: Sed est magnus Timor in eo, & Operatio ejus qui rationem non habet.* The Difference of their Sentiments being only, that one thought it the Undertaking of a Mad-man, the other of a confident Fellow; but from *Avicen's* Words, there is some Colour to believe that it was practised in his Days, though undoubtedly, if it were, from his talking so slightly of it, it was only by Persons of mean Character, such, perhaps, as our *Mountebanks*; who having no Regard or Concern for the Lives of Men, and little Reputation of their own to lose, venture boldly, and sometimes successfully, upon those things which wary and more judicious Men avoid. All the rest of their Writers are silent.

Traſt. 4. c. 22.

*P. 361. Edit.
Ven. 1562.*

Among the Moderns, as well as I can inform myself, *Fr. Rosettus* seems to have been the first who seriously advised this Practice. But notwithstanding his Zeal to bring this Operation into Use; and though he urges *Hippocrates's* Authority to justify the cutting into the *Kidney*, he is yet so ingenious as to acknowledge, *Præſente Tumore, nec aliter, Hippocratem imperaſſe Sectionem.* And as plausible as his Reasonings may seem, it does not appear, that he hath been able to gain many Profelytes to his Opinion; the Sense of those Authors, who have mentioned it (who are not many neither) being generally against it, and concluding in Effect with *Riolanus*, *Niſi Naturâ monſtrante viam atque præeunte, nefas eſt tentare Nephrotomiam.* But although it appears to be the concurrent Opinion of those Authors, who have treated of Wounds in the *Kidneys*, that if they penetrate the *Pelvis* they terminate in Death; yet the Experiment above related, shews us, that they ought not to have so magisterially exploded the Operation.

*De Partu Cæ-
ſareo.*

*Ench. Anat,
Lib. 2. c. 28.*

An extraordinary Situation of the Vasa Præparantia; by Dr. Nath. Fairfax. n. 29. p. 549.

XCVI. I lately took Notice in the Corpse of a Felon, that whereas ordinarily the *Preparing Vessels* arise on the Right-side out of the *Cava*, as on the Left out of the *Emulgent*, his Right *Vas Præparans* sprang clearly from the Right *Emulgent*.

The Testes examined; by Vadius Dathirius Bonglarus. n. 42. p. 843. Fig. 47, 48.

XCVII. 1. I send you two Figures of what I have observed concerning the Structure of the *Testicles*, one of which is taken from the *Testicle* of a *Man*, and the other from that of a *Boar*, that being larger its Vessels might appear more distinct.

A A, Each of the *Testicles* cut through the Middle. *B B*, The *Tunica Albuginea*. *C*, The Insertion of the *Vasa Præparantia* into the *Albuginea*. *D D*, *Higmore's Duct*, running through the Middle of the *Testicle*, exactly in the Middle in the *Boar's*, but not so in the human *Testicle*. Whether or not is this *Riolan's fibrous Line*, inseparable from the Coat of the *Testicle*? *E E E E*, The *Vasa Præparantia*, perforating the *Albuginea*, and running in a Semicircular Course into the *Duct*. *F F F F*, The genuine Substance of the human *Testicle*, not at all glandular, but altogether vascular; so that the whole *Testicle* is composed intirely of Vessels. In the *Boar*, between the proper Vessels of the *Testicle* there lies a Stratum of true fleshy Fibres, *f f f f*. *G G*, Slender Tubes, sometimes more, sometimes fewer, rising from the *Duct* in the Head of the *Testicle*, immediately after it emerges from the *Albuginea*. *H H*, The Beginning of the *Epididymis*, not glandular, according to *Higmore's* Opinion of it, but wholly composed of Vessels, connected together by a strong Membrane, according to *Riolan*. Hence you may observe the *Epididymis* to be produced from small *Pipes* or *Canals*, and these *Pipes* from the *Ducts*. The preparing therefore of the *Semen* is first begun in the Vessels of the *Testicle*, from which it immediately flows into the *Duct*, and from thence is conveyed by the above-mentioned *Canals* into the *Epididymis*, in the *Meanders* of which it is at last perfected. *I I*, The remaining Substance of the *Epididymis* plainly Vascular, so that there is no glandular *Apparatus*, neither in the human *Testicle* nor *Epididymis*. *K K*, The *Excretory Vessel*, a Continuation of the *Epididymis*.

By ——— *Ib.*
p. 484.

2. This Paper was printed at *Florence*, 1658. Since which the Subject hath been considered by *D. de Graef*, and lately examined by the *Royal Society* with so much Care and Exactness, that now there remains but little Doubt of what is, and has been so many Years ago conceived, by able Anatomists here in *England*, of the Structure of the *Testicles*, viz. That they are a *Congeries*, or Heap of very fine *Vessels*, that may be drawn out like a Thread, and distinctly exposed to the Eye.

The Texture of the Testes; by Dr. Timothy Clarck. n. 35. p. 681.

XCVIII. 1. What the learned *Van Horne* asserts, (together with *de Graef*) that the Substance of the *Testicle* is nothing else than a Heap of a Sort of *Chords*, or rather very minute Vessels, was known long ago, not only to me, but likewise to the celebrated *Riolan* and others. I must add however, that by the Help of a Microscope, you can observe these *Chords* passing

passing every where through exceeding small Glands; whence the *Testicle* resembles a Kind of pappy Substance. But although these *Chords* can be drawn out into a considerable Length, yet hitherto I could never find that the whole Substance of the *Testicle* could be drawn out like Wool from the Spindle, as some Anatomists will have it.

2. In Nov. 1688, I dissected the *Testiculos Cuniculorum Marium* in several Shapes, and I find the Vessels in them to lie in round Folds, in the manner of the little *Intestines*; but both Ends of each Roll meeting at their Insertion, which seems to be made into the *Ductus Nervosus*: And every one of these little Rolls are very curiously embroidered with other Vessels, which I judge to be Veins and Arteries, by reason of their reddish Colour, appearing in them even to the bare Eye. These little Rolls lie in Ranges, having a kind of Uniformity, not unpleasant to behold by a good Light. When I cut one of these Rolls transverse, there seemed to me 5, 6, or more distinct Tubes in one Roll, contained as it were in one common *Membranula*; but the fine Texture and Tenderness of them is such, that they will not admit of Expansion in such a manner, as some other *Testes* will, and especially as that of a *Rat* is said to do by Dr. de Graef, if we mistake him not.

It was asserted by me several Years ago, concerning the *Parenchyma*, that it is a Congeries of *Vessels* and *Liquors*, without any intermediate Substance: And I have since that Time made several Experiments of the same Kind, about the *Testes*, the *Pancreas*, and other (so esteemed) *Glands*; and as far as I have examined them, I find them to be only a Texture of fine Tubes or *Ducts*, with more or less Liquor, without any other Substance.

I have also dissected the *Testiculos Tauri*, and ordered them several Ways; some boiled, others broiled, others infused in *Spirit* of Wine, hot and cold, &c. and upon the best Examination I can make, I cannot see any of this intermediate Substance, or indeed any thing else, that is not *Vessel* or *Liquor*.

I shall here add another Experiment, and that is *Testiculi Humani*, hoping to put it out of dispute, that it is nothing else but a Congeries of *Vessels* of various Sorts, and their several *Liquors*; and that there is no such thing as an intermediate Substance (by what Name soever it be called). To demonstrate this, I expanded on a Glass the true and genuine Substance *Testiculi Humani*, I mean, the Body of it after the *Tunica Albuginea* is removed, without any Addition or Diminution, excepting only what *Liquors* dried up during the Time of the Expansion (which could not be prevented in making such a Scheme of it) and it then appeared to the naked Eye as in the *Figure*.

If it should be objected, that this may be drawn out into seeming *Vessels*, which yet may not be really such; I answer, that these *Vessels* have the same Appearance in the Body of the *Testis*, as to denote them such, before they are drawn out; and in the Extension, it does sometimes so happen, that one of them will extend easily near half a Yard long before it breaks, though so exceeding delicate and tender, as you may imagine: And when

By Sir Edm.
King. n. 52.
p. 1043.

Vid. Sup. c. I.
Sect. XI.

ab. Dr. B.
Quest. n. 52.
p. 1043.

Fig. 49.

it is thus extended, it hath a kind of Resemblance to the Corrugations of the *Epididymis*, and keeps the same Figure and Magnitude in the whole Extent of them, as to the Sight; unless they begin to dry, and then you may see them lose their *Girations* upon Stretching: As you may see of both Sorts represented in the *Figure*, as they appeared on the Glass above mentioned.

And that the greatest Part of these Vessels are Arteries, or other Vessels, that immediately receive Liquors from them, I may prove, I think, from another Experiment, made by Injection into a Part of the *Arteria Præparans*, before I went to expand the Body of the *Testis*, whereupon opening the Part, which I saw discoloured, I found that many of these Tubes had received some of the fine Particles of that Matter, which I tinged my injected *Spirit* with.

And to prevent another Objection that might arise, *viz.* that these Particles might possibly change their Colour only outwardly; I used other Endeavours to assure myself, that the said Particles were indeed included within the Cavities of these Tubes. In the doing of which, I did moisten those two Tubes with *Spirit of Wine*, to see whether that would remove or alter those Particles: But finding no such thing, I prick'd and open'd with a fine Needle, part of the containing Tube; whereupon I saw issue forth several of those liquid Particles afore-mentioned: Which assures me farther, that this is a meer Scheme or Congeries of Vessels.

By Dr. de
Graeff, n. 52.
p. 1046.

3. What Dr. *Clarck* says, *viz.* that he can shew to the Senses, the *Parenchyma* (which, he says, resembles a Kind of Juice affused, or effused, and in some Measure concreted in the Interstices of the Vessels, and Fibres) in the *Testicles* of Men, and those of other Animals; asking that great Man's Pardon, I cannot admit to be true, unless I was to see it. Forasmuch as I have frequently dissolved the Human *Testicles*, and also those of Brutes, so as, excepting some very fine slender Membranes, not the least Portion of *Parenchyma* remained. Nay, which is still more, I have dissolved the *Testicles* of some Animals so, as even these Membranes themselves quite disappeared. And in order to prove what I have said by Fact, I have sent you the *Testicle* of a Rat, dissolved according to my Method, that you may see whether there are such Glands, or even such a *Parenchyma* in the *Testicle* as Dr. *Clarck* speaks of. After the same Manner almost, I can dissolve the *Testicles* of other Animals, but with this Difference, that in some of them some slender Membranes remain, and in others, besides these, the Root of *Higmore's Epididymis*.

By ———
p. 1047.

4. What these two last industrious Physicians have imparted, looks very fair to evince, that the *Testes* of Animals are made up of nothing but *Vessels* and their *Liquors*. But notwithstanding this, Dr. *Clarck* and divers other ingenious and expert *Anatomists* and Physicians, still doubt, whether that be so indeed, considering that not only it cannot be denied, that this curious Heap of *Strings*, or supposed *Vessels*, was at first covered all over with a mucous Matter (which in so fine and tender a Part may well be thought to serve for a *Parenchyma*) but also that M. *de Graeff* must himself grant, that in the said Part there are found certain small Membranes besides those

Vessels

Vessels he is asserting; such another Substance being conceived to be highly necessary to serve for a *Medium*, whereby that compounded *Liquor*, which from the greater *Vessels* passeth into the minute Arteries, Nerves, and *Lympheducts* of the *Testes*, may be secreted, and, according to the different Nature and Figure of their several Particles, conveyed into those several small and subtle *Vessels*.

5. The internal Coat of the *Testicles*, especially in *Horses*, has fleshy Fibres, or an expanded Muscle, together with various *Vessels* in the middle of its Substance, which having different Directions, running transversely, and being woven together in a reticular Manner, as in the Spleen, strengthen and compress the *Intestinula* of the *Testicles*.

By S. Malpighi. n. 71, p. 2150.

XCIX. I here send you a Figure of the *Vasa Deferentia* and *Vesiculæ Seminales*, as they were dissected from the Human Body, by that experienced Anatomist Dr. Lower and myself. And here I must congratulate Dr. Regner de Graeff, or rather myself, that both of us have found out and asserted the same Truth; for the Communication of the *Vasa Deferentia* with the *Vesiculæ Seminales* is so very manifest, that upon injecting any *Liquor* into the *Vas Deferens*, there does not a Drop of it go out by the *Foramen* into the *Urethra*, till after it has reached the upper Extremity of the *Vesiculæ Seminales*.

The *Vasa Deferentia*; by Dr. Timothy Clark. n. 35. p. 681.

For in the Angle *A*, that Communication is formed in such a Manner, as the *Vesiculæ Seminales* must be quite filled before any *Liquor* can pass out into the *Urethra*. I own indeed, that the *Semen* passes by two *Foramina* into the *Urethra*, but I cannot agree with that great Man, where he says, that the Matter of the *Semen* is simple: For if the *Testicle* differs in its Structure, Colour, and Substance, from the *Epididymis*, as the *Epididymis* does from the *Prostatæ*; and if the Juices in these Parts differ from one another both in Colour and Substance, then certainly different Materials must be prepared in them for the *Semen*.

Fig. 51.

Fig. 51. A View of Part of the *Vas Deferens*, with the *Vesiculæ Seminales* of one side, as they appeared in the Body before they were cut out. *A*, the Angle of Communication. *B*, the upper Extremity of the *Vesiculæ Seminales*. *C*, the *Vas Deferens*, where we thrust in a small Syringe. *D*, the *Foramen* opening into the *Urethra*. *a a a*, Part of the *Vas Deferens*. *b b b*, the *Vesiculæ Seminales*. *c c c*, the *Duct* from the *Vesiculæ Seminales* into the *Urethra*.

Explication of the Figure.

C. About a quarter of an Inch below the *prostate Glands E*, I found two other small *Glands G G*, placed on each Side the *Urethra F*, a little above the Bulb of its cavernous Body *I*. These *Glands* are of a depressed oval Figure, not exceeding the Magnitude of a small *French Bean*. After those Parts of the *Musculus Accelerator l l*, are removed, which pass over these *Glands*, you may feel them placed like two hard Bodies on each Side the *Urethra*. They incline to a yellowish Colour, like that of the *Prostates*. Their excretory *Ducts* appear on their internal Surface *A b*, next the inner Membrane of the *Urethra C*, whence they descend about half an Inch in length before they grow

Two new Glands near the prostate Glands, with their Excretory Ducts, lately discovered; by Mr. W. Cowper. n. 258. p. 364. Fig. 52, 53.

grow less, and pierce that Membrane obliquely at their opening into the *Urethra D*, in which they discharge their separated Liquor. After opening the upper Part of the *Urethra* towards the *Dorsum Penis*, and expanding its inner Membrane, if you compress these *Glands*, you may see their Liquor issue from two distinct Orifices, which is very transparent and tenacious. These two Orifices open into the *Urethra*, just below its Bending, under the *Ossa Pubis*, in the *Perinaeum*.

The Artifice of Nature is very extraordinary, in thus placing these *Glands*, and their *excretory Ducts*, since, on the *Erection* of the *Penis*, and the Distention of the Bulb of the cavernous Body of the *Urethra*, they are thereby necessarily compressed, and the Liquor, contained in their *excretory Ducts*, forced through their two Orifices into the Cavity of the *Urethra*: Besides this, that Part of the *Musculus Accelerator* (mentioned above) which passes over these *Glands*, contributes to this Compression. It seems requisite such Agents should conspire in compressing these Organs, since the Liquor they separate is so very tenacious; which Consistence of it, is absolutely necessary for the Uses it is employed in.

The main Design of Nature in framing these *Glands*, seems to respect the grand Work of *Generation*, which will be more evident, if we examine the *analogous Organs* in other Animals. In *Rats* these *Glands* are remarkably large, and are so placed, that upon the *Erection* of the *Penis*, they are compressed by its Turgency and Apposition of the *Ossa Pubis*. The like may be observed in other Animals, particularly in *Hedge-Hogs*.

Boars have these *Glands* very large, and the Matter they separate is more tenacious, and not so transparent as in all other Creatures I have examined: There is something peculiar in the Contrivance of them in this Animal, each *Gland* being covered with a peculiar Muscle not unlike the *Gizzards* of some Fowl; which Mechanism seems contrived for more forcibly compressing of them, to discharge their very tenacious Contents into the *Urethra*, and that not only in the Time of *Coition*, but at any other Time; which seems to be more peculiarly required in those Creatures, because the *Passage* of their *Urine* is very long, and therefore stands in need of more of this *glutinous Matter* to besmear it, whereby it is defended from the Injuries that may arise from the *Salts* of the *Urine*. As the *Urine* of different Animals is more or less impregnated with pungent *Salts*, so the Proportion of these *Glands* differ, as well as on the account of the various Lengths of their *Urethra's*. It is remarkable we do not find these *Glands* in *Females* like those in *Males*, though they have something analogous to them, which are described in *Women* by *De Graeff*, and called *Prostatæ Mulierum*; but the Orifices of the *excretory Ducts* opening at the Exit of the *Urethra*, they serve to defend the *Nymphæ* and *Labia Pudendi* only from the *urinous Salts*, and discharge their Liquor in *Coitu*, as I have elsewhere taken notice; the whole *Urethra* in them being so short, that the Contraction of the *Sphincter Muscle* of the *Bladder* is sufficient to expel any Remains of *Urine* from that Passage.

The Use of these *Glands* is twofold; *First*, on the *Erection* of the *Penis* there is so much of their Liquor discharged into the *Urethra*, as suffices to drive

drive

drive out any Remains of *Urine*, and prevent its mixing with the *Semen*; and at other Times the continual Discharge of some Part of their Liquor into the *Urethra*, defends that Passage from the *Salts* in the *Urine*: The like continual Exudation cannot happen either from the *excretory Duets* of the *Prostates*, or those of the *Vesiculæ Seminales*, because the nearness of the *Sphincter Muscle* so corrugates the inner Membrane of the *Urethra*, as prevents an easy Passage of the Liquor by the *Ostiolæ* of the former; nor can the *Semen* run out of the latter, since the *Caruncula*, or *Caput Gallinaginis*, is contrived on purpose to prevent it: Wherefore the *Diaphragm*, *Abdominal Muscles*, and *Levatores Ani*, are employed in compressing those Parts to discharge their Contents.

It is not improbable that the Matter, which flows at the latter End of the Cure of *Venereal Diseases*, and is called a *Gleet*, proceeds from these *Glands*, and not from the *Prostate*, or *Vesiculæ Seminales*, as is commonly supposed; which may afford us no mean Argument for the Use of *Injections* in such Cases; instead of which some Practitioners persecute their Patients with violent Purges, and cram them with vast Quantities of astringent Medicines. We may easily conceive such *Gleets* become sometimes very obstinate, if not incurable, by supposing the *Ulcer* in that Contact to happen upon the *Ostiolæ* of these *Secretory Duets*.

Fig. 52. *A*, A Portion of the *Bladder of Urine*. *BB*, Parts of the *Ureters*. *CC*, Parts of the *Vasa Deferentia*. *DD*, The *Vesiculæ Seminales* somewhat distended with Wind, by blowing into the *Vasa Deferentia*. *a a*, The Blood Vessels of the *Vesiculæ Seminales*. *E*, The *Glandulæ Prostatæ*. *F*, The *Urethra* expanded, after opening its Superior and Fore-part, to see the *Ostiolæ* of the *excretory Duets* of the following *Glands*. *GG*, The two *Glands* above described, which, from the Liquor they separate, may be called *Glandulæ Mucosæ*. *b*, The *excretory Duct* of the last mentioned *Glands*, before it passes under the Bulb of the cavernous Body of the *Urethra*. *I*, The Bulb of the cavernous Body of the *Urethra*, partly distended with Wind, and divested of the *Accelerator Muscle*, to shew its external Membrane, which is very thin, whereby the last named Muscle, does more adequately compress that Bulb, and derive its contained Blood towards the *Glands*, when the *Penis* is erected. *K*, The 3d Pair of the *Muscles* of the *Penis*. *LL*, The *Accelerator Muscle*, divided in its middle Seam on the Bulb, and afterwards freed from it, and expanded. *ll*, The upper Part of this Muscle, which passes immediately over the *mucous Glands*. *MM*, The *Musculi Directores Penis*. *NN*, The cavernous Bodies of the *Penis*. *O*, The cavernous Body of the *Urethra*. *P*, The Ligature made to prevent the Wind from passing out of the cavernous Body of the *Urethra* and its Bulb. *Q*, The Aperture by which the Inflation was made.

Explication of
the Figures.
Fig. 52.

Fig. 53. One of the *mucous Glands* after being macerated in Water, and its *excretory Duct* filled with Quicksilver. *A*, The *mucous Gland*, somewhat distended. *b*, Its *Excretory Duct*. *C*, A Portion of the internal Membrane of the *Urethra* expanded. *D*, The *Ostiola* of the last mentioned *excretory Duct*.

Fig. 53.

The Structure
of the Uterus;
by S. Marc.
Malpighius.
n. 161. p. 630.

CI. In this which is the most obscure of all the *Viscera*, in the unimpregnated State, upon Account of the Vessels being so contracted and contorted, the Parts it is composed of are so interwoven together, that it is hardly possible to distinguish them from one another. But in the pregnant *Uterus*, (especially in Brutes) we are able to unravel the Structure a little. I therefore took to examine a Cow's *Uterus*, both because it is easier come at, and being large, its component Parts are not so obscure. The external Membrane is very thick, covers over and strengthens the whole *Uterus*, *Tubes*, *Vagina* and *Appendages*. Under this are placed fleshy Fibres, which running lengthways, and here and there forming a Kind of fleshy Bands, are differently waved. They are connected, however, with one another, especially towards the *Tubes*, and not far from the *Ovaria* are gathered into little Bundles or *Fasciculi*. Others again run horizontally, according to the Thickness of the *Uterus*, and adhere by very fine Membranes on different Planes, surrounding the whole *Uterus*. Not far from these the *Lymphatick Vessels* occur turgid with Lymph, which being held to the Fire, at last evaporates. Under these Vessels again run the *Veins* and *Arteries* here and there upon the *Uterus*, and form an elegant Kind of Net-work, the *Area* of which again, makes still a different Appearance. And I have frequently observed, that one Branch of the *Arteries* is commonly accompanied with two of the *Veins*. There are likewise *Nerves* bestowed on the whole Surface of the *Uterus*.

I have likewise observed other Vessels or Ducts proper to the *Uterus*, which are pretty large and remarkable, especially in Time of Pregnancy. These Vessels of which I now speak are variously produced, seeing they partly emerge from the Substance of the *Uterus*, and partly lie concealed within its Cavity. They are two in Number, one of them on each Side, running here and there upon the Sides of the *Uterus* and *Vagina*, especially in that Part where the *Uterus* is contiguous to the *Bladder*; and though they are extended from the Extremity of the *Vagina*, to where the *Horns* of the *Uterus* begin to grow slender, yet they have not every where the same Form, nor are they of the same Bigness, neither do they run in the same Plane; for the lower Portion, which terminates not far from the Orifice of the *Urethra*, marches directly upwards, immediately under the Membrane that lines the *Vagina*, towards the *Mouth* of the *Womb*. This Portion very frequently will hardly admit a Probe; and sometimes it is as broad as one's middle Finger, and opens into the *Vagina*, with a broad conspicuous Orifice, for the most Part above the Orifice of the *Urethra*, or *Meatus Urinarius*. Not far from the Corrugations at the *Mouth* of the *Womb*, these *Ducts* seem to become obliterated, and there only occur (as I thought I discovered) some very small Holes and Pores ending in one continued Vessel. This obscurer Portion then of these Vessels rising evidently from a *Duct*, and hid amongst fleshy Fibres, is continued upwards upon the Sides of the *Uterus*, where it is narrow, till flying off from its *Neck* externallv it emerges upon its Productions. These Vessels put on a great many different Forms, and require an accurate Scrutiny to make them be rightly understood. For frequently where they lie

lie internal, they become so very slender, that they can hardly be seen; often enough you see them rise in the Form of a great many large round Buttons, making a Kind of Crown, and sometimes they run streight like other Vessels turgid with Liquor. That Portion of these *Ducts* which emerges from the *Neck* of the *Uterus* over the fleshy Fibres, and under the Blood-Vessels, is extended laterally upon the *Body* and *Horns* of the *Uterus*, and distributes its Branches to the internal Circumvolution of these *Horns*, its small Extremities ending in the *Tubes* where they grow narrow. These Vessels, though they are Tubulous, and run on in an uninterrupted Course, yet they put on various Forms, both from their surrounding Sheath or Ligament, and from their internal Structure; for that Part of them that runs upon the *Vagina* is sinuous, and produced streight upwards. The Membrane which lines them internally is rough, having round Orifices laterally, which will admit the End of a Probe, but will not allow it to go far; and here and there are placed small roundish Glandular *Folliculi*, opening into the Cavities of these *Ducts*. There are likewise several Membranes stretched across like *Valves*, whence in some they rise up like *Cæcal Appendages*, such as are observed on the *Intestinum Colon*. Near the Orifice of the *Urethra* these Vessels become broader, and frequently they swell into a sinuous Head, from which the tortuous *Ducts* open into the Cavity of the *Vagina* by two obscure Orifices hard by the Extremity of the *Urethra*. The upper Parts of these Vessels, running upon the Sides of the *Os Uteri*, is guarded, as it were, in a cartilaginous Sheath, whence it becomes varicous, and seems to push out here and there into roundish Appendages, especially where the surrounding Sheath swells out into the round Knot or Button abovementioned, in which however is contained a streight Tube turgid with Liquor; for that cartilaginous Sheath being removed, the tender Membrane of the Vessels appears. At last that Portion which rises from the *Neck* of the *Uterus*, going out in the Form, and of the Bigness of a Quill, is included for some Space in a firm Sheath, and afterwards being surrounded with a spiral Ligament, as it were, it puts on a beautiful Appearance, gradually decreases, is studded here and there with lateral Appendages full of Liquor, and running on till it gets to the *Curvature* of the *Horns*, then splits into a great many small Branches, which are distributed to the *Uterus*, where it becomes small. But as you cannot push an Injection to the Extremities of these Vessels, therefore their ultimate Terminations are not yet discovered. Sometimes instead of Branches I have observed Appendages or *Loculi* turgid with Liquor. These Vessels in Time of Pregnancy are so lengthened and distended, together with the *Uterus*, that in Cows I have seen them as long as one's Arm, and very turgid, so that they were extremely conspicuous. These Vessels are filled with a palish Fluid, of a different Consistence in different Parts; for in the sinuous Portion which runs upon the *Vagina*, it is frequently *mucous*, and often enough congealed, as it were, into a thick Jelly or Pap; while in the other Productions it resembles *Turpentine* both in Colour and Clamminess, and exposed to the Fire it raises a great many Air Bubbles, and at last leaves a glutinous Recrement like Amber.

But in order to discover these Vessels, and every Thing about them, you must first clear away the *Bladder* with the surrounding Membranes, together with the Blood-Vessels and fleshy Fibres, so as to lay bare the *Uterus* externally immediately above the *Mouth*, as also its *Cervix* and *Horns*, and you will immediately see these tubular Vessels emerge here and there upon the *Neck* of the *Womb*, and may pursue their Progress farther upon the Sides of the *Cornua*. But the lower Portion of these Vessels will appear to you upon finding out their Orifices into the *Vagina*, not far from the *Mouth* of the *Womb*. Sometimes the Liquor contained in these *Ducts* shines through, so as upon looking at the internal Surface of the *Vagina*, you see broad Lines running according to the Length of it, and upon making a *Foramen* into one of these Lines, you can thrust in a Probe, which gradually penetrating runs as it were through the whole *Vagina*. But in order to discover the intermediate and more obscure Portion and Continuation of these Vessels, you must carefully dissect off the Sheath, which covers them immediately as they arise from the *Neck* of the *Womb*, and the yellowish Membrane of the contained *Duct* will shew you their Course; for although these Vessels are slender and varicous, yet after having cut through the fleshy Fibres of the *Uterus* longitudinally, and through the varicous Prominences, they will at last discover themselves. Sometimes when they happen to be turgid with Liquor, they appear very obvious, large and streight.

If you cut through the *Uterus* according to its Thickness, especially in Impregnation, after having got through the Coats, and confused Layers of the Vessels and fleshy Fibres, for the Space sometimes of Half an Inch transversely, you meet with a reticular Texture, by which some *yolky Bodies*, supplied with proper Blood-Vessels and produced as far as the internal Substance of the *Uterus*, are kept firm, and a Series of very small Vessels playing about them, there is formed, as it were, a Kind of *Omentum*. The *Uterus* is lined internally with a Membrane, which has an innumerable deal of very small Orifices, pouring a glutinous *mucous* Liquor into its Cavity, with which both it and the *Vagina* are perpetually moistened, and upon compressing the *Uterus* you see it ooze out. These Orifices of the excretory Vessels appear very plain, especially in *Sheep*, if the internal Membrane of the *Uterus* is long macerated in Water; wherefore it is probable that they are the Orifices of the *yolky Bodies* just mentioned, opening into that Cavity; but whether they have small *Glands* annexed to them, which cannot be distinctly discovered to the Senses, is not quite certain, yet it appears very probable from Nature's constant uniform Method of Operating. There are likewise observed on the whole internal Surface of the *Uterus* and its *Horns*, a great many *Tubercles* of unequal Bigness, rising a little prominent, which in the Time of Pregnancy grow considerably turgid, and seem to be *Appendages* to the *Uterus*, or a Congeries of *Vaginulæ*, whence they have obtained the Name of *Cotelydons*. They admit the Extremities of Vessels going out from the *Chorion*, so that from these two connected thus with one another, there is formed, as it were, a compleat *Gland*, whereby the *Fætus* is supplied with Aliment, separated from the *Uterus*. This compact Body then, com-

posed

posed of two Parts, puts on the Form of a little *Placenta*, or a roundish flat Substance, of different Colours; for that Part of it which is produced from the *Uterus* is of an ash Colour, and the other is reddish. That Half which belongs to the *Uterus* is a Congeries of little *Vaginulae* and *Sinuses*, going deep into it, whence by injecting of Ink, they appear very conspicuous. Its Substance differs little from that villous Coat, with which the Stomach and Intestines of ruminating Animals are lined; for it has roundish little *Appendages* produced from it, and oozes out upon Compression a considerable Quantity of a Juice very like *Ptisan*. It is well supplied with Blood-Vessels, whence upon injecting Ink by the *Uterine Artery*, it becomes wholly black. I have sometimes seem'd, though obscurely, to discover a yellowish Kind of Vessel here, the farther Discovery of which I leave to your Industry. The other Part of that Gland, which is produced from the *Chorion*, is compos'd of scattered *Roots*, as it were, which enter into the *Vaginulae* or *Sheaths* above described. This, when it is separated from the other, macerated long in Water, and view'd through a Microscope, makes a very beautiful Appearance; because the *Roots* being now free, raise themselves gradually so as to resemble a beautiful little *Grove*; for there are innumerable Trunks dividing into Branches, and these again subdividing into still smaller and smaller, till at last they become almost invisible. Its Substance is the same with that of the *Vaginulae*, and it is supplied with Blood-Vessels in such a Manner, as that even the smallest Branch has its proper Blood-Vessels running in the Middle of it.

The Structure of the *Womb* in *Women* is so obscure, that it is almost impossible to unravel it; for when it is contracted, its Vessels are so complicated and varicous, that there is no Room even for the most accurate Dissection. I shall inform you however, of all that I have been able to observe from repeated Dissections of the human *Uterus* in *Women*, who have either died after Labour, or about the seventh Month of Pregnancy. In these then the *Womb* is about an Inch in Thickness, and is plentifully supplied with Blood-Vessels, which form a kind of Network. The external Structure of the *Uterus* is compos'd of fleshy Fibres gathered into Bundles, and interwoven with one another in a reticular Manner, and the internal likewise is a Congeries or *Plexus* of strong fleshy Bands, running in various Directions. Amongst these fleshy Fibres are extended a great many thin Membranes or soft Coats; over which innumerable large *Sinuses*, like Vessels, run longitudinally, which being placed in different Planes, are supplied with a great many Orifices directed to every Circle, whereby there is a mutual *Anastomosis* between the neighbouring *Sinuses*. We have something of this Structure in the small *Tubes* of the *Breast*, and in the *Penis*. They contain a little Blood, so that they seem to be a Kind of *Diverticula* to the *Veins*, or at least to their *Appendages*; and at a little Distance from them run Branches of the Blood-Vessels, almost in the same Manner as in the *Spleen*. The *Chorion* and *Placenta* being removed, the internal Substance of the *Uterus* next occurs, and is muscular, being compos'd of fleshy Fibres variously interwoven, and supplied with Ramifications of Blood-Vessels from

the little Chinks. To this Surface of the *Uterus*, during the Time of Pregnancy, adhere certain *Pellicles*, which are connected chiefly to the *Chorion* and *Placenta*. They are soft and mucous, and very easily tore. From these there seems to be produced and supported a Kind of Network, composed of some ash-coloured, friable, round Bodies, forming Lozenges laterally, and very much resembling the *Omentum* of *Fishes*. About these Bodies play the varicous Branches of Blood-Vessels, stretching themselves towards the *Chorion* and *Placenta*. Whether these Bodies, interwoven in this reticular Manner, are fleshy Fibres, or Nerves, or rather the Excretory Vessels of the *Uterus*, I leave you to judge. Next occurs the *Placenta*, together with the *Chorion*, firmly connected to the *Uterus*; but as the Parts which compose it are very friable, mucous, and variously entangled with one another, it is not possible quite to unravel its Structure. This, however, seems certain, that the *Placenta* is composed of the Umbilical Vessels connected and kept firm by a peculiar Substance. And as the *Cotyledons* are supplied with a proper Substance, which supports the Blood-Vessels, and serves them by Way of a Sieve or Strainer, so the *Placenta*, which is only a Heap of *Cotyledons*, viz. of those Parts which enter the *Vaginule* of the *Uterus*, is consequently a Congeries of Roots and Branches from the Umbilical Vessels, which are produced over the unequal Glandular Substance. I have sometimes thought I discovered round Globules, or Glands, such as we observe in the *Kidneys*, along with the Blood-Vessels; but upon dipping the *Placenta* into Water, these Glands did not occur, only I observed here and there scattered Bodies, plentifully supplied with Blood-Vessels, resembling the Roots of Plants. The Surface of the *Placenta*, where it is connected to the *Uterus*, is unequal, seeming by its Appendages to enter the *Sinuses* and Concavities of the *Uterus*, after the Manner of the *Cotyledons*.

The Form of the Womb is different in almost every Species of Animals, and is described so accurately by Anatomists, that I need not insist upon it here. But this seems to be a constant Rule, that they should all be provided with Tubes, which are most luxuriant in the Wombs of Plants. Not far from the *Tubes* are placed the *Ovaria*, which amongst the old Anatomists were looked upon to be the *Testes*. In Cows, where they are large and very plain, they are surrounded with a Membrane strengthened with fleshy Fibres. After what Manner the *Ovum* bursts from the *Ovarium*, and is conveyed into the *Tubes*, requires a good deal of Trouble and Application to find out. But what I have been able to discover from accidental Surveys of the *Ovarium* in *Cows*, I shall disclose to you in a few Words; for it has not been in my Power, as I did in the *incubated Egg*, to make a successive Series of Observations in a great many Quadrupeds killed at certain Times of Pregnancy, because that would require an extraordinary Fund of Money, which however has been allowed to *Harvey* and a few others. But this appears certain in young adult Quadrupeds, and especially in *Cows*, that the *Ovaria* contain a great many *Vesiculæ* or little *Bladders* turgid with *Colliquament*, which concretes with the Heat of a Fire like the white of an Egg. I have oftener than once seen one of these *Bladders* hanging from the

Ovarium, larger than a Hen's Egg, and full of *Albumen*. These *Bladders* are provided with a pretty thick Coat, the inner Surface of which (as I have several Times observed) is supplied with extraordinary *Plexuses* of Blood-Vessels. After some Time there emerges a yellowish solid Body, which grows to such a Bigness, as to make the whole *Ovarium* protuberate in the Form of a *Nipple*, and when it is grown to its full Size, is as large as a Cherry. Its external Surface is rough, occasioned by some small unequal Tumours rising upon it, and is surrounded with fleshy Fibres, which insinuate themselves into its Substance, as is observed in the Glands. It is likewise supplied with Nerves and Blood-Vessels. It is involved in a Membrane, especially in the *Papillary Appendicle*, which is covered besides with the common Coat of the *Ovarium*. This Body is composed of different Portions or Lobes, as it were, such as we find in some of the other *Viscera*; but they are angular, and inclined in various Directions, for they seem to hang, as it were, to the Blood-Vessels, and to the produced *Umbilical Rope*. The Structure of these little Lobes is obscure, and composed of varicous Vessels of a yellow Colour, with which roundish Bodies with the Gold-coloured Appendages, and very small Pieces of Fat are connected together. The external Configuration of the above described yellow Body or *Corpus Luteum* is not always the same, but various at various Times. For sometimes, to begin with the more simple, you see it a *conglobate*, intricate Kind of Body, composed of varicous Productions, of a yellow, and sometimes something of an Ash Colour, hardly exceeding the Size of a Millet or Vetch Seed. Frequently at that Time, about the little *Bladders* filled with *Colliquament*, or the White of the Egg, and still very small, the external Covering of the *Corpus Luteum* is rendered more compact, and as it were supported with a yellow Substance; often enough, this yellow Body, when it is ^{at} the Size of a Vetch, puts on the Figure of a Pear, and growing gradually narrower, internally from the Center towards the Neck, it has a *Sinus* or Cavity turgid with *White*. Frequently after it is grown to the Bigness of a *Cherry*, bursting out from the *Ovarium* at the external Part of the *Papilla* or *Nipple*, it contains in its Center a little *Bladder*, like a *Cherry-Stone*, full of *Colliquament* or *White*; and this *Bladder* is sometimes round, and often enough has a good many *Styliform Appendages*, but more frequently there is only one of these *Appendages*. Sometimes too in this yellow Body, when it is arrived at its full Growth, there is almost nothing of *White* to be found; but most frequently from the inner Coat of the *Papilla*, where for the most Part you may observe a Depression externally, and afterwards a *Foramen*, there is produced a Kind of Membranous Ash-coloured Body, very probably vascular; which being stretched out perpendicularly towards the Center of the yellow Body, is divided into Branches in a vascular Manner, distributed thro' all the Substance of that Body, and to them are fixed small Lobes differently inclined, or in different *Planes*. In some of the ripe *Corpora Lutea*, towards the Center, you may observe the little *Ovum* with an *Appendage* of the Bigness of a Grain of Millet, contained in the above described Ash-coloured Body. Frequently there is opened a Kind of *Meatus* or *Duct*, going to the Center of the *Papilla*, in which is contained a Diaphanous Liquor, which

which concretes with the Heat of the Fire like *Albumen*, and often enough a small *Ovum* or two with their *Appendages*, not unlike in their Figure to those of the Moss of Galls or Oak Apples. At last these yellow Bodies or *Corpora Lutea* are rendered effete, perforated with a *Sinous Duct*, whose Orifice opens externally from the Middle of the *Papilla*, so as to admit a Probe, but the included Cavity is about as large as a Pea, and is lined with a surrounding Membrane, as also the Duct. These Things being then observed at different Times, and in different Subjects, make it seem very probable, that the *Corpus Luteum* of the *Ovarium* is made not only to preserve the *Egg* and send it out at a proper Time, but perhaps it may contribute in some Measure to its Generation, and therefore ought rather to be looked upon as Glandular than Muscular. For its Structure is not fibrous, nor fleshy, but rather like that of the *Renes succenturiati*, whence it may probably be suspected that through this glandular Strainer is separated a Kind of Matter, which being transmitted through the Branches of the *Umbilical Vessels*, is changed into the *Ovum*. A Production analogous to this we see in the *Ova* of *Plants*, in which the *Umbilical Rope* emerges first, the Extremity of which is gradually relaxed and swelled from the *Colligament* entering it, and thus at last produces the *Plant*. From the same Observations it may likewise be doubted, that the little *Bladders*, which are at all Times in great Numbers in the *Ovaria*, of unequal Sizes, and filled with concreting *White*, it may be doubted, I say, that these are not the true *Ova*, which are at last impregnated, but that Substance which perhaps serves to constitute originally the glandular *Corpus Luteum*. For it does not appear certain, that that Body is only made manifest after *Coition*, and the *Affusion* of the Male Seed, and that this produces the Signs of the *Ovum* being impregnated; because very frequently I have found in Calves, that were new born, one or two remarkable *Vesiculae*, with this luteous Substance growing to it like Grass. In *Cows* too, especially ^{ies} the Time of *Pregnancy*, and in different Ages of the *Fœtus*, I have sometimes observed these *Corpora Lutea* sometimes of the Size of Vetches, sometimes as large as Cherries in the *Ovaria*, and a good Number of them, though there was no Suspicion of a Superfetation. I observed the same Thing in a *Woman* about the eighth Month of *Pregnancy*, and in one and the same *Ovarium*, in different Animals, there are several of these Bodies of different Sizes, in which there is no such Multiplicity of *Fœtuses* succeed. To these I may add, that in most *Ovaria*, especially when they are boiled, there are large Vessels turgid with a concremented luteous Juice. It may likewise be questioned, whether only one *Bladder* of *Albumen* is consumed in producing one *Corpus Luteum*, or whether there are not more; for when the *Corpus Luteum* is come to Perfection, it takes up not only the whole Concavity almost of the *Ovarium*, but frequently a few of these *Bladders* are connected to it while they are very numerous upon other Parts of the *Ovarium*. These Things then being considered, you will find it not improbable, that this *Luteous Glandular* Substance does not immediately arise upon the *Affusion* of the *Semen* into the *Ovum*, contained in the *Ovarium*, but that it precedes it

it a long while, and that there are likewise impregnated *Ova* or *Addle-Eggs*. That these Bladders too filled with *Colliquament* or *White*, are not strictly *Ova*, but a Substance of which a Gland is composed, which prepares the *Ovum*, nourishes and sends it out, after a certain Time. But the little *Ovum* bursts, or is thrust forth, when the protuberating *Papillæ* of the *Ovarium*, by the Contraction of the fleshy Fibres, is squeezed outwards, and the surrounding Membrane being gradually tore, the little *Ovum* is pushed out, leaving a little Cicatrix or *Sinus* behind it. For sometimes I have seen a little *Nipple*, like a *Præputium* from the fleshy Fibres, surrounding the *Ovarium*, being tore where there was an Opening into the Cavity of the glandular Body. But the little *Ovum*, as it happens in *Hens*, is received safe into the *Tube* to be impregnated, by the Contraction of the fleshy Fibres at the Extremity of the *Tube*. After the *Ovum* is extracted, the glandular Body growing gradually flaccid decays, and is easily obliterated, as the *Glands* and even the *Viscera* become almost abolished, upon the Blood-Vessels being any Way straitened or compressed.

Upon considering the Structure of the *Uterus* thus explained, I must beg leave to mention some Conjectures of my own about it. The *Womb* by its Nature is the Subject of *Vegetation*, in which the *Seed* or *Eggs* thrown into it are nourished, and the Parts of the little animal *Fætus* are unfolded as it were, become more apparent and strong. And though the *Ovum* is bred and sown as it were in the Female, yet of itself it is barren, and can produce no Effect, and therefore it requires the Assistance of this *Male Seed* to invigorate it, and infuse into it a Principle of *Vegetation*. Wherefore, according to the Laws of Nature, *Women*, in the same Manner as all other Females, produce *Eggs*, which being received into the *Womb*, and impregnated with the *Male Seed*, produce a new *Animal*. But in what Manner the *Egg* is rendered fruitful, especially in *viviparous Animals*, Anatomists do not agree in their Opinions. Most Part of them think, that the *Seed* is conveyed to the *Egg* while it is connected to the *Ovarium*, by Means of a certain Duct peculiar for that Purpose: Others, again, imagine, that these two do not meet till the *Egg* has fallen into the *Uterus*: Lastly, some are of Opinion, that the whole Tone of the *Uterus* is changed, and even the Blood itself altered by the Spirit of the *Semen*, whereby the *Egg* is at last rendered fruitful. But it is plain, and you will find it so, upon dissecting the *Uterus* in different Animals, that there are Obstacles which occur so as to hinder the *Seed* from getting into the Cavity of the *Uterus*. In *Cows*, there is a thick Liquor, or Jelly, with which the *Womb* is not only besmeared internally, but its Mouth, and the upper Part of the *Vagina* is blocked up; and as this may hinder the Substance of the *Seed* from entering the *Uterus*, so it may very probably afford a proper *Menstruum* or Vehicle for entangling the finer and more spirituous Parts of the *Seed*. This Liquor then oozing out from the above-mentioned Vessels, which open upon the internal Surface of the *Womb* and its *Tubes*, not only moistens the whole *Uterus* and *Vagina*, but meets with the *Seed* poured into the *Vagina*, and confining its volatile Particles mixes them intimately with its own, whereby it at last ferments and swells. This

Motion

Motion by the Contiguity of Parts is communicated to the *Uterus* and its Humours, so that a new Tone, Conjunctions and Motions, so to speak, succeed there. The *Egg* then being received into the *Womb* from the *Ovarium* by means of the *Tubes*, may be sufficiently moistened, and made fruitful by the active Spirit of the *Seed*, from which the Beginning of Motion seems to arise. Hence, perhaps, it was that *Hippocrates* pronounced those *Wombs* to be barren that were either *dry*, or too much *moistened*; for in the first, the impregnating Principle is not confined nor propagated; and in the other, it is either dissipated or flows out, so that *Conception* only obtains in *Wombs* of a moderate *Temperament*. There is something like this to be observed in *Butterflies*, in which there is a large two-horned *Bladder*, connected to the Extremity of the *Ovarium*, from which a glutinous Liquor perpetually distills into the Cavity of the *Vagina*, with which the *Male-Seed*, and another Liquor which is spued out from a little lateral Sack are mixed, and as it were cohobated, by all which the *Eggs* in their Passage are besmeared and rendered fruitful; and thus for several Days that Plastick Force is preserved, and communicated the following Days to the *Ova* as they pass. This we may likewise conceive to be the Case in *Hens*, in which the Energy of the *Seed* once received is preserved a good while, so that the *Eggs* which are laid afterwards are fruitful. And since in *Hens*, Nature not only pours the *Seed* of the *Cock*, or some other Liquor impregnated with the *Seed* to the *Cicatrix*, in which the Rudiments of the *Chick* are contained, but endues the whole *Egg*, or that Aliment under the Form of *White* and *Yolk*, with a Plastick Force, so that the whole is rendered fruitful; therefore, as the *Uterus* turgid with Humours, and surrounding the little *Ovum*, is analogous to the *Hen's Egg*, it is probable likewise that it is rendered fruitful together with its contained Humours; for this may be done by means of that Liquor which flows into the Cavity of the *Uterus* turgid with the *Seed*. But it may be questioned whether the Vessels of the *Womb* above described contribute to this Fertility or not: And, at first, it seems probable that the *Female Seed*, or at least the Liquor of the *Prostatae*, may serve instead of that *Ichor* or Liquor above described, and thence together with the *Seed* of the *Male* may communicate a proper Energy to the *Egg*. But as these Vessels are produced all along the *Uterus*, their Extremities running upon the *Cornua*, and are turgid with a glutinous Liquor, especially in the Time of Pregnancy, I am therefore led to doubt, whether the Liquor contained in these Vessels is not considerably changed by the volatile Particles of the *Male Seed*, and thence the more external Parts of the *Uterus*, and of its Horns especially, are rendered fruitful; in which *Conception* is first begun, and the Increase and Nourishment of the *Fetus* successively carried on. Nor will you think this improbable, if you only consider how easily this Humour is altered by the *Male Seed*, seeing that sometimes from one single Coition with a Person touched with the *Venereal Disease*, it shall become so corrupted, as growing more acid to drill constantly away, and preserve the Taint it has received a long while. The *Egg* then, after it has fallen down from the *Ovarium*, is quite besmeared with the *Uterine Menstruum*, impregnated strongly

ly with the volatile Particles both of the *Male* and *Female-Seed*. The *Womb* likewise, with its contained Humours, grows so turgid both within and without, that the Blood having received a new Motion within its Vessels, makes a longer Stay there, the *Cotyledons* swell out, and all the Humours becoming more fluid and moveable, the Nutrition and Growth of the *Fætus* in the *Ovum*, are carried on.

Nature varies in that mechanical Apparatus, whereby the Humours are conveyed from the Vessels of the *Uterus* to the *Fætus*; for a *Placenta* or something analogous to it frequently intervenes. The Structure of the *Cotyledons* above explained is very remarkable, for it is a conglobate Gland of its own Kind, so to speak, in which a Portion of the *Womb*, supplied with its own proper Flesh, strains a Juice received from the *Uterine Arteries*, which being separated in the Cavities of the *Sinuses* is collected together again, and then is dispersed through the Vessels of another Gland contiguous to it, from whence it is received into the Extremities of Veins, and so transmitted to the *Fætus*.

CII. Jan. 6, 1669, M. Benoit Vassal, Chirurgion at Paris, opening the Body of a Woman of 32 Years of Age, of a sanguine Constitution, and a masculine Port, found two *Matrixes*. They were so well disposed by an extraordinary Contrivance of Nature, that the true one had conceived eleven several times, viz. 7 Males, and 4 Females, all born at the full Time, and all perfectly well formed: But they were at last followed by a Brother, yet a *Fætus*, that was conceived in an adjunct *Uterus*, in a Place so little capable of Distention, that seeking Enlargement, after it had caused to the Mother for two Months and a half grievous Symptoms, did at last, being of the Age of about 3 or 4 Months, break Prison, and found its Grave in that of its Mother, by a very great Effusion of Blood in the whole Capacity of her *Abdomen*; which cast the Mother into such violent convulsive Motions for 3 Days together, that she died of them.

A Woman with a Double Matrix; by M. Benoit Vassal. n. 48. p. 969.

Fig. 54.

A, A Part of the *Vagina*. B, The internal Orifice of the *Womb* laid open. C, The Neck of the *Womb*. D, The Cavity of the *Womb*. E, A Line dividing the Cavity of the *Womb*. F, The Bottom of the *Womb*. G, Two *Sinuses* found in the Bottom of the *Womb*. H H, The Thickness of the *Womb*. I I, The Broad Ligament, or a Production of the *Peritonæum* of the left Side, containing within its Foldings the *Vasa Deferentia* and *Ejaculantia*. K, The *Spermatick Artery*. L, The *Spermatick Vein*. M, The *Testicle* or *Ovarium*. N. The True *Vas Ejaculatorium*, inserted into the Bottom of the *Womb*, by a *Sinus* which is found there. O, Another *Vas Ejaculatorium*, which enters at the Neck of the *Womb*, whereby Women eject after Conception. P, The Tube of the *Womb*. R, The round Ligament. S, The broad Ligament from that Part where in this Case a *spurious Womb* is formed. V, The *spermatick Vein*. T, The *spermatick Artery*. Y, The *Testicle*. Z, Part of the Tube. 2, The true *Vas Ejaculatorium* which enters the Bottom of the *Womb* by the above-mentioned *Sinus*. 3, Another *Vas Ejaculatorium* going into the Neck of the

Explication of the Figure.

Womb. 4, The Part lacerated from the *Fœtus*, being increased in its Bulk.
 5. The *Fœtus* in the Situation in which it was found involved in its *Amnios*.
 6. The *Umbilical Vessels*, 7, The *Placenta*, adhering to a certain *fleshy Substance*. 8, That *fleshy Substance*. 9, The round *Ligament*.

By— ib.

2. It may be, that that which is by *M. Vassal* esteemed a *second Womb*, is nothing else but the true *Matrix* lengthened, or that which by Anatomists is called *Tuba Fallopii*.

A Woman
 Hydropical
 in the external
 Tunick of the
 Uterus; by
 Mr. Turner.
 n. 207. p. 20.

CIII. A Woman aged 44 and upwards, some time after she was married, had conceived, (as she thought) by some supposed Symptoms of *Pregnancy*; and, in order to her Delivery, at the Expiration of the Time of her Account, her Midwife was consulted. Her (fancied) Pains came on, and she thought herself very near her Labour. Her Belly was grown very big, and had gradually increased from the Time of her (imagined) *Conception*; but, alas! she found herself deceived in her Expectation, and her Preparations for this Time all in vain. Her Illness wore off, without leaving any Prognostick of an approaching Birth. Thus she continued, growing bigger and more indisposed, and took much Physick, but without any Relief, those whom she consulted not knowing what her Distemper was. At last, after more than three Years from the Time she thought herself pregnant, she removed into the Air, where she had not continued long before she languished and died.

The Corpse being laid as advantageously as might be, we began our *Incision* from the *Umbilicus* transverse the *Abdomen* to the *Iliæ*; and from the same Center another *Incision* direct to the *Os Pubis*. Here was now an Expectation on all Hands of something rare and monstrous, when on a sudden one of the Dissectors (little thinking what was so near) in cutting through the *Peritonæum*, accidentally thrust his Knife too far, and immediately there arose a Spring, as it were of a *limpid Serum*, or *Lympha*, as clear as Water from a Fountain, rising up a very considerable Height, and with great Impetuosity. Having emptied the containing Part of its Water, which in Quantity did somewhat exceed two Gallons, we found its Inclosure was a thin transparent Membrane. And when I had turned this Membrane to the Right-side, I perceived underneath this outward *Tunick*, or, (as I thought) adhering to it, a more carnosus Substance. We then divided the *Os Pubis*, and passed in a Probe through the *Pudenda* into the *Vagina Uteri*, and having traced it as far as it went, by looking into the *Pelvis*, and searching for that carnosus Substance I have already spoken of, we found it to be nothing less than the *Uterus* itself; when cutting into its Body, we perceived the End of the Probe already entered into the *Cervix* or Neck thereof. So that (what seemed to us strange) we were at length ascertained of the Truth, and convinced that the aforesaid Water was contained in the external *Tunick* of the *Womb*, whose great Weight had thrust the Body thereof perfectly on one Side, and hindered an Admission of Search from the *Vagina*, towards the *Fundus Uteri*, the *Cervix* thereof being kept close, as in a true *Conception*.

One of the great Indications of this Woman's *Pregnancy*, was a Flux of a whitish or pallid Humour to her *Breasts*, which she could squeeze out at Pleasure,

sure, and thought it to be no other than *Milk* generated therein, in order to the Nutrition and Conservation of a future Birth. She had likewise labour'd the greatest Part of the Time under a Suppression of the *Menses*, whose Reflux to the Breasts, when an Alteration had been induced by its Glandules, might, as I conjecture (issuing from the *Papillæ* under a subalbid Form) be taken for *Milk*, and give Grounds of the Suspicion that she had conceived.

CIV. This Woman was about 50 Years old ; had been married, but had never born Child ; had been a Widow for about 10 Years before her Death, in which Time she was much oppress'd with Grief, and her Belly, by degrees, began to swell ; yet not much, till about 4 Years before she died. In the Year 1677, at which time she weigh'd 216 lb, I advis'd her to the Use of *Cathartick Hydragogues*, and *Diureticks* ; after the Use of which for some Time, she weigh'd but 200 lb. But still the morbifick Matter was re-accumulated to the diseas'd Part. So that resolving to forbear further Medicines, within half a Year after she weigh'd 250 lb. Her Belly being, at last, so far distended, as to hang down, as she sat, a good way below her Knees.

Being call'd to open her, I put a Pipe into the Cavity of the *Abdomen* ; but hereupon there issued only some Drops of *Serum*, like the White of an Egg. At another Place there ran about 20 lb of a brownish Water, or *Serum*, out of the Vesicles, hereafter mentioned, being pierc'd. Having separated the Muscles of the *Abdomen*, I found no *Serum* or *Hydropick* Water therein, but a Heap of Bladders, of several Sizes presented themselves. From the greatest whereof, being pierc'd, there issued out about 20 lb more, of a brown and thickisk *Serum*, tinctured with a Sediment of the Colour of Amber. Some of the Lesser were about the Bigness of a Child's Head ; which yielded a slimy *Serum*, in Consistence and Colour like the Mucilage of Quince-Seeds. Others were much less ; some as Big as a Man's Fist, some as an ordinary Apple, and some as a Walnut. In most of which was contained a *Serum* like to the White of an Egg ; in some of them, much less viscous and somewhat white, like Starch newly boiled. At the length I perceived, that all these Bladders were Parts some way relating to the *Womb*. Wherefore having separated the *Ossa Pubis*, I took out the *Womb*, with the *Pudendum*, and Parts appendent all together. And then, amongst other Particulars, observ'd, that the Right *Testicle* or *Ovary* was but small, white, and its Vesicles in a manner dried up ; but the Left, to be swelled into a vast Bulk : The aforesaid Bladders, in one of which were contained so many Pounds of Liquor, being nothing else originally but the *Eggs* belonging to this Left *Ovary*. Imagine you saw about 40 Bladders, some of a little Pig, others of a Hog or a Calf, and some of an Ox, all distended with Liquor, and tied, like a Reeve of Onions, all together, and you have also seen this *Ovary*. The *Testicle* or *Ovary* itself, all the *Serum* being exhausted, weigh'd (together with the *Womb*, which was but light) 25 lb. Out of all the said Vesicles or Bladders together, were exhausted above 112 lb of *Serum*.

A Woman
Hydropical
in her Left
Testicle ; by
Dr. Henry
Sampson.
n. 140. p. 1000.

*A Dropsy in
one of the O-
varies of a
Woman; by
Dr. Hans
Sloan. n. 252
p. 150.*

CV. Mrs. Brown, aged about 29, of a sanguine Complexion, had been married about 4 Years, in which time she had had one Child: Her Belly swelled, and she thought she was with Child; she had often great Hysterick Fits, something like those of an *Epilepsy*, lying in her Fit sometimes without Sense or Motion, at other times with great screaming and idle Talk. These with proper Remedies, were removed at several times with Difficulty. Coming to be about 6 Months gone with Child (as she thought) she began to have some Doubt whether it were so or not, because she had her *Catamenia* very regularly. I was of Opinion she was not with Child, and would have treated her with Steel, and Purgers of Water, as *Hydropically* disposed Bodies require; but she fancying she felt the Child stir, put a Stop to that Course, and went on expecting the good Hour, having prepared all things for the Child (to be born) and herself during her Lying-in. She delayed the proposed Method for 3 or 4 Months beyond 9, thinking she had counted wrong; but at last she was persuaded to Medicines, and underwent a very strict Course, as for *Hydropick* People: Her Legs did not swell nor pit, her Belly was unequal, and the Swelling more of the Right-side, so that the Navel was thrust over to the Left-side. She had also Resolving Plaisters applied to her Belly, but all in vain, excepting that with much Anxiety, Gripes, and Trouble, so much Water might be evacuated, as to bring down her Belly 3 or 4 Inches. At last, after she had consulted other Physicians, and some Quacks, she hearkenod to a *Paracentesis*, which was proposed by some; and after a suitable Prognostick, was resolved on, and performed at several times by discharging great Quantities of, first, a limpid thick *Serum*, as Whites of Eggs, insipid and coagulable into the like Substance by Heat: It came afterwards to the Colour and Consistence of thin Honey, and coagulated on Evaporation. In some time she fell into a Fever, with a great Thrush, Hickups, and, in about 9 Days, died.

Out of her Body, when dissected, was discharged some Buckets of the same watry Substance that had been discharged by the *Paracentesis*; Part of this was floating in the *Abdomen*, but far the greater voided out of great and thick Bags, some of which were as large as the Stomach, others smaller, many of them rotted to Pieces, and all of them in the Right *Ovary* or *Tef-ticle*: The *Uterus*, *Tuba Fallopiana*, and every thing else being sound, bating the *Omentum*, which was quite consumed. What was very strange was, that several Bags of the larger Size in this *Ovary*, contained others smaller within them; and those which were larger were filled with a mellaginous Liquor; those smaller, with one like Whites of Eggs. Here and there between, were *Apostems*, which were but small, and filled with yellow Matter. The *Gall-Bladder* was full of several triangular yellow *Stones*. She was very lean all over her Body, and never had her Legs swell or pit; nor the Noise of Water on her stirring in Bed, till some small time before the *Paracentesis*; when she fell into so great an *Orthopnœa*, that she could not, unless erect, breath.

CVI. This

CVI. This *Embryo* was from a Woman of forty Years of Age, who miscarried, for the the third Time, *Sept.* 27, 1685. About four Weeks before that Misfortune happened to her, she had her *Menses* upon her, but the third Day before the *Abortion* she was busy in ironing and calendring of Cloaths; and the same Day she was seized with a violent *Flooding*, which she had formerly been subject to; at last, however, the *Placenta* came away together with the *Chorion*, *Amnios*, and *Fætus*, in the Shape of an entire Egg, which I had leave to carry home with me, without its being handled by any Body else, to examine it at my Leisure.

An Embryo
of 4 Weeks: by
Dr. Phil. Ja.
Hartman.
n. 238. p 69.

Fig. 55. The external *Cotyledon* Part of the *Placenta*, by which it adheres to the *Uterus*. *a a a a*, The Size of the *Placenta*, which filled the whole Cavity of the *Uterus*. *b b b b*, The *Cotyledon* Part set round with small globular *Glands*; the round Points in the middle of the *Glands* shew the gaping Mouths of the *Vessels* broke off. About the Points are dug, as it were, little *Foveæ*, which likewise appear in the dried Preparation of it. To this same Part, internally were applied little *Vesicles*, distended with a reddish yellow Liquor, and these are expressed in *Fig. 57*. *c c c*, Places in which the *Blood-Vessels* were remarkably conspicuous.

Explication of
the Figures.
Fig. 55.

Fig. 56. Another Part of the *Placenta* externally, by which it adheres to the *Uterus*. *A*, That Part from which the longer *Vessels* that were tore off depended; where the *Placenta* was more firmly glued or connected to the *Uterus*. *B B*, The *Borders* or *Fimbriæ* of the *Placenta* becoming thin. *C*, A *Foramen* through which the *Chorion* and *Amnios* appeared prominent. *D D D D*, The *Globe* of the *Placenta*, which all Figures represent, as if it lined the whole Cavity of the *Uterus*, and the *Fætus* was contained in it as in another little *Uterus*.

Fig. 56.

Fig. 57. The first internal Part of the *Placenta*, with the *Embryo*. 1, A remarkable *Vesicle* filled with very red Blood. 2, Another *Vesicle* filled with a yellow Liquor. 3, The largest of all distended with a yellow Liquor. 4 4 4 4, Lesser *Vessels* placed round the others, of various Sizes, and filled with different Fluids, red, yellow and limpid. 5, The *Umbilical Rope* with its *Vessels*. 6, The *Embryo*, its Figure, Size, Situation of its Hands and Feet, its *Penis*, and Rump, the *Anus*, as if marked Black with *Meconium*, the *Helices* of the Ear, and the gaping Mouth, all very accurately delineated. 7, The Place where the Coat of the *Funis Umbilicalis* insinuated itself into the Cavities of the *Vesicles*. 8 8 8 8 8, A Space void of *Vesicles*, where the *Chorion* and *Amnios* are connected to the Borders of the *Placenta*.

Fig. 57.

Fig. 58. Another Part of the *Placenta* internally without the *Embryo*. 1 1 1, *Vesicles* of various Sizes, and filled with Liquors of different Colours, 2, *Blood-Vessels* running here and there upon it. 3 3 3, A Space void of *Vesicles*, shewing an Expansion of the *Placenta*, with the Coat of the *Chorion* annexed to it. 4 4 4, The Borders of the *Chorion* with the thinner Part of the *Placenta* tore away. 5, A *Foramen* from the *Placenta* and *Chorion* being tore.

Fig. 58.

Fig. 59.

Fig. 59.

Fig. 59. The Embryo. A, Its plump Habit of Body. 1, A white Line dividing its *Fore-head*. 2, 3, Two other white Lines reaching to the *Coronal Suture*. 4, Two *Points* marking out the *Foramina* of the *Nostrils*. 5, The *Helix* of the *Ear*, distinguished by a whitish Line. 6. The *Penis*. 7. The *Toes* ending irregularly, with small Lines pointing out the Interstices betwixt them; and the same in the *Hands*. 8, The *Protuberance* of the *Rump*, with the *Foramen* of the *Anus* marked. 9, The Opening of the *Mouth*. 10, The whitish *Spinal Marrow*, sending off laterally slender white Lines of an equal Shortness. 11, The *Umbilical Rope*, with the slender Vessels shining through its Coat.

The Respiration and Nourishment of a Fœtus in Utero Materno; by Dr. Charles Prellon. n. 226. p. 464.

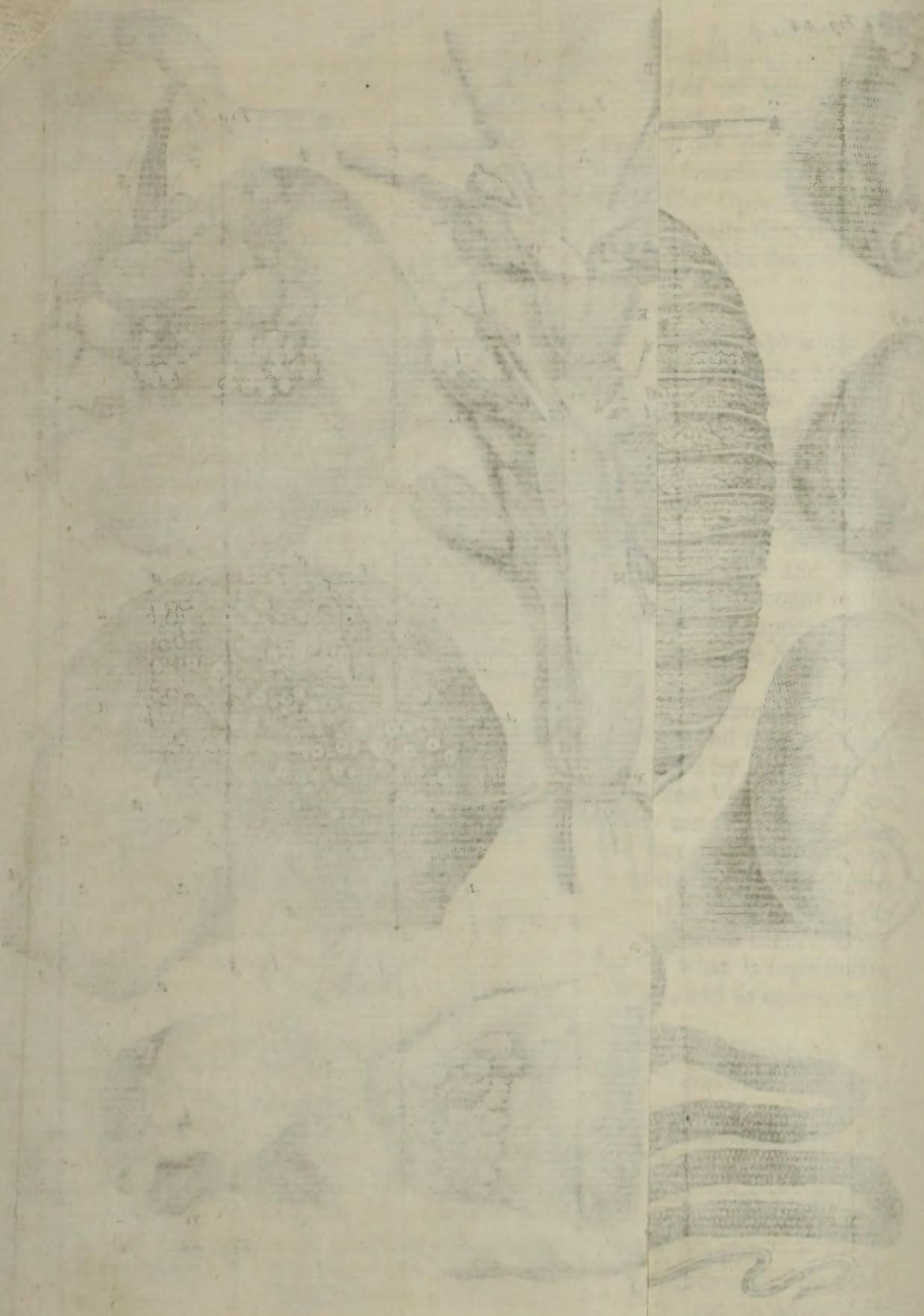
CVII. It is much controverted, Whether a *Fœtus* does *respire* while in *Utero Materno*, there being only a continued Circulation from the Mother to the Child, and from the Child to the Mother, by means of the *Placenta* and *Cordon*, so that the *Lungs* of the Mother serve for both, and that the Blood circulates a much shorter way by the *Canal of Communication* and *Foramen Ovale*, without passing the *Lungs*, than it does after the Birth, the Child having then the proper Use of its own *Lungs*, the former Passage being so mechanically stopped by a *Valvule*, that the Blood quite alters its former Channel or Course, as I have seen it, to my great Pleasure and Satisfaction, demonstrated on several *Fœtus's* dissected on that Account in the private Lectures of M. du Verney. And that the Thing may appear more clear, I shall mention two Opinions that obtain most as to the *Nourishment* of a *Fœtus*.

The *first* is, That there are a Number of *Glands* in the internal Tunick of the *Matrix*, which all the time of Child-bearing filter and separate from the Blood a white Liquor, like unto *Chyle*, that is received by the *Glands* of the *Placenta*, (which is nothing but a Heap of *Glands* and *Vessels*) that are joined with those of the *Matrix*; hence in Brutes they can separate the *Placenta* from the *Matrix* without the Effusion of Blood, but only of that white Liquor, the *Umbilical Veins* and *Arteries* being distributed to all the *Glands* of the *Placenta*; so that the *Capillary Veins* receive that Liquor with the Blood, and carry it to the *Vena Porta* of the Child, and from thence to the Heart, to be distributed through the whole Body; and what is superfluous, is carried back to the *Placenta*, by the *Umbilical Arteries*, and so continues to circulate from the *Placenta* to the Child, & *vice versa*.

By the *second* Opinion they pretend, That the *Umbilical Vessels* are dispersed through the *Placenta*, and that the *Capillary Veins* of the *Placenta* are *anastomosed* with the *Capillary Arteries* of the *Matrix*, from which they receive the Blood that is carried to the Child for its *Nourishment*, and the Remainder is carried back by the *Umbilical Arteries*, which are *anastomosed* with the *Veins* of the *Matrix*; so that the Circulation is made from the Mother to the Child, and from the Child to the Mother, by means of the *Placenta* and *Umbilical Vessels*.

Which of these Opinions is the most probable, depends upon the Anatomy of the Parts; but any of them will serve my turn, *viz.* to prove there

Fig



is a continued Circulation from the Mother to the Child, and from the Child to the Mother. And to confirm it, I shall produce two or three Experiments which I had occasion to see performed. The first was on a *Fætus*, by M. du Verney, where, by blowing into the *Umbilical Vein*, and tying the Arteries a little after the *Umbilical Arteries* were distended. The second Experiment, performed also by M. du Verney, was upon the Dissection of the *Uterus* of a Woman newly brought to Bed, by blowing into the *Hypogastrick Artery*, the whole Vessels were filled, and the *Matrix* blown up; and, for a further Trial, he made an Injection, by which the Liquor came forth at the Orifices of the little Glands, which are dispersed through the *Matrix*. This Experiment cannot be performed but only in such Cases. The third Experiment I saw performed by M. Bidloo, Professor of Anatomy at *Leyden*, on a *Fætus*, where, by an Injection of Wax into the *Umbilical Vein*, the whole Vessels were filled, both Veins and Arteries; at which he was a little surpris'd, being contrary to his Doctrine. I could instance several other Experiments, but this is sufficient to prove there is a continued Circulation from the Mother to the Child, and from the Child to the Mother; so that a *Fætus* seems not to *respire* but by the Mother, as M. Merrey, in the *Memoires de l'Academie de Science* has confirmed by several Experiments: The first was upon two Tortoises, by tying their Jaws strongly together, and sealing their Nose and Throat with *Spanish Wax*, to try how long they could live without *breathing*: The first lived 31 Days, the other 32. Another Experiment was by laying open the *Sternum* of a Dog, who died a little after; but having lifted that of a Tortoise, it lived yet 7 Days.

Although their Reasons seem to be strong, that a Tortoise can live so long without *breathing*, having the *Canal of Communication* and *Foramen Ovale* always open, yet M. Merrey pretends they are not concluding, but by other Reasons quite different; and that is, by the continued *Circulation*, as we have said above, as he has several times observed in *Accouchmens*: That if the *Cordon*, by which the *Fætus* is tied to the *Placenta*, was so pressed, that the Blood could not pass from the Mother to the *Fætus*, and that the Head of the *Fætus* is engaged in the Passage, the *Fætus* is *choaked* in a very little time; but if the Head is come forth, the *Fætus* dies not, although the *Cordon* be strongly compressed by the rest of the Body.

CVIII. She was a young Woman of about five or six and twenty, and had lain in not long before, which I discovered, 1. By the *Cicatrices* of the *Scarf-Skin* of the lower *Belly* which were still recent. 2. By the Tearing of the *Hymen*, which was just newly cicatrised. 3. By the Largeness of the *Matrix*, and in short by the Orifice of the *Ovarium* of the left Side, through which the *Ovum* which contained the last *Fætus* was dropt, which remained still pretty large, and the Lips of it seemed still a little shattered. In the mean while, though she had not been lain-in a long Time, whether it was owing to some Debauch, or perhaps imagining that if she should fall with Child, they would not take her Life, she diverted herself with a Friend, or perhaps with one of the Prisoners, so as to conceive. But having been executed.

An Egg found
in the Tuba
Fallopiana of
a Woman; by
M. Buffiere.
n. 207. p. 17.

ecuted before the *Egg* impregnated with the *Male Seed*, could have Time to fall down from the *Ovarium* to the *Uterus*, when I opened her I found the *Fallopian Tube* of the left Side extraordinarily dilated towards its Extremity, and this Dilatation where it was largest was a little more than an Inch in Diameter, and extended a little more than an Inch and Half, diminishing on the Side next to the *Womb*. The Part thus dilated became crooked and embraced almost the whole *Ovarium*, sticking so close to its Membrane as not to be separated from it without Force. Upon detaching it there flowed out a limpid unctuous Liquor, which served in all Appearance either to relax the Membranes of the *Tube*, so as it might dilate itself sufficiently to allow the *Egg* to pass easily into the *Matrix*; or possibly to lubricate the *Tube*, and by that Means assist the *Egg* in its Passage; or perhaps for them both. I examined at first whether I should find any Thing in the Body of the *Tube*, which could produce this Liquor; but I could observe nothing there of that Kind, although the *Tube* was a good deal thicker than usual. This Thickness was owing to the Swelling of the *Fibres*, which were as fleshy as those of common Muscles, which only happens in this Case, no doubt, in order to give them sufficient Force and Motion, for squeezing the *Egg* (after it is detached) from the *Ovarium*, and pushing it into the *Womb*. I am of Opinion then that this Liquor, which is contained in the *Tube*, comes from the *Ovarium*, and that the *Fibres* and small *lymphatick Vessels*, or others, which break to open a Passage for the impregnated *Egg*, let this Liquor run out there, so that although the Tearing the *Ovarium* is a Wound, and a Symptom, yet it has its Use, and produces Effects perhaps absolutely necessary, either for the first Nourishment of the *Egg*, or to facilitate its Passage into the *Womb*. So well does Nature know how to improve every Thing to the best Advantage. What confirms me in this Opinion is, that in the Females of Brutes, from whose *Ovaria* several *Eggs* are broke off at a Time, this Liquor is found in a very great Quantity. I was lucky enough not long ago to find in a *Sow* the same Appearances as in the *Woman*, in which the *Tube* of each Side, which embraced the *Ovarium*, contained between three and four Ounces of this Liquor.

The *Tube* being detached from the *Ovarium*, and the Liquor poured out, the *Egg* was brought to view, of the Bigness of a Filberd, surrounded with Liquor, in the middle of the dilated Cavity of the *Tube*. Three Parts of the *Egg* were already out of the *Ovarium*, by the Hole which it had made there, so that it seemed hardly to be attached to it; but when I went to separate it, I found it still fixed by a firm Pedicle, upon which run the Blood-Vessels to disperse themselves within and upon the *Egg*. It is by these Vessels that the *Fætus* receives its Supply of Nourishment, not only in the *Ovarium*, but likewise in the *Womb*: This *Pedicle* serving to form the *Placenta*, (if it is not the *Placenta* itself already formed in the *Ovarium*) by attaching itself to the Body of the *Womb*. It is likewise by this that we must conceive the *Seminal Spirit* of the *Male*, to be conveyed into the Body of the *Fætus* within the *Egg*, to give it Motion and Fruitfulness.

There

There did not appear any sensible Change in the *Womb* yet, excepting that there was a good deal of *Mucus* in it, which is natural enough. The *Tube* of the left Side was in its natural State, as well as the *Ovarium*, except the Orifice by which the *Egg* of the preceding *Birth* had passed through.

Fig. 60. The *Womb*. *aa*, The *Body* of the *Womb*. *bb*, The *Tube* dilated embracing the *Ovarium*. *d*, *c*, The impregnated *Egg* shut up in the *Tube*. *E*, The left *Ovarium*. *F*, The Hole through which the *Egg* of the preceding *Birth* had passed. *g*, The left *Tube*. *h*, The *Hypogastrick Artery*. *II*, The *round Ligament*. *K*, The *Egg* detached from the *Ovarium*. *L*, The *Pedicle* by which it still hung at the *Ovarium*.

Explication of the Figure. Fig. 60.

Fig. 61. The *Womb* of a *Sow*. *aa*, The *Vagina*. *b*, The *Vulva*. *c*, The *Bladder*. *ddd*, The *Horns* of the *Womb*. *EE*, The *Trumpets*, or *Fallopian Tubes*. *FF*, The *Extremity* of the *Tubes* dilated, embracing the *Ovaria* and full of *Liquor*. *g*, The *Appendix* of the *Tubes*. *HH*, The *Arteries* of the *Womb*. *iiii*, The *Eggs* as they go out of the *Ovary*. *KK*, One of the *Tubes* detached on the Side of the *Ovary*.

Fig 61.

CIX. Madam *de Saint Mere* had been safely brought to Bed 8 times; and after having continued 5 Years without being with Child, about 3 Months before her Death she suspected herself to be fallen into that Condition again, because having never failed of being very regular, and not finding herself ill, she was more than a Month without her ordinary Relief. But whilst in this State she had a little Show, which scarce left her wholly during the two last Months of her Life, and which she passed nevertheless without much Trouble, so that she thought herself to be secure, as to the Point of her being with Child. But 22 *Apr.* 1682, after she was up in the Morning, in very good Health, she fell into *Faintings*, which made her lose absolutely her *Pulse* from that Moment, without depriving her of her Understanding or Speech. About 8 o'Clock in the Evening I came to her: I found her cold, her Countenance deadish, and covered with a clammy and cold Sweat, having still an entire Understanding, and her Speech strong. She complained of a great *Cholick* in the Region of the Right Groin, which terminated at the Reins: This *Cholick* was so violent, that as I was going to touch the Place, she prayed me not to press it, and told me, I should make her fall into a *Swoon*. In a Moment after, she felt all the *Præludiums* of an imminent *Travail*; she called her Chirurghion, and died in his Arms, saying, *I am delivering, I am delivering*; there appearing outwardly neither Distillation nor Flooding, nor any Mark of this Disorder.

A Fœtus formed in the Ovarium; by M. de S. Maurice. n. 150. p. 285.

M. de la Chese was made choice of to open the Body. As soon as he had opened the *Integuments* of the *Belly*, we saw in the *Epigastrick* Region, all the *Intrails* floating in *Blood*: I caused 2 ℥ to be taken forth with a Spoon, to avoid changing the Situation of the Parts; after which, seeing that there remained in the Right Flank a prodigious Quantity, which was coagulated, I tried myself to take it out with my Hand; and amongst the first Clots which I drew forth, I found a little *Fœtus*, about the Bigness of a Thumb, and a 3d less in Length, all very distinctly formed, and in which was mani-

festly

festly discovered the Sex of a Boy, but naked and without covering. Two Fingers from this Place I found the Right *Cornu* of the *Womb*; but was amazed when I found the *Testicle* torn long-ways, and through the Middle on the Side, that it did not touch the *Tuba*, and all its Cavity full of clotted Blood. I no longer doubted but this was the Place where this Infant was formed; and I conceived, that having acquired in this Place a Growth too great to be able to fall in time; and having continued to grow there without being able to come forth, it had at length broken its Prison, by stretching it. I was confirmed in this Opinion, when comparing this *Testicle* with the Left, I found it at least 4 times bigger, its Greatness approaching that of an Hen's Egg, and the Left being not greater than a little Chesnut; it was all red without and within, besides the clotted Blood that it contained; whereas the Left was pale, and full of little Grains of the Colour and Consistency of yellow Tallow. I examined the *Tube* on the Right-side; and I could not find that this Infant had ever entred there; it was in all Things like the Left *Tube*. The *Womb* was every where without any Rent, and in State purely natural: I only observed, that it was a little bigger and softer than it is found in Women who die without being with Child. It was all, as Dr. *Harvey* has described it, in the first Month of *Pregnancy*: But when it was opened, I found not the least Sign of *Conception*. Indeed the Vessels of the interior Membrane appeared to me full of Blood, and varicous, as it were, which doubtless was the Cause of that little Show of Blood, as before-mentioned.

Authors speak of certain *Fœtus's* found in the *Tubes*; and of others that have been found in the Cavity of the *Belly*, the *Womb* nor the *Tubes* being any way torn; but I do not think that any Person hitherto has been able to shew, that the *Conception* is made in the *Testicle* or *Ovarium*, as it seems to me that the Fact which I have now related manifestly demonstrates.

*A Fœtus lying
without the
Uterus in the
Belly; by M.
Saviard. n.
222. p. 314.*

CX. 1. A Woman big with Child, came to *l'Hotel Dieu* to lie in of her 3d or 4th Child; and after excessive Pains about the *Navel* and the lower Part of the *Belly*, by the different Motions of the Child, she died there, 13 Oct. 1696. She was quickly opened by M. *Colignon* and *Foui*, assisted by the Chief Midwife Mad. *de Glue*: They found the Child dead, and not in the *Matrix*, which was whole, near it. They deferred a further Search till the next Day, and sent for many eminent Physicians and Chirurgions. We then examined the Body with Attention, and found that all the Parts that compose the *Matrix*, both inward and outward, as also the *Vagina*, were very sound: It was as big as it uses to be in Women 10 or 12 Days after they are brought to Bed. The *Internal Orifice* was of a livid Colour, occasioned by the several Touchings of it, both before and after Death. There was no Mark of a Cicatrice or Hole, but those of the Processes, called *Tubæ Fallopianæ*, which yet were hardly wide enough to admit of a Hog's Bristle. All the Company did agree, that the Child was never conceived in the *Matrix*, and that it never had stayed there. The Right *Testicle*, or *Ovary*, was very found, but the *Tuba* and its Fringe were rotten in the Place where it is fastened

fastened to the Membranes of the *Peritonæum*, which formed the *Bag* in which the Child was wrapt. The Left *Testicle* was of the Bigness of a Hen's Egg, full of a stinking *Serum*, and the Ligaments large; the *Tuba* and its Fringe were rotten. The *Bag* was placed betwixt the *Matrix* and the *straight Gut*, in the Cavity which is formed by the bending of the *Os Sacrum*: The Child was on his Knees, lying towards the Right-side, and seemed to have been dead 7 or 8 Days; for the Scarf-skin, or *Epidermis*, did easily separate from the Parts under it. The Child had left its *Placenta*, though still fastened to it by the *umbilical Vessels*; and the *Placenta* being out of the *Bag*, was on the Left-side, whence was voided a great Quantity of Blood into the Capacity. Its Edges being brought near to one another, represented a Bowl, such as they play at Nine-Pins with. All the Membranes that formed this *Bag*, and those that encompassed it, were gangrened.

I believe that the Bigness which we observed in the *Matrix*, proceeded only from the Reflux of Blood, and the Spirits which carried the Nourishment to the *Fætus* when it lived.

2. A Goldsmith's Wife, near 9 Months gone with her 5th Child, was received into the *Hotel Dieu*, 29 Sept. 1696. She was then about 34 Years of Age, of a tender Constitution, had had 4 Children before, all which had done very well; but with the present she had been very ill, and endured a great deal of Misery. The Midwife who examined her Body, found a considerable Rising on the Right-side near the *Navel*, which very much resembled a Child's Head, her Belly below that Place bearing no Proportion to that above, or to the Time of her *Pregnancy*. On the Left-side there was nothing singular. The Midwife thought she felt, through the *Vagina*, a thick Membrane filled and distended with Water, and in it the Heel of a Child bent towards the Thigh; but she could not be assured whether this was within the *Womb* or not, by reason the *inner Orifice* was drawn so high, under the *Os Pubis*, she could not, without some Difficulty, touch it with the Extremity of her Finger. Upon trying sometime after, she could not discern any thing like the *Fætus* she had before felt. The Patient told her, That for the first 6 Weeks after her being with Child, she had great and continual Pains, which shot towards the *Navel*, and terminated there, and these lasted till the 3d Month; that from thence to the 6th she had frequent *Convulsions*, *Apoplectick Fits*, and terrible *Syncopes*, so that those about her despaired of her Life; that from the 6th to the 8th Month, she had enjoyed a much better Health, which in some measure had strengthened both her and her Infant; that the Pains she had endured since that time, seemed to be so many alternate *Throws* (probably proceeding from the repeated Strokes of the Child's Head in that Place where the *Teguments* were so thin, by reason of their great Extension, that the Hardness of the *Cranium* could plainly be discerned through them). In this Condition was this miserable Woman when she was received into that *Hospital*, till her Affliction increasing, she could not lie on her Side or Back, being forced to sit in a Chair, or kneel in Bed, with her Hand resting on her Breast. These strange and unaccountable Symptoms obliged the Midwife to consult with the Physician and Master Chirurgion of

By Dr. Fern.
n. 251. p. 121

the House, who thought it was best to leave the Work to Nature, and prepare the *Woman* for her *Labour*, by opening a Vein in her Foot. The Evacuation was ordered to be small (in which regard was had to the Weakness of the Patient, and the Nicety of her Constitution). However, after this time the *Child* made no Efforts, and the Tumor subsided, there remaining only an *hydropick* Indisposition, which might be perceived by the Fluctuation; and a great Quantity of Water came away for several Days from the *Orifice* of the Vein; infomuch, that she who seemed to have her lower Belly and Thighs extremely distended, was very much extenuated before her Death.

After her Decease her Body was opened by M. *Jouey*: And upon the first Incision through the *Teguments*, there came away 2 or 3 Pints [of *Paris* Measure] of Water and Blood, and there appeared the Head of a Child naked; and when the Parts were all laid open, there was found an entire Female *Fætus*, contained in a sort of Cover or Bag, which at once served it both for a *Womb* and Membranes. M. *Jouey* took the Child with the *Umbilical String* out of the Mother's Belly, tracing the *String* to the *Placenta*, into which it was inserted. This last appeared like a great round Lump of Flesh, and adhered so firmly to the *Mesentery* and *Colon* on the Left-side, that it could not be separated from them without some trouble. On one side of this Lump was a lesser, about the Size of a *Kidney*, which principally adhered to the *Mesentery*, and received several Branches of the *String* into it. The larger Lump was round, and the greatest Part of it adhered to the *Bag* or Case which contained the Child. This Case or *Bag* was corrupted and mortified in part, which probably might proceed from the frequent Strokes of the *Infant's* Head. It sprung from the Edges of the *Tube*, or *Fimbria* of the Right *Ovary*, which was more entire than the Left, and proceeded obliquely to the Left Side, terminating at the Bottom of the *Pelvis*. In its Descent it sent out a small Portion between the *Womb* and the *Rectum*. This *Bag*, by compressing the neighbouring Parts, had gained a considerable Space in the above-mentioned Cavity; in such manner, that a great Part of the *Child's* Body was lodged at the Bottom of it, in a bended Posture, with the Head projecting forwards, which formed the Prominence near the *Navel*. This *Bag* seemed to be nothing else than an Elongation and Distention of the *Tube*, and an Expansion or Production of the *broad Ligament* on the Right Side, which was evident from its Continuity to those Parts, and the Distribution of the *spermatick Vessels*, which were larger than usual, and passed from the Extremity of the *Tube* to the larger Lump. The *Womb* was entire, and in its natural State, except that it was something larger than ordinary, being about the Size of that of a Woman 10 or 12 Days after her *Delivery*, and no Marks that the Child had been lodged in it.

M. *Jouey* having observed this, thought fit to desist till several eminent Physicians and Chirurgions were called, and then the *Womb* being carefully dissected, it was unanimously agreed, that the *Fætus* had never been in it, [it being, as it was noted above, in the same State as in Women who are not with Child, except the small Dilatation of its Bulk, which might arise from a Compression of the Vessels, and Interception of the reflux Blood, by the

unnatural Position of the *Fœtus*.] In thrusting a long and slender Probe through the Right *Horn* of the *Womb*, it easily passed into the *Tube* of the same Side, for 3 Fingers breadth in length, but it could not be thrust further, by reason of the Constriction of the *Tube* in that Part. The Capacity of the *Tube* could not be distinguished, the *Parietes* of it, by their Coalition with the *Chorion* and *Amnios* of the *Child*, forming the *Bag* in which the *Child* was included, which extended from the *Tube* on the Right Side to that on the Left, and was agglutinated to the *Viscera* of the *lower Belly*, the *Rectum*, and to the back Part of the *Womb*, as appeared by some Fragments remaining on those Parts after the Separation.

CXI. In dissecting the Body of a Woman, who supposed herself to be 3 Months gone with Child, I found the *Womb* very small, not larger than in Virgins, and a hard Substance in the Right *Horn*, which being opened, appeared to be the *Skeleton* of an *Infant*, with the *Navel-String* smeared round with a white Matter not unlike Plaister.

A Fœtus in the Right Horn of the Uterus; by Dr. Fern. n. 251. p. 125.

CXII. A few Weeks ago, I was called to a Woman in Labour, who had had her Pains upon her for two Days, but without any Effect, for there was not a Drop of Blood nor Water had come away; and indeed no Wonder; for the *Vagina Uteri*, (a little above the Orifice of the *Urethra*) was as firmly grown together, and its Sides as closely united with one another, as if it had never been perforated. I asked her Husband how long it had been in this State, and he told me five Years, *viz.* from the Time of her former lying-in, when I delivered her of a difficult Birth. That it was grown so close together I discovered not only by the Touch, but by the Sight. After a whole Day's Labour, from the Time that I was called, by Means of the Pains which were strong and frequent, together with the Assistance of the Hand of the Midwife, the Membrane was at last a little opened (and if I am not mistaken, tore) so as to admit one's little Finger. In order then to assist the Birth, I thought it proper to dilate this Opening by the *Speculum Matricis*, which being done a great *Hæmorrhage* immediately ensued, which weakened the unhappy Patient so much, that she died in six or seven Hours after she was delivered of a dead Child.

A Woman with Child, notwithstanding a Coalescence of the Vagina Uteri. By ——— n. 237. p. 56.

Upon revolving this Case frequently in my Mind, how it could happen that this Woman should conceive, when neither the *Member* nor *Seed* of the *Male* could approach near the *Womb*, I recollected the Opinion of the learned *Dr. Harvey*, in his Book upon *Generation*, (which from this Demonstration I am obliged to assent to,) *viz.* that the *Fœtus* is not formed from the *Male Seed* conveyed into the *Uterus*, but that the whole Mass of Blood (as if by a Kind of Infection) receiving a Plastick Force from the *Semen*, communicates it to the *Eggs* fallen down in the *Uterus*, whereby they are rendered fruitful: And I am the more of this Opinion, as I know that the Woman was extremely anxious to have a Child, which doubtless increased the Vigour of her Embraces with her Husband, and it seems very probable, that in the Time of Coition, when she was strongly stimulated, the Animal Spirits at that

that

that Time flowing in great Abundance, attracted some *Effluvia* from the *Seed* of the *Male*, and communicated a Fecundity to the *Mass* of *Blood*, and so to the *Eggs* contained in the *Uterus*.

Note, That notwithstanding this Coalescence of the *Vagina*, she had frequently had her *Menses* before she conceived.

*A Child 26
Years in the
Mother's Bel-
ly, out of the
Uterus; by
Dr. Bayle.
n. 139. p. 979.*

CXIII. 1. *Margaret Mathew*, Wife of *John Puget*, Shearman (at or near *Toulouse*) being with Child in 1652, perceived about the End of the 9th Month of her Bearing, such Pains as Women usually have, when about to fall in Labour. Her Waters also broke, but no Child followed. For the Space of 20 Years, she perceived this Child to stir, with many troublesome Symptoms accompanying: But for the six last Years, she perceived not the Child to move. She died *June 18, 1678*; and the the next Day, being opened, a dead Child was found in her *Belly*, out of the *Womb*, no way joined or fastened to it; the Head downward; the Buttocks hanging toward the Left-side. All the Back-part of this Child was covered with the *Omentum*, which was about two Fingers thick, and stuck hard to divers Parts of the Body of it, not to be separated without a Knife; which being done, very little Blood issued. This *Infant* weighed 8 Pounds *Averdupois*. The *Skull* was broken into several Pieces. The *Brain*, of the Colour and Consistence of Ointment of *Roses*. The *Flesh* red, where the *Omentum* stuck, other Parts whitish, yellowish, and somewhat livid; except the *Tongue*, which had the natural Softness and Colour. All the inward Parts were discoloured with a Blackishness, except the *Heart*, which was red; and without any issuing Blood. The *Forehead*, *Ears*, *Eyes*, and *Nose*, were covered with a callous Substance, as thick as the Breadth of a Finger. The *Gums* being cut, the *Teeth* appeared in the Adulthood of those in grown Persons. The Body had no bad Smell, though kept 3 Days out of the Mother's Belly. The Length of the Body from the Buttocks to the Top of the Head, about 11 *Inches*. The Mother died about the 64th Year of her Age.

*By—n. 140.
p. 1001.
Vid. Sect. CVI.*

2. This History of the *Fœtus*, and that of an *hydropick Testicle* (mentioned above) may be two Arguments farther to satisfy those who have hitherto doubted of the *Female Testicle*, being an *Ovary*. The former proving the *Vesicles* thereof with the Humour or Humours they contain, to be the *Eggs* out of which the *Fœtus* is bred. Which, as they are used to enter into the *Womb* by the *Fallopian Tube*, so in this Case, it is most likely that the *Egg* falling off the *Ovary* into the said *Tube*, by some preternatural Contraction of its lower Orifice, was stopped from issuing thence into the *Womb*: Yet being, it seems, near enough to receive the *Vital Contact*, it thereupon began to be enlarged; and so, by reason of its own increasing Bulk, was made gradually to slip back again towards the upper and larger Orifice of the said *Tube*, and at last to drop thence into the *Cavity* of the *Abdomen*; which now, instead of the *Womb*, became its *Nest*. The latter sheweth, that it is possible for the said *Vesicles* or *Eggs*, to be enlarged upon Conception, as much as is necessary for the Generation of a Child:

Child: That is to say, when within the *Womb*, as much as they were in that Case, upon the *Ovary*. So that it is not, I conceive, reasonable to be doubted, but the Membranes, which we call the *Secundine* or *After-birth*, are the individual ones which belong to that *Vesicle* or *Egg* which falls from the *Ovary* into the *Womb*; being therein, with their contained Humour, naturally augmented and amplified, as there they were preternaturally in that *hydropical* Case.

CXIV. This History of a preternatural Excretion of a *Fætus*, which happened almost forty Years ago, I send you as I had it from the Relations and Acquaintance of the Woman, who is the Subject of it. In the Village called *Swafy*, *Mary Kid*, a Woman of low Birth, but not unhand-some, when she was about thirty Years of Age, after having had one Child, conceived again in the Year 1658. During the whole Time of Pregnancy, the usual Symptoms appeared and succeeded one another. At length a Midwife was called, and the Labour came on, which after continuing some Days without producing any Effect, at last went quite off, but her Belly was still big. The Woman, no doubt, was surpris'd at all this, but however she returned to her usual Work. A Year and a Half afterwards, the Swelling of her Belly remaining still the same, the poor Woman frightned, at her uncommon Condition, tried to find Relief from this extraordinary Case by an extraordinary Remedy. For there was at that Time in the Town of *St. Ives*, a low ignorant Fellow, who being the Seventh Son, was born to cure all Diseases. This Man there, this Treasure of Physick, being called to the Woman, promised to relieve her, not by Means of any ungrateful Medicine, but by the Touch alone. The Woman believed him (so credulous are some People apt to be in these Cases) and the Neighbours being called in, and the Smock tore away on each Side of her Belly, she suffered him to stroak it down with both his Hands. After this Benediction of the *Womb*, as one may call it, he ordered her to provide herself with a Wooden Chest, and lay up in it whatever should come away from the *Womb*. The Chest was got immediately, and about two Weeks afterwards she voided a little Bone, not by the *Vagina*, but by the *Anus*, and at different Intervals afterwards she voided several more. For as long as the Belly was swelled after the usual Time of Gestation, and before she voided any Bones by Stool, so long did this voiding of Bones by Stool continue afterwards. All the Bones were laid up most religiously in this wooden Chest, and there was such a Number of them, and so many different *Skulls*, that every Body thought that there must have been three *Fætuses* buried in the *Womb* all that Time. Nature however, who is the best Physician of the Sick, preserved her safe thro' this tedious and troublesome cadaverous Birth, healed up the *Abcess* which she had first formed for the Exclusion of the *Fætus*, and so performed now the Office of a Physician, as she had before done that of a Midwife. But her inconsiderate Rashness did not allow her to enjoy long the Benefit of this Cure, for two Years afterwards riding to *Sturbridge-Fair*, near

The Bones of
a Fætus void-
ed per A-
num, some
Years after
Conception;
by Dr. Ch.
Morley.
n. 227. 486.

near *Cambridge*, upon a high trotted Horse, the Violence of the Motion renewed the Ulcer again, so that she died of it.

A Fœtus voided at an ulcerated Navel; by Mr. James Brodie. n. 229. p. 580.

CXV. A Negro-Woman, belonging to Capt. *Mead* in *Nevis*, about the 17th Month of her being with Child, was relieved after this Manner. Her *Navel* impostumated and broke of itself, and after it had voided some Quantity of *ichorous* Matter, whereby she had some Ease, it left off. In about a Month more it impostumated again to a far greater Degree than before; whereupon, the Chirurghion being sent for, he, where it did seem most jetting out, which was the *Navel* itself, did lay it open with a large Lancer; and then, after voiding a great deal of thin *Ichor* and Matter, there appeared some *Bones* which proved to be a *Child* that the *Flesh* was decayed from, the which did stink much. But after the Extraction of the *Bones*, the Woman recovered: And I was told by the Chirurghion, and several others, that she hath had a *Child* since.

The Bones of a Fœtus voided above the Os Pubis; by n. 243 p. 292.

CXVI. *Margaret Parry*, of *Hintbery* in *Berkshire*, in the Year 1668, was delivered of a *Child*: She continued indifferently well 2 or 3 Days after her Delivery; then new Pains came upon her, and for 3 Weeks together there came from her daily some Quantity of Corruption, with Pieces of *Flesh* and *Skin*; and she continued dangerously ill for about 8 Weeks, at the End of which Time she was relieved. After 2 Years she began to Breed again, had 3 Children in the 3 Years following, all which were drawn from her by Violence. During her *Lying-in* with the last of these 3 Children, some *Bones* of a *Fœtus* came from her; after this several other *Bones* came away with her *Catamenia*, and several (amongst which were divers Parts of the *Skull*, and some of the larger *Bones* of the Body of a *Fœtus*) worked their Way by Degrees through the *Flesh*, above the *Os Pubis*.

The Woman was alive and in Health in *Oct.* 1684. All the Children were born perfect.

A false Conception; by Dr. William Cole. n. 172. p. 1045.

CXVII. An old Woman of good Sense, and unquestionable Veracity, formerly much conversant with Women with Child and lying-in, now in the Seventy-ninth Year of her Age (*viz.* in the Year 1670.) imagined herself to be with Child a good while ago, and believes it still; nay, what is more surprizing (and perhaps will make you laugh) she fancies she has carried it these seven Years last past. Happening to go that Way about Business four Years ago, and being informed of the Thing, by some no less credulous than she, struck with the Novelty of the Case, I went on purpose to examine it, and found her Belly much swelled, not in the Manner of your hydropick People, but protuberating upwards, as in the Case of Women with Child. As I asked a good many Questions, and found that neither she (nor her Husband, who was ten Years younger than she) doubted at all of her Pregnancy, I desired to know the Reason why they were so positive about it. She answered me with some Reluctance, that she had bore ten Children, and from that Time for the Space of eight and twenty

twenty Years the menstrual Discharge was entirely stopt. At last, however, it broke out again very plentifully, after which she soon perceived the Signs of Conception; she had *Nauseas*, frequent Vomitings, and Longings, such as Women with Child commonly have, for several Months, her Belly growing gradually bigger and bigger. Afterwards, at the usual Time, the first Motions of the *Fætus* were to be felt, sometimes in one Part, sometimes in another, and grew more and more sensible, as in real Pregnancy, the Belly likewise increasing in its Bulk every Day. At last (the usual Time of Delivery approaching) she had true Labour Pains, and was obliged to call a Midwife: But there was no Birth. However, though the Pains went off again, yet the Swelling of her Belly did not diminish; and the Pains frequently returning, the Midwife (who, as I have been told, was of the same Opinion with her Mistress) was again called. From that Time she affirms that she felt the same Motion as before, but still stronger, so that the By-standers could easily see her Cloaths lifted up by it; the Swelling of her Belly in the mean Time a little increased, but not considerably. Her Breasts, which I saw and handled, were not at all flabby, as is usual in old Women, but full and swelled (though not extraordinarily) and you would feel them glandular, as is common in pregnant Women. She told me too without being asked, that the Midwife affirmed, that the internal Orifice of the Womb was as soft and lax, as in any Woman that is just going to be delivered. When I asked her farther, whether when she was lying, in turning herself from the one Side to the other, she felt the Weight roll accordingly? she positively denied it, and told me I must not suspect any Thing of a *Mole* in the Case; for she was too well acquainted with these Bodies to be deceived in that Point.

After a few Days I visited her again, and heard her repeat the same Story as before; I found the Breasts too in the same Condition, but her Belly was a little more swelled, and she complained much of its Tension. She felt the Motions stronger, she said, then before, and during the little Time that I could stay with her, I laid my Hands twice upon her Belly above her Cloaths, and felt the same Kind of Motion now in one Part and now in another, as I remember to have felt in Women that were really with Child. During all this Time of *Gestation* (if I may be allowed with her to call it so) she says she has suffered very little for Want of Health, and has been troubled with no Symptoms, but such are common to Women with Child, and such as she used to have herself while she was bearing Children. Her Appetite and Digestion are both very good, she is not at all drougthy, as is usual in Hydropick Patients, and the Quantity of Urine she makes is in Proportion to what she drinks; but she makes it oftner than usual, as Women with Child commonly do. She walks about the House and Gardens very well, and without the Help of a Stick. She sleeps moderately, but her unruly Guest will hardly allow her any Rest after Day-break, but kicks her out of Bed; after which, and having eat something, he allows her to sleep again, at least he is not so troublesome as before. As to her Habit of Body, she is fleshy, and her Looks, in my

Opinion, do not betray any Thing morbid within. This whole Time she never had any Swelling of her Feet or Legs, nor any common Symptom neither of an *Anasarca*, an *Ascitis*, or a *Dropsy* of the *Uterus*, excepting only the Swelling of the Belly, as far as I could learn. Nor at the same Time would any one who has any Regard for his Reputation, assert, that there must be a *Fætus* contained in the Womb, since both her Age, and the long Time since the Symptoms first appeared, utterly contradict such an absurd Opinion.

Apræternatural Conception in Staffordshire; by Mr. Sampson Brick. n. 150. p. 281.

CXVIII. 1. The Wife of one *Taylor*, a *Taylor* in *Heywood* in *Staffordshire*, about 24 or 25 Years of Age, being married about a Year, in *Jan.* 168²/₃, fell into *Travel*, and after 5 or 6 Days, the Child being dead, was brought away with fit Instruments: And when *Mr. Birch's* Wife had also brought away the *After-birth*, she perceived something still remaining; which so firmly adhered to the Womb, that it was very difficult and painful to separate it, and occasioned a large Flux of Blood.

It is further observable, that the *Child* was perfectly formed; that the Mother recovered; that before Marriage she was never troubled with any remarkable Distempers; and that this monstrous Substance was not observed to be included in any *Cystis*, the *Secundine* being all brought away before it.

By Dr. Edw. Tyson. ibid. p. 282. Fig. 62.

2. I have had an Opportunity of observing this *preternatural Body*, and of discoursing *Mr. Birch* himself. Its *Shape* may be easily conceived by the *Figure*. In the uppermost Part thereof was a round protuberant Bone 3 ¹/₂ Inches in Compass, covered with a thick fleshy Skin, beset with short Hairs. In the Top of this Bone in a Circle were placed 8 *Dentes Molares*, which so exactly resembled *Teeth* as to their Shape, Whiteness, Hardness, and in all other Circumstances, that they can certainly be nothing else. A little below this, in another Bone (which yet was fastened to the former) were placed 5 other *Dentes Molares*, 4 of which made almost a straight Line, but some Distance in the Middle, and the 5th was a little out of Rank, being placed below the two uppermost. The remaining Part composed a large *Cystis* or Bag, filled with a liquid, slimy Matter, but not foetid. This *Cystis* on the outside was smooth, appeared somewhat red, and was about the Thickness of the *Scrotum*.

A little below the Bone (in which were set the 8 *Teeth* before described) we observed a large Lock of *Hair*, of a bright brown Colour, whose End was intricately and intangled in a large Quantity of *Hair*, of a more faded and yellowish Colour, which was fastened to the End of the *Cystis* opposite to these *Teeth*. But that this Lock of *Hair* was of a considerable Length, we easily guessed by the several small Curls we observed in the yellowish *Hair*, which were of the same bright Colour with the former Lock. In the Middle of the Circle of the eight *Teeth*, I observed a small Hole, but which did not lead far.

Vid. Sup. Cap. I. Sect. X. 4. H. Teeth, Bones and Hair met with in the Ovaria of Women by Dr. Sampson and

and myself: But our present Instance differs from them, in that this was in the *Womb*, and firmly adhering to it; the others in the *Ovarium*. In this the *Hair* was on the outside of the *Cystis*, and rooted into its *Tunicle*; in the others it was contained within it. But as the *Child*, which was perfectly formed, and, with much Difficulty, at last brought from this Woman, I doubt not, at first, being included in the *Egg*, descended from the *Ovarium*; so likewise this *subventaneous Egg*, I question not, might be transmitted from the same Place; and Nature, which is never idle, being disappointed of forming in this a perfect *Fœtus*, made the best of what the Matter would afford, and might produce these *Teeth, Bones and Hair*, which may be reckoned as *Animal Vegetables*.

CXIX. 1. One *Eliz. Dooly*, of the County of *Kilkenny*, was aged 13 Years in *Jan. 1688*. Her Mother being with Child of her, was frightened by a Cow as she milked it, thrown down and hit on her left Temple, within an Eighth of an Inch from her Eye, by the Cow's Teat. This Child has exactly in that Place, a Piece of Flesh resembling a Cow's Teat, about 3 Inches and a Half in Length: 'Tis very red; has a Bone in the midst about half the Length of it; it is perforated, and she weeps through it; when she laughs it wrinkles up, and contracts to 2 Thirds of its Length; and it grows in Proportion to the rest of her Body. She is there as sensible as in any other Part.

Extraordinary Effects of Strength of Imagination, by Dr. St. Geo. Ash. Bp. of Cloyne. n. 228. p. 334. n. 243. p. 293.

2. A Lady was lately delivered of a Girl, with a *Wound* in her Breast above four Fingers long; which obliquely from the Top downwards, from the *Sternum* to the left Side, stretched itself over the whole Breast. I found that the *Wound* penetrated to the *Musculi Intercostales*, and that it was at least an Inch broad, hollow under the Flesh round about the *Wound*: Besides that, there was a *Contusion* with a little Swelling (red and blue, as is used to be in *Contusions*) at the lower Part of the *Wound* in the Inside. The Child came into the World without any Force; and consequently it got not this *Wound* in its *Birth*; but it was occasioned by Strength of *Imagination*: For about two Months before the Mother was gone to Bed, and by Chance she heard a Report that a Man had murdered his Wife, and with a Knife had given her a great *Wound* in her Breast; at which Relation she changed, but not excessively.

By Dr. Cyprianus. n. 221. p. 291.

Now my Opinion is, that the Child at that very Moment that the Mother was *frighted*, received the *Wound* in its Mother's Body, because that the *Wound* was very fordid; and the Inside, as well as the Outside, beset with Slime, proceeding from the Water wherein the Child is used to lie in its Mother's Womb, and also very like a *Wound* received long since. But after 3 or 4 Days Dressing the *Wound*, beginning to come to *Suppuration* and *Mundification*, began to bleed very fast with Streams when dressed and wiped; and it plainly, in all its Circumstances, was very like a fresh cut *Wound*, and being simply handled as such, is healed up. The *Contusion* also, whilst the *Wound* was Healing, began to come to *Suppuration*, and made a Gathering, and drew down the Matter and Blood towards

the Back ; for the Situation of the Child was such, that the Matter could not ascend to the *Wound*, out of which Swelling, when it was opened, Matter and Blood ran, in the same Manner we used to see in a *Contusion* made some Days. So that I judged this *Wound* wholly, even at the Birth of the Child, in that State (as I suppose it was) at that very Moment when the Mother was terrified, except that it was covered with Slime, as abovesaid. And I suppose that this Accident remained so long in the same Condition, because no Air could come to it, and the Child lay all over in Water, which has a preserving Virtue, insomuch that it excludes the Air.

CXX. *Papers (of less General Use) omitted.*

- n. 29. p. 552. 1. The Structure of the *Epiploon*; extracted from the *Tetras Anatomicarum Epistolarum Marcelli Malpighii & Caroli Fracassati de Lingua & Cerebro.*
- n. 157. p. 533. 2. Experiments relating to the *Stone*, and its Cure; proposed by Dr. *Fred. Slare.*
- n. 81. p. 4018. 3. Some late Observations by Dr. *Kerckringius*, concerning *Eggs* to be found in all Sorts of *Females*; extracted from his *Anthropogeniæ Ichnographia*; with some Reflections thereon, by M. *Denys.*

CXXI. *Accounts of Books omitted.*

- n. 130. p. 768. 1. *Caspari Bartholini, Thomæ Filii, Diaphragmatis Structura nova; una cum Methodo præparandi Viscera. Paris, 1676, in 8vo.*
- n. 44. p. 888. 2. *De Viscerum Structura; Exercitatio Anatomica Marcelli Malpighii. Bononiæ, 1666, in 4to.*
- n. 264. p. 610. 3. *Dissertatio Anatomico-Medica, de Motu Bilis Circulari, ejusque Morbis, quam publice olim habuit Mauritius Van Reverborst, in 8vo.*
- n. 10. p. 178. 4. *Regn. de Graaf, de Succo Pancreatico; Exercitatio Anatomico-Medica. Lugd. Bat. 1671, in 12mo.*
- n. 79. p. 3066. 5. *De Secretione Animalis Cogitata; Auth. Guil. Cole, M. D. Oxon. 1674, in 12mo.*
- n. 106. p. 134. 6. *Traité du Cancer; ou l'on explique sa Nature, & ou l'on propose les moyens les plus sûres pour le Guérir Methodiquement. Avec un Examen du Systeme & de la Pratique de Mr. Helvetius, par M. J. B. Alliot. Paris, 1698, in 8vo.*
- n. 240. p. 199. 7. *Recherches sur la Nature & la Guérison des Cancers. Par M. Deshayes Geudron, M. D. A Paris, 1700, in 8vo.*
- n. 128. p. 705. 8. *Tractatus de Ventriculo & Intestinis; cui præmittitur alius de Partibus Continentibus in genere, & in specie de Partibus Abdominis; Auth. Franc. Glissonio, M. D. Lond. 1676, in 4to.*
- n. 177. p. 1246. 9. *J. Con. Peyerii Merycologia; sive de Ruminantibus & Ruminacione Commentarius. Basil. in 4to.*
- n. 263. p. 566. 10. *Petri Chirac. Dissertatio Academica; an Passioni Iliacæ Globuli Plumbei Hydrargyro præferendi? Monsp. 169, in 12mo.*

11. *Christiani a Steenvelt* Differtatio, de *Ulcere Verminoso*. *Lugd. Bat.* 1697, *lb.* p. 570-
in 40.
12. *Godefr. Bidloo* Observatio, de *Animalculis* in *Ovino* aliorumque Ani- *lb.* p. 571.
mantium *Hepate* detectis. *Lugd. Bat.* 1698, in 4to.
13. *Nath. Highmori*, de *Hysterica, & Hypochondriaca Passione*, Responsio *n.54.p.1089.*
Epistolaris ad *D. Willis.* *Lond.* 1670, in 4to.
14. *Affectio*num quæ dicuntur *Hystericæ & Hypochondriacæ Pathologia* *n.57.p.1178.*
Spasmodica Vindicata, contra Responsion. *Epistol. Nathanaelis Highmori,*
M. D. Cui accessere Exercitat. Medico-Physicæ duæ; 1. De Sanguinis
Accensione: 2. De Motu Musculari. Auth. *Tho. Willis, M. D. Lond.* 1676,
in 4to.
15. *Tractatus de Podagra & Hydrope; per Tho. Sydenham, M. D. Lond.* *n.850.p.309.*
1683.
16. *La Lettre de Charles Drelincourt à M. Porreé, sur la Methode, pre-* *n.107.p.164.*
tendue Nouvelle, de Tailler la Pierre: Avec tres autres à M. Vallot. A Leide,
1674, in 12mo.
17. *Regneri de Graaf, M. D. Epistola, de nonnullis circa Partes Genita-* *n.34.p.663.*
les Inventis novis. *Lugd. Bat.* 1668, in 16o.
18. *Ejusdem, de Virorum Organis Generationi* inservientibus, &c. *Lugd.* *n.38.p.750.*
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19. *Ejusdem, de Mulierum Organis Generationi* inservientibus, *Tractatus* *n.81.p.4026.*
novus, Lugd. Bat. 1672, in 8vo. *n.82.p.4052*
20. *Johan. Van Horne, M. D. Observationum suarum, circa Partes Geni-* *n.24.p.663.*
tales in utroque Sexu, *Prodromus.* *Lugd. Bat.* 1668, in 16o.
21. *Job. Swammerdami, M. D. Uteri Mulieris Fabrica; una cum Metho-* *n.84.p.4098.*
do novo Cavitates Corporis ita præparandi, ut suam semper genuinam Fa-
ciem servent. *Lugd. Bat.* 1672, in 4to.
22. *Differtationes Medicæ tres: 1. De Causis Fluxus Menstrui Mulierum.* *n.64.p.2074.*
2. De Sympathia variarum Corporis Partium cum Utero. 3. De usu Lactis
ad Tabidos reficiendos, & de immediato Corporis Alimento. Auth. *Francisco*
Bayle, M. D. Tolosæ, 1670, in 4to.
23. *Gualteri Charletoni Inquisitio Physica, de Causis Catameniorum, & Ute-* *n.171.p.1020.*
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24. *Nicholai Hobokeni Anatomia Secundinæ Humanæ. Ultrajecti.* 1669, *n.58.p.1201.*
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25. *Disquisitio Anatomica de Formato Fætu.* Auth. *Gualtero Needham,* *n.27.p.506.*
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26. *Theodori Kerckringii, M. D. Anthropogeniæ Ichnographia; sive Con-* *n.70.p.2136.*
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27. *Christ. Fred. Garmanni Homo ex Ovo. Chemnitii.* 1672, in 4to. *n.86.p.5049.*
28. *Of the Formation of Fætus's by S. Gieronymo Barlato, Publick Professor* *n.74.p.2224.*
of Practicall Physick at Padua.
29. *Tractatus 5 Physico-Medici, de Sale, Nitro & Spiritu Nitro-Aereo; n.105.p.1017.*
De Respiratione Fætus in Utero & Ovo, &c. Auth. *Job. Mayow, LL. D. Oxon.*
1674, in 8vo.

- n. 125. p. 622. 30. New and curious Observations of the Art of curing the *Veneréal Disease*, &c. Written in *French* by M. de Blegny; *English'd* by Walter Harris, M. D. Lond. 1676, in 8vo.
- n. 160. p. 620. 31. Tuta ac Efficax *Luis Venereæ*, sæpe absque *Mercurio*, ac semper sine *Salivatione Mercuriali*, curandæ Methodus. Auth. Dav. Alercromby, M. D. Lond. 1684, in 8vo.

C H A P. V.

The Humours, and general Affections of the Body.

The visible Circulation of the Blood; by Mr. Will. Molyneux. n. 177. p. 1236.

I. **I**N the Beginning of the Year 1683, I first discovered the *visible Circulation* of the *Blood* in the *Water-Newt*; which, I perceive, Dr. *Garden* has since hit upon, and mentions in a Letter to Dr. *Middleton*, *July 17, 1685*. I frequently shewed it, both on the outside without Dissection, and in the inward Vessels, to several curious Philosophers; particularly *May 26, 1684*, I opened (before our *Society at Dublin*) a *Water-Newt*, which I take to be the *Salamandra*, or *Lacerta Aquatica*; in the Body of this Animal there are two long *Sacculi Aerei*, in which the *Blood-Vessels* are curiously ramified. To these *Blood-Vessels* applying a *Microscope*, I shewed the *Circulation* of the *Blood, ad Oculum*, as plainly as Water running in a River; and more rapidly than any common Stream. The same Experiment I repeated again before them on the 2d of *June* following, and to those that had good observing Eyes, the *Circulation* was as *visible* outwardly on the Hands and Toes, as in the Vessels within. But certainly the Appearance in the Vessels on the two forementioned *Sacculi*, with the Beating, Emptying and Filling of the Heart, is most surprizing.

The Quantity of Blood in Men, and the Celerity of its Circulation; by Dr. Allen Moulin. n. 191. p. 433.

II. In a Sheep, weighing alive 118 lb. we found $5\frac{1}{4}$ lb. of *Blood*; which is less than $\frac{1}{10}$ Part of the Weight of the Sheep. In a Lamb, weighing $30\frac{1}{2}$ lb. when living, there was but about $1\frac{1}{2}$ lb. of *Blood*; which is nearly $\frac{1}{20}$ Part. In a Duck, weighing alive 2 lb. 14 Ounces, 50 Gr. we found an Ounce and half and 53 Gr. of *Blood*; which is less than $\frac{1}{10}$ Part. In a Rabbit weighing 10 Ounces, 7 Dr. and 50 Gr. we found 2 Dr. 57 Gr. of *Blood*; which is about $\frac{1}{10}$ Part.

In the Right *Ventricle* and *Auricle* of the *Heart* of a Dog, I found 6 Ounces of *Blood*, after that I had injected into the *Jugular Vein* a Liquor that coagulated the *Blood*; I found a greater Quantity of *Blood* in the *Heart* of another Dog, whom I treated after the same manner. The *Hearts* were much distended by the *Blood* found in them. I shall therefore suppose that 4 Ounces only were received at a Time by these *Hearts* without Force, that is naturally. But I shall suppose a *Man's Heart* (though much larger, and

has

has much larger Vessels than those I speak of) to receive but 4 Ounces at each *Diastole*, and then allowing 75 Pulses to every Minute, there will be 4500 in an Hour, and 18000 Ounces of *Blood* transmitted in that time.

Now if we shall suppose that a *Man's Blood* bears the same Proportion to his Weight, as that of any of the foresaid Animals had to its Weight, which in a Lamb was the greatest, being $\frac{1}{4}$ Part, it will follow that the Quantity of *circulating Blood* in a *Man* weighing 160 lb. will not exceed 8 lb. or 128 Ounces; according to which Computation the *Blood* will *circulate* 140 times in an Hour. But let us suppose, that instead of 8 lb. the Mass of *Blood* in such a *Man* be 12 lb. it will follow, that it will *circulate* between 93 and 94 times in an Hour. From this *Celerity* of the *Circulation* of the *Blood*, we may give an Account of a sudden *Refectio*n with Victuals, and particularly such as are liquid; we may also account for the quick passing of *Urine* from the same thing; and also the quick Motion of the *Chyle* into the *Breasts* of *Nurses*; without supposing unknown Passages, from the Stomach or any other Part, into the *Bladder* and *Breasts*.

Anatomists commonly suppose no more than *Half* an Ounce of *Blood* to get into the *Heart* at one *Diastole*; and the whole Quantity of *Blood* in the Body to be between 15 and 25 lb. by which it may appear how their Computations and mine differ.

III. 1. First, take up the *Carotidal Artery* of the Dog or other Animal, whose *Blood* is to be *transfused* into another of the same, or a different Kind, and separate it from the *Nerve* of the 8th *Pair*, and lay it bare above an Inch. Then make a strong Ligature on the upper Part of the *Artery*, not to be untied again: But an Inch below, *viz.* towards the *Heart*, make another Ligature of a running Knot, which may be loosened or fastened as there shall be Occasion. Having made these two Knots, draw two Threads under the *Artery* between the two Ligatures; and then open the *Artery*, and put in a Quill, and tie the *Artery* upon the Quill very fast by those two Threads, and stop the Quill with a Stick. After this, make bare the *Jugular Vein* in the other Dog, about an Inch and a Half long; and at each End make a Ligature with a running Knot, and in the Space betwixt the two running Knots draw under the *Vein* two Threads, as in the other: Then make an Incision in the *Vein*, and put into it two Quills, one into the *descendent* Part of the *Vein*, to receive the Blood from the other Dog, and carry it to the *Heart*; and the other Quill put into the other Part of the *Jugular Vein*, (which comes from the *Head*) out of which, the second Dog's own Blood must run into *Dishes*. These two Quills being put in and tied fast, stop them with a Stick, till there be Occasion to open them.

All Things being thus prepared, fasten the Dogs on their Sides towards one another so conveniently, that the Quills may go into each other. After that unstop the Quill that goes down into the first Dog's *Jugular Vein*, and the other Quill coming out of the other Dog's *Artery*; and by the help of two or three other Quills, put into each other, according as there shall be Occasion, insert them into one another. Then slip the running Knots, and immediately

*A Method of
transfusing
Blood; by
Dr. Lower.
n. 19. p. 352.
n. 20. p. 353.*

immediately the *Blood* runs through the Quills, as through an *Artery*, very impetuously. And immediately, as the *Blood* runs into the Dog, unstop the other Quills, coming out of the upper Part of his *Jugular Vein* (a Ligature being first made about his Neck, or else his other *Jugular Vein* being compressed by one's Finger) and let his own *Blood* run out at the same Time into Dishes (yet not constantly, but according as you perceive him able to bear it) till the other Dog begin to cry, and faint, and fall into *Convulsions*, and at last die by his Side.

Then take out both the Quills out of the Dog's *Jugular Vein* and tie the running Knot fast, and cut the *Vein* asunder (which you may do without any Harm to the Dog, one *Jugular Vein* being sufficient to convey all the *Blood* from the *Head* and upper Parts, by reason of a large *Anastomosis*, whereby both the *Jugular Veins* meet about the *Larynx*). This done, sew up the Skin, and dismiss him, and the Dog will leap from the Table, and shake himself, and run away as if nothing ailed him.

In the performing of this Experiment, these Circumstances are to be observed. 1. That the Animals be fastened at such a convenient Distance, that the *Vein* or *Artery* be not stretched. 2. If the Pulse fails beyond the Quill in the *Jugular Vein*, you must draw out the *arterial* Quill, and, with a Probe, open the Passage again in both of them, that the *Blood* may have its free Course.

By _____ Instead of a Quill, take a small crooked Pipe of Silver or Brass, so slender, that the one End may enter into a Quill; and having at the other End, that is to enter into the *Vein* and *Artery*, a small Knob, and for the better fastening them to it with a Thread; for this is much more easy to be managed than a Quill.

Considerations
concerning
Transfusion
of Blood; by
_____ lb. p. 35

IV. 1. It may be considered, in the Experiments of *Transfusion*, that the *Blood* of the *emittent* Animal may, after a few Minutes of Time, by the *Circulation*, mix and run out with that of the *Recipient*. Wherefore, to be assured in these Trials, that all the *Blood* of the *Recipient* is run out, and none left in him but the *adventitious Blood* of the *Emittent*, two or three or more Animals may be prepared and administered, to bleed them all out into one.

2. It seems not irrational to guess beforehand, that the *Exchange* of *Blood* will not alter the Nature and Disposition of the Animals, upon which it shall be practised; though it may be thought worth while, for Satisfaction and Certainty, to determine that Point by *Experiments*. The Case of *exchanging* the *Blood* of Animals, seems not like that of *Grafting*, where the Cyon turns the Sap of the Stock, grafted upon, into its Nature, the Fibres of the Cyons so straining the Juice, which passes from the Stem to it, as thereby to change into that of the Cyons; whereas in this *Transfusion* there seems to be no such Percolation of the *Blood* of Animals, whereby that of the one should be changed into the Nature of the other.

3. The most probable Use of this Experiment may be conjectured to be, that one Animal may live with the *Blood* of another; and, consequently,
that

that those Animals that want *Blood*, or have corrupt *Blood*, may be supplied from others with a sufficient Quantity, and of such as is good; provided the *Transfusion* be often repeated, by reason of the quick Expence that is made of the *Blood*.

V. 1. I once *bled* a Mastiff into a Curr, and the little Dog bled out at least double the Quantity of his own *Blood*, and left the Mastiff dead upon the Table: And after he was untied, he ran away, and shaked himself, as if he had been only thrown into Water.

2. I took a Calf and a Sheep, both of the larger Sort, and having prepared a *Jugular Vein* in each, I planted my Pipes and Quills as is usual, both in the *Jugular Vein* of the Calf (designed to be the *Emittent*) and in that of the *Sheep* (intended for the *Recipient*). Then I took out of the *Sheep* 49 Ounces (*Averdupois* Weight) of *Blood*, before any other *Blood* was let in; about which Time the Company concluding the *Sheep* to be very faint and finding the *Blood* to run very slowly, I stopped the *Vein* of the *Sheep*, and unstopped the Pipe in the Calf, letting run out 10 Ounces into a Porringer, which was done in about 40th of a Minute. Then I conveyed Pipes from the *emittent* Calf's *Vein*, into the *recipient* *Sheep's Vein*, and there ran a good free Stream of *Blood* for the Space of five Minutes (tho' perhaps less swift than the first 10 Ounces): And, not to be deceived in the running, I did often strike with my Finger the upper Part of the *emitting Vein*, and thereby easily felt every Stroke answered on the *recipient Vein*, just like a Pulse. And now supposing that by this Time (*viz.* the lapse of 5 Minutes) the *Sheep* had received as much, if not more, *Blood* than it had lost; we stopped the Current of *Blood* from the Calf, and closed also the *Vein* of the *Sheep*; and then, having untied her, and set her down in the Room, she went about, and appeared to have as much Strength as she had before the Loss of her own *Blood*. Then resolving to *bleed* the *Sheep* to Death, we bound her the 2d time, and opened the *emittent* Part of the *Vein* again; whereupon having *bled* about 60 Ounces, she fell into *Convulsions*, and after the Loss of about 5 Ounces more, she died upon the Place. And being dressed by the Butcher, there did not, in all the usual Places, appear above 3 Ounces of *Blood*; and the whole *Sheep* looked of a lovely white.

We resolved also to see the Calf *bled* to Death; but he having *bled* 10 Ounces, and then for the Space of 5 Minutes more into the *Sheep*, and rested a good while, the *Blood* by that time began to coagulate in the *Vein*; which made me open the *Carotid Artery*, letting thence run out about 25 Ounces of *Blood*, of a very lovely and vivid Colour, vastly excelling therein the *Blood* of the *Vein*. The Calf, when dressed, had, by the Information of the Butcher, as little *Blood* as the *Sheep*, and we saw him look whiter than they usually do in the ordinary way of killing.

3. I took out 45 Ounces and better of *Blood* out of the *Jugular Vein* of a *Sheep*, by which Time we found her exceeding faint. Then I conveyed *Blood* from the *Jugular Vein* of a Calf into that of the *Sheep*, for the

Space of 7 Minutes, when we did believe, by the Continuance of a good Stream from the Calf, that the Sheep had already received more *Blood* than she had lost. Whereupon we set her free, and she appeared not at all concerned at what she had endured in the Experiment, and continued lusty and strong. We then *bled* the Calf to Death, and received from him 6 Porringers full of *Blood*, after the Sheep had been supplied, each Porringer contained $11\frac{1}{4}$ Ounces of Water. The Sheep lost 4 of the same Measures full of *Blood*; which being supplied by that of the Calf, we reckon that the Calf lost 10 such Measures in all.

The Transfusion of the Blood of a mangy into a sound Dog; by Mr. Tho. Coxe. n. 25. p. 451.

4. I procured an old mungrel Curr, all over-run with the *Mange*, of a middle Size, and having some Hours before fed him plentifully with Cheeseparings and Milk, I prepared the *Jugular Vein*, as we use to do the *Carotidal Artery* of the *Emittent Animal*. Then I made as strong a Ligature upon the Dog's Neck as I durst, for fear of choaking him; to the End, that the *Venal Blood*, which is much more sluggish in its Motion and Evacuation than the *Arterial*, might be *emitted* with the greater Advantage of *Impetus*. Then I took a young Land-Spaniel, of about the same Bigness, and prepared his *Jugular Vein*, as is usually done in the *Recipient Animal*. Having thus prepared them both, and placed them in a convenient Posture one to the other, I let slip the running Knots, and by frequent Compression of the Neck (besides the Ligature I had made) by reason of the tardy Running of the *Venal Blood* out of the *Emittent*, transfused about 14 or 16 Ounces of the Blood of the *infected* into the Veins of the *sound Dog*, as near as I could guess by the Quantity of *Blood*, which ran into a Dish from the *Recipient*, supposing the *recipient Animal* to lose near about the same Proportion to what the *Emittent* supplies.

The Effect of this *Experiment* was no Alteration at all any way to be observed in the *sound Dog*. But for the *mangy Dog*, he was in about 10 Days or a Fortnight's Space perfectly *cured*: Which might with Probability enough, I think, have been expected from the considerable *Evacuation* he made, perhaps the quickest and surest Remedy for the *Cure* of that Sort of Disease he was infected with, both in Man and Beast.

* *The Transfusion of the Blood of a young into an old Dog; by M. Gayant.*

n. 26. p. 479.

† *The Transfusion of the Blood of Calves into Dogs; by M. Denis. n. 25.*

p. 453.

A very plentiful Transfusion on experimented upon a Bitch; by

n. 28.

p. 521.

5. Mr. Gayant transfused the *Blood* of a * *young Dog* into the *Veins* of an *old*, which, two Hours after, did leap and frisk; whereas he was almost blind with Age, and could hardly stir before.

6. Since the 9th of *March*, 166 $\frac{6}{7}$, we have transfused the *Blood* of 3 † *Calves* into 3 *Dogs*: After which the *Dogs* (all of them) did eat as well as before; and one of the 3 *Dogs*, from which so much *Blood* had been drawn the Day before, that he could hardly stir any more, having been supplied the next Morning with the *Blood* of a *Calf*, recovered instantly his Strength, and shewed a surprising Vigour.

7. Several successful Experiments have been made in *London*, of very plentiful *Transfusions*; and among others (to mention a signal one) that upon a *Bitch*, which lost in the Operation near 30 Ounces of *Blood*, and was recruited accordingly. This Animal does not only survive to this very Day, but had another more severe Experiment soon after tried upon her, by which

her *Spleen* was cut out, without tying up the Vessels whence that *Viscus* was separated: Since which Time she took Dog (even before the *Wound* was healed up) was with Puppy, and brought forth Whelps, and remains well and jocund. So that it is not too hastily to be concluded, that large *Transfusions* are dangerous.

8. M. *Denys* writes from *Paris*, that they had lately transmitted the *Blood* of 4 Wethers into a Horse of 26 Years old, and that this Horse had thence received much Strength, and more than ordinary Stomach.

9. May 8, 1677, at S. *Cassini's* in *Bononia*, there was opened the *Carotid Artery* of a * Lamb, when the *Blood* was let run as long as it could into the Right Branch of the *Jugular Vein* of another Lamb, from which there had before been drawn so much *Blood* as was judged it could be supplied with from a Lamb of the like Bigness, whose *Blood* should be let out till it died. After this there was made two Ligatures pretty near to one another, in the *Vein* or the Lamb that had received the *Blood*; and this *Vein* was quite cut through between the two Ligatures. This done, the Lamb was untied, and went about without any appearance of Feebleness; and its Wound being healed up, it grew like other Lambs. But on the 5th of *Jan.* 1678, it died, and its *Stomach* was found full of corrupt Food. Its Neck being dissected, to see what had happened to the *Vein* cut through, it was found that it had joined itself to the next Muscle by some Fibres, and that the upper Part of that *Vein* had a Communication with the lower, by the Means of a little Branch, which might in some manner supply the Defects of the whole Trunk.

10. May 20, 1668, at S. *Griffoni's*, at *Udine*, the *Blood* of a Lamb was transfused into the *Veins* of a Spaniel of a middle Size of that Kind, 13 Years old, who had been altogether deaf for above 3 Years, so as what Noise soever was made, he gave not any Sign of hearing it. He walked very little, and was so feeble, that being unable to lift up his Feet, all he did was to trail his Body forward. After the *Transfusion* practised upon him, he remained for an Hour upon the Table, where he was yet untied; but afterwards leaping down, he went to find his Masters that were in other Chambers. Two Days after he went abroad, and ran up and down the Streets with other Dogs, without trailing his Feet, as he did before. His *Stomach* also returned to him, and he began to eat more, and more greedily than before. But that which is more surprizing is, that from that Time he gave Signs that he began to hear, returning sometimes at the Voice of his Masters. The 13th of *June* he was almost quite cured of his Deafness, and he appeared, without Comparison more jocund than he was before the *Operation*. At length, the 20th of the same Month, he had wholly recovered his Hearing; yet thus, that when he was call'd he turned back, as if he that had called him had been very far off: But that happened not always; in the mean time he heard always when he was called.

VI. I think, that a Silver Tube with a Silver Stopper, somewhat blunted at one End, and flatted at the other, for conveniency of handling, used already upon Beasts with good Success, is very proper for the *Transfusion* of *Blood* into

The Transfusion of the Blood of four Wethers into an Horse; by M. Denys. n. 30. p. 559. *The Transfusion of the Blood of one Lamb into another; by S. — n. 42. p. 840.

The Transfusion of the Blood of a Lamb into a Spaniel; by S. — n. 42. p. 841.

A Method of transfusing Blood into the Veins of Men; by Sir Edm. King. n. 28. p. 522.

into the *Veins* of *Men*. The Operation may be thus performed: After the *Artery* is prepared in a *Lamb*, a *Kid*, &c. let a Ligature be made upon the *Arm*, &c. of a *Man* (hard enough to render the *Vein* turgid) in the Place you intend to insert the lesser End of the Silver Pipe; which is so fitted, that the Silver Stopper, thrust into the Tube, reaches somewhat, by its blunt End, beyond one of the Ends of that Tube. This done, divide the Skin of the Part in the same Manner that is used in cutting an Issue, just over the *Vein* to be opened. Then, with a fine Lancet, open the *Vein*; or if you please, in case the *Vein* lie fair and high (especially if the Skin be fine) you may open both together, according to the usual Way of *letting Blood*. Which done, let an Assistant clap his Finger, or a little Boulster prepared before-hand, or the like, upon the *Vein*, a little below the Orifice, to hinder the *Blood* from ascending. Keeping that Position, insert the blunt-ended Tube upwards into the *Vein*; when it is in, hold it and the Skin close together between your Finger and Thumb. Then pull out of the Tube the Stopper, and insert the Pipe by which the *arterial Blood* is to be *infused* from the *emittent Animal*; managing the Remainder according to the known Method of this Experiment.

Transfusion
practised upon
a Man in
London; by
Dr. Richard
Lower and
Sir Edmund
King. n. 30.
p. 557. Vid.
Sup. Sect. VI.

VII. The Experiment of *transfusing Blood* into an human *Vein*, was performed upon Mr. *Arthur Coga*, Nov. 23, 1667, after this Manner: Having prepared the *Carotid Artery* in a young Sheep, we made an Incision in the *Vein*, observing the Method abovementioned, without any Alteration but in the Shape of one of our Pipes; which we found more convenient for our Purpose. And having opened the *Vein* in the *Man's Arm*, with as much ease as in the common Way of *Venæ-Section*, we let thence run out 6 or 7 Ounces of *Blood*. Then we planted our Silver Pipe into the said Incision, and inserted Quills between the two Pipes, already advanced in the two Subjects, to convey the *arterial Blood* from the Sheep into the *Vein* of the *Man*. The *Blood* ran freely into the *Man's Vein* for the Space of two Minutes at least; so that we could feel a *Pulse* in the said *Vein* just beyond the End of the Silver Pipe. The *Patient* said, he did not feel the *Blood hot* (as was reported of the Subject in the *French Experiment*) which may very well be imputed to the Length of the Pipes through which the *Blood* passed, losing thereby so much of the *Heat*, as to come into a Temper very agreeable to *venal Blood*. That the *Blood* did run all the Time of those two Minutes, we conclude from thence; *First*, because we felt a *Pulse* during that Time; *Secondly*, because when, upon the *Man's* saying, he thought he had enough, we drew the Pipe out of the *Vein*, the Sheep's *Blood* ran through it with a full Stream; which it had not done, if there had been any Stop before in the Space of those two Minutes, the *Blood* being so very apt to *coagulate* in the Pipes upon the least Stop, especially the Pipes being as long as three Quills. From the Quantity of *Blood*, which ran through the Pipe into a Porringer, we judged that about 9 or 10 Ounces was received into the *Man's Veins*. The *Man* after the Operation, as well as in it, found himself *very well*.

VIII. 1. In the Year 1664, I mentioned to the *Royal Society* an odd Experiment I had formerly made upon *Blood* yet warm, as it came from the Animal, viz. that by putting into it a little *Aqua-fortis*, or Oil of *Vitriol*, or *Spirit of Salt* (these being the most usual *acid Menstruums*) the *Blood* not only would presently lose its pure Colour, and become of a dirty one, but in a trice be also *coagulated*; whereas, if some fine *urinous Spirit*, abounding in *volatile Salt*, such as the *Spirit of Sal Armoniack*, were mingled with the warm *Blood*, it would not only not curdle it, or imbase its Colour, but make it look rather more *florid* than before, and both keep it *fluid*, and preserve it from Putrefaction for a long time. This Experiment I devised, among other things, to shew the Amicableness of *volatile Spirits* with the *Blood*.

The Effects of several Li- quors mixed with the Blood warm from the Veins; by Mr. Rob. Boyle. n. 29. p. 551.

2. This Experiment was publickly related by Mr. Boyle to the *Royal Society* in Dec. 1664, as appears by their *Journals*.

By Mr. Oldenburg. ib.

IX. 1. S. Fracassati, Professor of *Anatomy* at *Pisa* in *Italy*, having infused into the *Jugular* and *Crural Vein* of a Dog some *Aqua-fortis* diluted, the Animal died presently; and being opened, all the *Blood* in the Vessels was fixed, but that in the Guts not so well. It was also observed, that the great Vessels were burst, perhaps by an Effort of Nature; even, as in the greatest Part of those that die of an *Apoplexy*, the Vessels of the *Lungs* are found broken. Upon which Experiment the Author maketh these Reflections: First, That an *Apoplexy* being often caused by a like *Coagulation* of the *Blood* (as hath been observed by the Opening made of sundry Persons who died of that Distemper) it might be cured by a timely *infusing* some *Dissolvent* into the *Veins*. Secondly, That it is likely, that that useful Secret, by which M. de Bills dissected Animals without any *Effusion* of *Blood*, consists in some such *Infusion*.

Liquor injected into the Veins of Dogs; by S. Fracassati, n. 27. p. 490. Aqua-fortis.

2. There was afterwards *infused* into another Dog some *Spirit of Vitriol* which had not so present an Effect; for the Animal complained a great while, and foamed like *Epilepticks*, and had its *Respiration* very thick; and observing the Beating of his Breast, one might easily judge the Dog suffered much; who dying at last, his *Blood* was found fixed in the *Veins*, and grumous, resembling Soot.

Spirit of Vitriol.

3. Then there was *injected* into a Dog some *Oil of Sulphur*: But he died not of it, though this *Infusion* was several times tried upon him. And the Wound being closed, and the Dog let go, he went into all the Corners of the Room searching for Meat, and having found some Bones, he fell a gnawing of them with a strange Avidity, as if this *Liquor* had caused in him a great *Appetite*.

Oil of Sulphur.

4. Another Dog, into whose *Veins* some *Oil of Tartar* was *injected*, did not escape so well: For he complained much, and was altogether swoln, and then died. Being opened, the Spectators were surprized to find his *Blood* not curdled, but on the contrary more *thin* and *florid* than ordinary; which seems to hint, that too great *Fluidity* of the *Blood*, as well as its *Coagulation*, may cause Death.

Oil of Tartar:

Mercury in-
jected into the
Veins of Dogs;
by Dr. A.
Moulin.
n. 192. p. 186.

X. 1. In *Autumn*, 1690, I *injected* into the *Jugular Vein* of a Dog, about $\frac{1}{2}$ an *Ounce* of crude *Mercury*, and observed the Dog soon after to have a dry short *Cough*, which by Intervals seized him. About two Days after I found him troubled with a great Difficulty of *Breathing*, and making a Noise like that of a *broken-winded* Horse: There was no Tumour about the Root of his Tongue, nor any Swelling in the *Maxillary* or *Parotide Glandules*, neither was he observed to drivel, though I ordered him warm Broth in Expectation of a *Salivation*. The 4th Day after the *Injection* of the *Mercury* he died, being for the 2 Days before so troubled with an *Orthopnœa*, that he could sleep only when he leaned his Head against something. I opened him, and found about a Pint of *bloody Serum* extravasated in the *Thorax*. I found also the Outside of the *Lungs* in most Places *blistered* (for what I at first took to be some preternatural Dilatation of the *Vesiculæ* of the *Bronchiæ*, were only *Blisters*, or a Separation of the common Integuments of the *Lungs* from their Substance.) Some of these were larger than a Rouncival-pea, others were smaller; but most of them contained *mercurial* Globules, to be seen, even without opening, in several of them through the outward Skin. Several of them I found broken, and, upon a little Pressure, observed the *Mercury* to run out, and with it a little *Sanies*; but upon a pretty strong Pressure, I observed that a great Quantity of that *Sanies* issued out. When I opened the right *Ventricle* of the *Heart*, I found some Particles of the *Quick-silver* in the very midst of the *coagulated Blood* lodged there; and in that also, contained in the *Arteria Pulmonalis*. I observed moreover *Blood*, *coagulated* after a very different Manner (which I want Words to express) from what I have seen at any other time, notwithstanding the various Methods I had used to *coagulate* it, and this in the Interstices between the *Columnæ* of the aforesaid *Ventricle*; and in this a greater Quantity of *Quick-silver* than any where else in the Dog. This *Coagulum* was in the *Vertex* of the *Ventricle*, adhering pretty closely to the *Columnæ* and *Parietes*. Opening the left *Ventricle*, I found a very tenacious *Blood*, *coagulated* and sticking firmly to the great *Valva*, including the Tendons of it, and a little resembling a *Polypus*. In this *Ventricle* I searched diligently for *Mercury*, but found none; whence it may appear, that the *Mercury* passed no farther than the Extremities of the *Arteria Pulmonalis*. This occasioned the aforesaid *Blisters*, and forced its Way through the common Coat of the *Lungs*. I also opened the *Aspera Arteria* down to the very *Bronchiæ*, but could find no *Mercury* in it, though I searched diligently for it. Each of the Subdivisions, as well as Divisions, of the *Bronchiæ* was filled with a *Sanies*, which when I washed away, I found Globules of *Mercury* in many Places under the *Bronchiæ*, and upon Examination they proved to be in the *Arteria Pulmonalis*. I have pressed these Globules backwards and forwards, and made some of them get out at the Holes made in the *Vesiculæ* or *Blisters* above described.

From hence may appear the Danger of using *Mercury* in human Bodies, so as that it may get into the *Mass* of *Blood*, especially into the *Lungs*; they wanting that brisk strong Motion which the Muscles have in other Parts, which

which are able to force it along with the *Blood*, in order to the raising a *Salivation*. Their lax spongy Texture makes them extremely unfit for clearing themselves of so troublesome a Guest as *Mercury* is. That it has this Effect on human *Lungs*, is plain from what we daily see in Persons that have been often *fluxed*, who are afterwards observed to die of *Consumptions* that will not give Way to *Medicine*.

2. Dissecting a chance Dog, that had *Mercury injected* into one of the *Jugulars* (but how long it had been in his Body I cannot tell) I found it thrown out of the *Blood* into the *Cavity* of the *Abdomen*, as likewise some Appearance of it in the other *Cavities* of the Body. All the *Glandules* were very turgid and full of *Liquor*, especially in the *Ventricles* of the *Brain*, and all round there was a great Quantity of *Serum*. This may be called a true *Hydrocephalos*.

By Dr. Chr. Pitt. n. 240. p. 184.

XI. I. We have *injected*, by a Syphon, about 2 Dr. of a *laxative* Medicine into the *Median Vein* of the right Arm of 3 Patients in the *Hospital* at *Dantzick*. One of the Patients was a lusty robust Soldier dangerously infected with the *Venereal Disease*, and suffering grievous Protuberatings of the Bones in his Arms. He, when the *purgative* Liquor was *infused* into him, complained of great Pains in his Elbows, and the little *Valves* of his Arms did swell so visibly, that it was necessary, by a gentle Compression of one's Finger, to stroak up that Swelling towards the Patient's Shoulders. Some 4 Hours after it began to work, not very troublesomely, and so it did the next Day, insomuch that the Man had 5 good *Stools* after it. Without any other Remedies those Protuberances were gone, nor are there any Footsteps left of the above-mentioned Disease.

Medicated Liquors injected into human Veins; by Dr. Fabricius. n. 30. p. 564.

The two other Trials were made upon the other Sex. A married Woman of 35, and a Serving-maid of 20 Years of Age, had been both of them from their Birth very grievously afflicted with *Epileptick Fits*, so that there was little Hopes left to cure them. They both underwent this *Operation*, and there was *injected* into their *Veins* a *laxative Rosin*, dissolved in an *Anti-epileptical Spirit*. The *first* of these had gentle *Stools* some Hours after the *Injection*, and the next Day; the *Fits* recurring now and then, but much milder, are since altogether vanished. As for the other, *viz.* the Maid, she went the same Day to *Stool* 4 times, and several times the next; but, by going into the Air, and taking Cold, and not observing any Diet, cast herself away.

It is remarkable, that it was common to all three to vomit soon after the *Injection*, and that extremely and frequently.

2. Mr. Smith hath adventured to open a Vein, and *infuse* some *Medicines* into the *Blood* of two Persons in the *Hospital* at *Dantzick*, desperately infected with the *Pox*; whereof the one recovered, and the other died. Afterwards (*viz.* July, 1668) the same Physician, together with M. Scheffeler, repeated the Experiment, by *infusing* altering Medicines into the *Veins* of the Right Arms of 3 Persons; the one lame of the *Gout*, the other extremely *Apoplectical*; and the 3d reduced to Extremity by that odd Distemper,

Medicines injected into Human Veins; by— n. 39. p. 766.

per, the *Plica Polonica*. The Success of this, as M. *Hevelius* (who was the only Person admitted to be present at the *Operation*) informs me, was, That the *gouty* Man found himself pretty well next Day, and shortly after went to work, it being Harvest-time, and has continued well ever since, leaving the *Hospital Aug. 17, 1668*, and professing himself cured: The *Apoplectical* hath not had one *Paroxysm* since; and the several Sores which the *Plica Polonica* had occasioned, are healed, and both these Persons are able to work.

An Observati-
on upon Blood
grown cold;
by S. Fracaf-
sati. n. 27 p. 492

XII. It is commonly observed, that when any *Blood* is become *cold* in a Dish, that Part which is beneath the Superficies appears much blacker than that on the Top. S. *Fracassati* maintains, that this blackish Colour comes from hence, that the *Blood* which is underneath, is not exposed to the *Air*, and not (as is vulgarly supposed) from any Mixture of *Melancholy*. To prove which, he assures, that upon its being exposed to the *Air*, it changes Colour, and becomes of a *florid Red*.

Some Effects
of the Air up-
on Blood, ex-
plained by an
Experiment of
the Change of
Colour in a
clear Liquor,
upon the Ad-
mission of Air;
by Dr. Fred.
Slare. n. 204.
p. 898.

XIII. Take a Quantity of *Filings* of *Copper*, fresh made, and place them in a Glass Phial, whose Bottom is broad and even, and then pour on an *Urinous Spirit*, either of *Sal Armoniack*, or of *Urine* itself, not made with *Quick-Lime*. 1. The Glass should not be filled up much above one half-way, and then must presently be so exactly stopped, that no *Air* be capable of intruding. You may then observe for 4, 5, or 6 Days the *Tincture* will be growing deeper and deeper, and then will keep a Stand for 2 or 3 Days, more or less, and afterwards will gradually decline, until it become quite pale, and void of all Colour. When it is in this State, the easiest Way of performing the *Experiment* for your own Satisfaction, is to decant this *clear Spirit* into a Glass, so as to leave all the *Filings* behind, and that will demonstrate that the *Filings* did not give this *Tincture de novo*, but that it belongs to the Influence of the *Air*. But in case you are furnished with an *Air-pump*, and can pour off this *pallid Liquor* in a *Vacuo Aëris*, and there stop it up securely, you may then preserve it so long as you please, and exhibit it to Advantage. You may also observe, that so soon as you let in the *Air*, the upper Superficies immediately *tinges* first, and so descends deeper and deeper, until it has penetrated the Whole; and this it does the sooner, if the Glass be wide, and the Liquor by consequence have a large Superficies: Or, if you pour it out of one Glass into another, the *Air* makes a more sudden *Change* of the Whole.

That this Liquor should lose its *Tincture*, is not to be wondered at, for even Ink itself by standing still will lose much of its *Tincture*; and so do the *Tinctures* of many Minerals: Nor can we expect that there should be any *Precipitation* discernable at the Bottom of the Glass, if we consider, that 2 Grains of *Copper* will give a deep Colour to 3 Ounces of *Urinous Spirit*. But this is surprising, that since our *Menstruum* (that is, our *Spirit*) is divested of its *venereal Particles* which gave the *Tincture*, and is become as *clear* as *Rock-water*, and being separated from its *Metalline Filings*, does,

does yet, upon the Approach of the *Air*, immediately afford a very *blue Tincture*. This indeed plainly shews, that there must be concealed in the Pores of the Liquor, such Particles as are of a *cupreous* Nature. But how may this come to pass? To which I answer, I cannot be so vain to think, that the *Air* gives the Matter of the *Colour* to the *Spirit*, but that it conveys into it such Particles as do stimulate and give Motion to the *Menstruum*, and enable it to dissolve those Particles thoroughly, that for want of more *Air* had not been fully broken in pieces.

In the next place, I discover two very differing Sorts of Matter that our *urinous Menstruum* acts upon in this *Experiment*: One I call a *sulphureous* Matter, which gives the *blue* Colour, and does let fall again; and another, which deserves the Name of *Saline*; but though it be taken up into our *tinging Spirit*, does yet, notwithstanding, afford no *Tincture* whilst secluded from the *Air*. This was made to me very plain and clear; for having found out a Way to separate a white slimy Substance out of our clear Liquor, I then destroyed the *Experiment*, so that when exposed to the *Air* the *Menstruum* would no more give the least *Tincture*. For a farther Confirmation, this white *saline* Substance being in a small Quantity dissolved into any proper *Urinary Menstruum*, exhibits the *Experiment*, set down, to Advantage, and gives a much finer and brighter Colour than what is drawn from *crude Copper*, or from the *sulphureous* Parts.

The great Interest the *Air* has in this *Experiment*, made me think of applying it to the great *Change* that is made upon *Blood*: For it is obvious to every Body, that there is a great Difference in Colour betwixt the *Venal* and *Arterial Blood*; the *Venal*, as soon as it is let out of the *Vein*, is observed to be of a dark Complection, and requires some Time to be exposed to the *Air* before it obtains a *florid Red*, and that only Superficies, which is contiguous to the *Air*, does for a good while become *Red*; for I have turned up a Cake of *Blood* 24 Hours after it had been let out, and found it of a very dark and opaque Colour, but the *Air* has immediately given it a bright and florid *red Tincture*. This so manifest a *Change*, made by Virtue of the *Air*, is contrary to the Opinion of those Anatomists, who would have *Respiration* to be chiefly to promote the *Circulation* of the *Blood*, and that great *Apparatus* of *Air-Vessels*, to be for a Fan to cool the Mass of *Blood*; and that the *Air* returns unaltered, and not capable of making any great Alteration, being denied any Ingress into, or Mixture with the *Blood*. But the Observation is certain and unerring, that the *Venal Blood*, as it passes the *Right Ventricle*, at its Entrance into the *Lungs*, is of a very opaque and blackish Complection, and in its Passage through the *Lungs*, before it comes to the *Left Auricle*, is changed into a very florid and bright *Red*. And I have often observed, that Persons that have vomited *Blood*, upon a Rupture of some Capillary Vessels of the *Lungs*, have sent up a very frothy or spumous *Blood*, and at the same time of a bright scarlet *Red*: That it was frothy, argues that the *Air* had incorporated with it; that it was *red*, was due to the tinging Power of the *Air*. To expect that this *Change* should be made in the *Heart* by any local Ferment, or *Flamma Vitalis*, is fruitless, because we find it performed

formed before its Arrival there; the Structure of the *Heart* denoting that Engine to be principally made for projecting the *Blood*, in order to a *Circulation* through those various *Arteries*, or Pipes, which are branched from the *Heart*. Let us therefore examine the Structure of the *Lungs*, and we shall soon discover it to be a *Pneumatick* Engine made principally for taking in *Air*, and that in great Quantities. It's true, we may call the *Lungs* a Contexture of *Veins*, *Arteries*, *Nerves*, *Lymphæducts*, &c. and that these do very much make up the *Parenchyma* (as some do use the Word) of the *Lungs*; but yet we shall find the great Bulk of the *Lungs* to be *vesicular*: It seems to me to be a Continuation of the *Aspera Arteria*, or Wind-pipe, divided and subdivided into many Branches, and these still spun out into lesser and lesser Pipes, all of them hollow; the farther they run, the thinner their Sides do grow; which, upon the *Inspiration* of the *Air*, do swell up and grow round, and upon *Expiration*, do fall something flaccid, and abate something of that Figure, as the Microscope does plainly represent.

It is therefore more than probable, that the *Air* should insinuate itself into this Machine, which is so truly adapted to receive it, and that in great Quantity; for in each *Inspiration* the *Lungs* are stretched at that rate, as to take up double the Room they do in the State of *Expiration*, or in their compressed State; and even in this State the *Air-Bladders* are not fully evacuated, but contain *Air* for good Purposes. Nor can it be pretended, that any Augmentation is due to the *Expansion* of the *Blood-Vessels*, or any other, which do not swell beyond their usual Tension in each *Inspiration*. The *Sanguiferous Vessels* are divaricated through all the *Lobes* of the *Lungs*, and do give a very close Attendance to each *Vesicula* (for there is not the least *Vesicula* but has a capillary Vessel which intimately insinuates into it) in order to receive some considerable Benefit from it: And this appears to the Eye; for in an Instant a dark and foul Blood is changed into a bright florid red Colour. Nor is the *Air* thus infused into the *Lungs*, for a bare Colour, and of no farther Consideration: But I am apt to believe the great *Fermentations* of the *Blood* the Cause of the *Motions* and *Actions* of the *Muscles*; the *Animal Spirits* themselves, the great Spring of *Motions*, deriving their Energy and Powers, if not Nature, from hence. But, *Corollary I.* That the *Air* is full of *Volatile Salts*, none will deny; but that these *Salts* must bear the Name of *Nitrous Salts*, is called in question by this and some other Experiments I have made. *Nitrous Salts* seem to me not to have any Property of *Volatile Salt*. *Nitre* is a Salt of so *fixed* a Nature, that it will continue melted in a very strong Fire, with scarce any Evaporation; but if you put into it Charcoal or Brimstone, or give it an Accension, by another *Encheiresis*, you may obtain a great Quantity of as *fixed* a Salt as any Concrete whatever affords; so that to me Gold seems not of a more fixed Nature.

Corol. II. A Standard of *Volatile Salts* should be settled, at present I can think of none better than *Water*: That Salt which, in *Distillation*, is more *fixed* than *Water*, ought not to be reckoned among *Volatile Salts*. This Standard will be justified by good Measures, grounded on Experience: For all *Salts* that are truly *Volatile*, as far as I could observe, are really lighter than

than Water; that is, in a *chymical* Sense, do with a less Degree of Fire *Jublime* in our Glasses, or come over the *Helm*, than *Water* does. This I find justified in our *Volatile Salt* of *Amber*, erroneously so called, for it does not come up to our Standard of *Volatility*, and is really no *Volatile Salt*; as will be made appear, if you take this supposed *Volatile Salt*, and *distil* it in a *Retort*, or Head and Body, with common *Water*, the *Water* will ascend in such a Degree of Fire where the *Salt* will not, for you must encrease your Fire considerably, to make it rise after the *Water* is gone, and has left the dry *Salt* at the Bottom. This made me enquire farther into the Properties of the *Salt*, which did not at all correspond with *Volatile Salts* (for all true *Volatile Salts* are *Alkalies*) but on the contrary would ferment with them, and quite destroy the Property of true *Volatile Salt*, by bringing them to a dull insipid *Salt*, which some call *Sal Neutrum*; and also by fixing their Volatile Nature. not only in putting them by the Standard of *Volatility*, but also does quite destroy their spirituous and stimulating Smell, by Virtue of which they have been always deservedly esteemed such excellent *Cephalick* Medicines. Therefore examining this *Salt* yet a little farther, you will plainly prove it to be an *Acid* that corrodes *Iron*, turns Syrup of *Gilly-flowers* green, destroys the Tincture of *Lignum Nephriticum*, and does not ferment with common *Acids*; so that it plainly belongs to the Tribe of *Acids*, and should be struck out of the Catalogue of *Volatile Salts*, and perhaps out of the Number of *Specifick Cephalicks*, and rather to be degraded amongst the *Diureticks*, and even in that Rank to have but an inferior Station; for it seems to me to be but a dull Medicine, and more valuable for its Price than great Vertue, especially if quite divested of all its *Oil*, in which the great *Cephalick* and *Cordial* Vertues must needs be owned to consist.

Corol. III. That *Volatile Salts* have a great Property to draw *Tinctures*, and do particularly advance those Colours that are disposed to be *Red*: For though the *Spirit* of *Wine* be a very *Catholic Menstruum*, and draws a very deep *Tincture* of *Cocheneal*, yet we have often observed, that if we put to this *Tincture*, when highest, a small Proportion of *Volatile Salt*, that would advance it to a great, even a double Degree. Thus I have observed it to advance the *Tincture* of *Arterial Blood*, and, which is very curious, if you dissolve it in your *Blood*, whilst you are bleeding at one of your Veins, that *Blood* will become very *florid*, and like *Arterial Blood*. Therefore, since *Nitrous Salts* produce none of these *tinging* Effects, this *Corollary* seems much to favour the Notion, that the Effects of the *Air* upon the *Blood*, may be due to such *Salts* as are of a *Volatile Alkalifat* Nature.

Corol. IV. *Contagious* Diseases are communicated by the *Air* inspired at the *Lungs*; and this seems more probable, than what *Dr. Needham* and others have endeavoured to make out with more Difficulty, in attributing the same Effect to the *Air* taken in our Meat by *Mastication*, and swallowed down in our Drink, and communicated to our *Chyle*, from thence to our *Blood* and *Spirits*. But this Way a very small Quantity of *infected Air* is communicated, if we compare it with what is communicated to the *Lungs*: For in each *In-*
spiration,

piration, human *Lungs*, of an ordinary Size, do at least take in such a Quantity of *Air*, as will fill up a Quart Bottle, and in the Space of a Minute I have made 12 *Respirations* (when I was very sedate, and drew in my *Breath* very treatably) and in that Time, by Consequence, took in as much *Air* as would fill up a Vessel capacious enough to hold 3 Gallons of Water; and it is plain, that the *Air* expired, returns much altered, forasmuch as the *Breath* or *Halitus* returns *impregnated* with a moist Vapour, and such a one as does many times indicate the Temper of the *Blood*. From this *Halitus* Impositions of the *Lungs* are frequently predicted: Such as have *sulphureous Blood* shall emit no very pleasing, but rancid Exhalations. Nor does the *Blood* only clear itself of some Vapours in *Expiration*, but also imbibe and impregnate itself with such Particles as are necessary to maintain *Life* in *Inspiration*: For a Man could not subsist long in a Tun of *Air*, should he be kept close in so capacious a Vessel; as we have found by Experiments made with several *respiring* Animals, Dogs, Cats, and Birds, &c. that these would soon die there; so that we need constant Supplies of vast Quantities of fresh *Air*, which makes me believe, that those Particles separated out of the *Air* by the *Lungs* are very sparingly delivered or mixed with the common *Air*, but yet with this Difference, that the more compressed the *Air* is, the more it contains of that *Vivifying Salt* or *Spirit*; and on the contrary, the more rarified, the less is found: For we are told by the Experience of such as have been at the *Pike* of *Teneriff*, that their Breathing is more difficult there than at the Bottom, where the *Air* is more compressed. And we have found Birds and Mice, &c. would *live* as long again in a Vessel where we had crowded in, by a Syringe (or any other condensing Engine) a double Quantity of *Air*, as they did where they were confined only to common *Air*. To conclude, since the *Vivifying* Particles in the *Air* seem to be very sparingly diffused through it, I am apt to believe, that the Noxious and Pestilential are more sparingly scattered up and down (the Author of human Nature having taken more Care for its Preservation than for its Destruction) and therefore it may much better be inferred from the Premises, that contagious *Diseases* must needs be communicated to the *Blood* by *Inspiration* into the *Lungs* rather than any other Way.

White Blood; XIV. 1. A curious Person writes from *Paris*, that there they had, in the
by M. — House of a Physician, newly opened a Man's Vein, wherein they found
n. 6. p. 100. *Milk* instead of *Blood*.

By Dr. Lower. 2. A Maid, after eating a good Breakfast about 7 in the Morning, was
ib. p. 117. let Blood about 11 the same Day in her Foot; the first *Blood* was received in
a Porringer, and within a little while it turned very *white*; the last *Blood*
we received in a Sawcer, which turned *white* immediately, like the White of
a Custard. Within 5 or 6 Hours after I chanced to see both, and that in
the Porringer was half *Blood* and half *Chyle*, swimming upon it like a *Serum*,
as *white* as Milk, and that in the Sawcer all *Chyle*, without the least Appearance
of a Drop of *Blood*; and when we heated them distinctly over a gentle
Fire, they both hardened, as the White of an Egg when it is heated, or just
as

as the *Serum* of *Blood* doth with heating, but far more white. This Maid was then in good Health, and only let Blood because she never had her *Courses*, yet of a very florid clear Complexion.

3. About 20 Years ago Mr. *Thomas Day* [an Apothecary in *Cambridge*] By Dr. H. Beal. n. 8. p. 139. told me, that himself let a Man Blood in the Arm, and the *Blood* was as white as Milk. As it run out of his Arm it had a little dilute *Redness*, but as it fell into the Vessel it was presently *white*; and it continued like Drops of Milk on the Pavement wherever it fell. The Conjecture which Dr. *Eade* a Physician there, had of this Appearance, was, that the Patient had much fed on *Fish*; affirming withal, that he had soon been a *Leper*, if not prevented by *Physick*.

XV. 1. After his *Majesty* upon Account of some Medical Treatises which I published, generously settled a Pension of a Thousand Pounds a Year upon me; that I might not be thought unworthy of so great a Favour, I immediately set to work in order to compose a full and accurate History of internal Diseases. But in entering upon this Work I thought it necessary first to settle and demonstrate what is the Nature and Efficacy of the constituent Parts of the Blood, and further how they are proportioned to one another. I therefore bent my whole Care in examining the Blood, treading in the Footsteps of the celebrated *Boyle*, and trying, if possible, to push it still farther than he had done, which I had long and often wished, but durst scarce hope to do it. At last however, by long and greivous Labour, I succeeded; and here I found the Mistake of those Chemists and Physicians, who hitherto believed that the *Salt*, which is commonly obtained from the *Blood*, is only merely *Acrid* or *Alkaline*, and that no *acid Salt* can by any Means be produced from it. They are likewise mistaken, who for so many Ages past, have judged it impossible to find out by any Art the Proportion of the constituent Parts of the Blood to one another. *The constituent Parts of Human Blood; by Dr. Raym. Vieussens. n. 241. p. 224.*

I know very well, and I own it for a Truth, that the *Salt* obtained from the *Blood* by the Force of Fire, whether it is *volatile* or *fixed*, if it is mixed with any acid Liquids even of the gentler Kinds, presently raises a Fermentation, as they say: And besides, that same *Salt* precipitates dissolved *corrosive Sublimate*, and tinges the Syrup of Violets of a green Colour, as every Body knows, and therefore has a great many *saline-acrid* or *alkaline* Particles, whereby it produces these Effects; but it likewise contains a good many *saline-acid* Particles, as will appear plain from Experiments which I shall very soon mention, and thus it will be put out of all Question that it is a true *salt Body*. When I say a *salt Body*, I mean that it is composed both of *saline-acid* and *saline-acrid* Particles, but the *saline-acrid* are in much greater Proportion; from which this Consequence must be deduced, that in a natural State of the Blood, the *saline-acid* Particles are exceeded in Quantity by the *saline-acrid*, and as it were lie hid in them.

When I tried to separate, if possible, the *acid Salt* of the *Blood*, viz. in the Form of an *acid Spirit*, from the *Salt* abovementioned, which I long ago divided into the *innate* and *adventitious*, or that which is supplied chiefly by

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the Aliments; I burnt, or, as they say, calcined, fifty Pounds of *Blood*, first sufficiently baked and dried in a Brass Vessel over the Fire, for four and twenty Hours in a *Potter's* Furnace, and so reduced the whole to 3 Ounces and 7 *Drachms* of a greyish Kind of Ashes; and of these Ashes, which were very rough to the Taste, fermented with acid Spirits, and tinged a Tincture of the Flowers of Mallows of a green Colour, I made a *Lixive*, from which I got an Ounce of a *fixed Salt*, almost as white as Snow. Of that *Salt*, which, as I said before, fermented with all *acid Spirits*, precipitated the dissolved *corrosive Sublimate*, and tinged the Syrup of Violets green, I mixed 7 *Dr.* and 42 *Gr.* with about 3 Ounces of the driest *Bole*: Having mixed these in a Retort, luted it, and put it into a Reverberatory Furnace, I drew off Half an Ounce and eighteen Grains of *Spirit*, pretty much of the Colour of *Spirit of Sulphur*, and more *acid* to the Taste than *Spirit of Vinegar* itself.

This *Spirit* ferments violently, not only with the *Oil* and fixed *Salt* of *Tartar*, but likewise with the *Salt* both fixed and volatile, and with the reddish Spirit, which are extracted from the *Blood* by the Force of Fire. Besides, the same *Spirit* makes red the Syrup of Violets, the Tincture of Turnsole, and of the Flowers of Mallows. Whence it appears plain, that the *Salt* extracted from human *Blood*, ought to be looked upon as a true *Salt Body*, that is *Salt*, and something of an *acid-acid* mixed with it. That amongst all the *Salts* it seems to have a perfect Resemblance with *fixed Salt* of *Tartar* only, and none with *Sea Salt*, neither in Smell nor Taste, nor in setting the Teeth on Edge, or any other of its Effects, as is demonstrated from Experience. And hence it further appears, that the Extraction of an acid *Salt* from the human *Blood*, which has hitherto been reckoned by every Body very difficult, may nevertheless be done, if it is skilfully set about.

The same *Spirit* being extracted, and as it were forcibly drawn out of the Bowels of the fixed *Salt*, where it lay quite hid and buried, under the Form of a solid Body indeed, but divided into extremely minute Particles, I made a *Lixive* of what remained in the Bottom of the Vessel, from which I got two *Drachms* and a Half, and one *Grain* of a fixed whitish grey *Salt*. That *Salt* did not ferment, at least not sensibly, with any acid Liquor, except the *Oil of Vitriol*, yet it must be looked upon as an *acid Salt*, or a pure, or an almost pure *Alkaline* at least. For besides that it had deposited almost all its *saline-acid* Particles, it gave a green Colour to the Syrup of Violets after it had been warmed, and to the Tincture of the Flowers of Mallows, precipitated *corrosive Sublimate* dissolved, and raised no Fermentation with the *Oil of Tartar*. I must add likewise, that it did not in the least change the Colour of the Tincture of the *Turnsole*, which all Acids both solid and fluid turn constantly red.

Some time after I had drawn the *acid Spirit* from the fixed *Salt* of human *Blood*, I reflected upon the green Colour which the last Drops of the reddish Spirit of this Liquor put on, when I distilled it two Years ago from a Brass Alembick. And indeed, in my Opinion, that green and quite leeky Colour of those Drops was owing to some *saline-acid* Particles of *Vitriol* extracted

tracted by the Force of the Fire from the Brass of the Alembick, and intimately mixed with them. When first I called to Mind this Circumstance of the green Colour, I was not a little uneasy about it, because from that Accident, which I affirm really to have happened, I could scarce doubt but the *Blood* dried in the Brass Vessel, before it was burnt in the *Potter's* Furnace, must have received a great many *saline-acid* Particles of *Vitriol*, forced from the Brass by the Fire, which being inseparably united with its *saline-acrid* Particles, might compose the Salt from which my *acid Spirit* was drawn.

After revolving this Affair with a good deal of Anxiety, doubting much whether an *acid Liquor* could be obtained from human *Blood*, which had no extraneous Acid combined with it, I determined to search into the Truth of an Affair of so great Consequence, and to find out my Mistake, provided I was in one. I took therefore an *Ounce* of fixed *Salt*, which I had procured from human *Blood* dried in earthen Vessels, and mixed it intimately with three *Ounces* of the driest *Bole*, reduced to a very fine Powder. This Mixture I threw into a Retort, covered with Clay as is usual, then put it in the Reverberatory Furnace in my Laboratory, and having fitted a Receiver to its Neck, and carefully secured the joining with a wet Sow's *Bladder*, so that nothing could escape, I began first with a very gentle Heat, and then increasing it by Degrees to a sufficient Pitch, I drew off Half a *Drachm*, and ten *Grains* of *Pblegm*, and three *Drachms* of *acid Spirit* exactly resembling the former. This *Spirit* set the Teeth on Edge very much, and seemed to my Taste to be one of the strongest of *Acids*, and, in short, had all the Qualities which I attributed to the first *acid Spirit* that was drawn from the *Blood*. This happy Success of my Study and Labour, which gave me a great deal of Pleasure, intirely removed all my Doubts about the Extraction of an *acid Salt* from the *Blood*.

Afterwards I made a *Lixive* of the *Residuum* in the Bottom of the Vessel, from which I extracted five *Drachms* of a whitish fixed *Salt*; whence it plainly appears that I had not drawn off all the *acid Spirit* I might have got from the fixed *Salt*, which I put into the Retort, together with the *Bole*; but I did this on Purpose, that the fixed *Salt*, whose Analysis I was determined again to examine, might not be entirely deprived of all its *saline-acid* Particles. And I would not deprive it of all its *acid Salt*, because I wanted to find out whether it differed at all from the fixed *Salt*, from which I drew the *acid Spirit* before, and as much as it would yield. But I could observe no Manner of Difference between these two Salts. For both of them give the same light green Colour to the Tincture of the Flowers of Mallows; and although they raise no sensible Fermentation, upon *Spirit* of *Nitre* or *Vitriol*, or any such *Liquor* being poured upon them, yet they ferment violently, and both alike, upon adding a Drop or two of the *Oil* of *Vitriol* to them. From all which it is very certain, that the fixed *Salt* of the human *Blood* dried in the Brass Vessel, from which I extracted the *acid Spirit* at first, was not impregnated with any

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saline-acid Particles of *Vitriol*; and therefore we need not doubt, that the first was a true *acid Spirit* of the *Blood*.

Perhaps you will here object, that the *acid-acid Salt*, and the *acid Spirit* drawn from the *Blood*, is not extracted from it by the Force of Fire, but is produced from the Fire itself as from its *Matrix*; but hear what Experience says upon this Subject. I have frequently by the Heat of the Sun alone, extracted from the *Blood* a reddish *Salt*, of a more *acid* Taste than that which is extracted by the Force of the Fire; which greater Acrimony is always followed by a manifest Acidity upon the Tongue, and the Reason of the first Phænomenon is this, that the Sun blunts the Points of that Salt much less than the Fire; but the last again is owing to the *volatile acid Salt*, by whose Force the *Blood* naturally ferments, being firmly combined with the *saline-acid* Particles of the *Blood*, growing gradually cold when it is let out from its Vessels. Besides, these different *Salts*, thus mutually combined, are not so easily separated from each other by the gentle Heat of the Sun, as by the violent Action of the Fire; and hence this *Salt*, of which I am now speaking, has an *acid-acid* Taste, and scarce ferments with *acid Spirits*, if you except Oil of *Vitriol*.

Now I shall explain the Method, whereby I found out at last, that just and exact Proportion of Quantity, which Nature has given to those Parts of which the *Blood* is composed. First then, I examined the *Blood*, not of one or two Men only, but of a great many, and not only of healthy People, but of sick, neither of the same, but of different, and even contrary *Temperaments*, according to the exact Rules of *Analysis*, in such a Manner, as to separate the different Principles of it from one another, without any Loss of Substance. One would have thought, after this, that nothing remained to be done, in order to have the respective Quantities of those component Parts, but only to weigh them every one separately; but there was something more still required. For the *Pblegm*, the *reddish Spirit*, and also the *fætid Oil* carry along with them *saline* Particles, which it is impossible to separate from them, and consequently to weigh. I therefore contrived and compounded a Kind of *Pblegm*, every Way resembling the true *Pblegm* of the *Blood*, which therefore I call natural, though extracted by the Assistance of *Chemistry*. I mixed, *viz.* Half a Grain of *Volatile Salt* extracted from human *Blood*, with twelve Ounces of Fountain Water distilled: And though these two Bodies bore the same Proportion to one another as 11525 to 1, nevertheless the whole Water was so impregnated with the *Salt*, that immediately it became a little whitish, and contracted something of *Fætidness*; being mixed too with the Syrup of Violets, after some Hours it made it green, and it precipitated dissolved corrosive *Sublimate*.

Hence I could not help admiring Nature very much, for dividing Matter beyond what can be conceived; and then I had good Hopes of finding out the *Pblegm* I wanted. Nor was I deceived in my Hopes; for after having tried several Experiments in vain, I at last found out, that twelve Ounces of Spring Water, became exactly like the natural *Pblegm* of the

Blood

Blood, both in Colour, Smell, Taste, and every other Quality, upon dissolving in it a Grain and a Quarter of the *Salt* above-mentioned. But that I might examine still more accurately the Agreement of these two *Pblegms*, I took exactly equal Parts of each, which I poured separately to two equal Portions of the Tincture of the Flowers of Mallows, contained in two different Vials of the same Transparency, Size and Figure. Both Portions of the Tincture became immediately of a green Colour, and they were so like one another, that you could not observe the least Difference between the two. After this, I took twelve *Drops* of each Portion of the *Pblegm*, and mixed with each of them twenty-four *Drops* of dissolved *Corrosive Sublimate* contained likewise in two Vials of the same Transparency, Size and Figure; and presently both Portions became of the same milky Colour, dropping each a white Powder exactly resembling one another. It is as plain then, any Thing in the World can be, that no two Things can be liker one another than these two *Pblegms* are; wherefore, as there was only one *Grain* and a Quarter of *Volatile Salt* in twelve *Ounces* of the artificial *Pblegm*, so the natural *Pblegm* contained neither more nor less in it.

But as Nature is to be unravelled by Art, and Things that are unknown to be discovered by those that are known, having prepared a *reddish Spirit* like that above described, I set about examining the Quantity of *Volatile Salt* in the natural *reddish Spirit*. After a great many repeated Experiments, Numbers of them misgiving, I found at last that by mixing twenty-seven *Grains* of the *Volatile Salt* of the *Blood* with one *Drachm* of the *Pblegm*, there came out a Liquor in Colour, Smell, Taste, and every other Quality, exactly like the *reddish Spirit* of the *Blood*, which is nothing else than *Pblegm* impregnated with *Volatile Salt*, and upon Account of its sharp Particles, and a little *Sulphur* that is mixed with it, is rough and *fætid*, and very proper to produce the Effects which I shall mention afterwards.

Being willing however to try the full and perfect Resemblance in every Quality of these two Liquors, (the first of which I call the artificial, and the other the natural *reddish Spirit* of the *Blood*) into two equal Portions of each, contained in two drinking Glasses, I dropped in four *Drops* of the *Spirit* of *Vitriol*, whereby there was a Fermentation raised equally in each. Then into two drinking Glasses, of the same Transparency, Size and Figure, each of which contained twenty *Drops* of the Tincture of the Flowers of Mallows, I dropped in five *Drops* of each Portion of the Liquor, whereby there was immediately produced in each a very beautiful green Colour, like that of an *Emerald*, and both so like one another, that no Eye could observe the least Difference betwixt them. Last of all, I dropt in six *Drops* of each of the same *Spirits* into two different Vessels, each of which contained forty *Drops* of *Corrosive Sublimate* dissolved, whereby was produced the same white Colour in both, and the same Precipitation of a reddish white Powder.

From what has been said there appears, and has been plainly demonstrated, a perfect Similitude between the two *reddish Spirits* above-mentioned, viz. the Artificial and the Natural; wherefore the same Quantity of the

Volatile Salts of the *Blood* as is contained in a *Drachm* of the *Artificial Spirit*, (and it contains, as I said before, seven and twenty *Grains*) is precisely contained in a *Drachm* of the *Natural*.

Wanting next to find out the exact Quantity of *Salt*, which the *fætid Oil* of the *Blood* distilled from a *Glass Alembick* carries over with it, I set about the particular *Analysis* of that *Oil*. I mixed then, as well as possible, an *Ounce* of this *Oil* with three *Ounces* of the driest *Bole*, reduced to a very fine *Powder*. This *Mass* I divided into several little *Balls*, and put it into a small *Retort*, covered with *Clay*; and having fitted a proper *Receiver* to its *Neck*, after luting it, I placed it in a *Reverberatory Furnace*. With a very gentle *Heat*, I first drew off two *Scruples* of a limpid *Pblegm* from the *Bole*, and then changing the *Receiver*, as soon as I observed the first *Drop* of the *reddish Spirit* come off, and fitting another in its *Place* I drew off with a stronger *Heat* than before *Half an Ounce* and *forty-two Grains* of a *reddish Spirit*, every Way resembling the other above-mentioned. After this, I drew off with the strongest *Heat* two *Drachms*, and one and fifty *Grains* of an *Oil*, every way resembling the *Bile* in the *Gall-Bladder*, both in *Colour* and *Consistence*. But before I proceed further, I must observe here by the *Bye*, that there is this *Difference* between this *reddish Spirit* and the *Oil* I am now speaking of, *viz.* that the *Spirit*, being composed wholly of *Pblegm* and *Salt*, extinguishes the *Fire*, as appears upon pouring some *Drops* of it upon a live *Coal*; but the *Oil*, as consisting only of *Sulphureous* and *Saline* *Particles*, takes *Fire* almost as quick as *Gun-Powder* itself, and is all consumed in a very bright *Flame*.

Afterwards, from the *Lixive* which I made of the *Residuum* in the *Bottom* of the *Vessel*, I extracted eight *Grains* of a blackish *fixed Salt*, which easily attracted the *Humidity* of the *Air*, was extremely sharp and pungent to the *Taste*, fermented when mixed with *acid Spirits*, and tinged the *Tincture* of the *Flowers of Mallows* of a green *Colour*. From what has been now said, may easily and very evidently be gathered, that that *Ounce* of the *fætid Oil* of the *Blood*, the *Analysis* of which I very carefully went through, contained no more than *nineteen Grains* of *Earth*, which remained mixed with the *Bole*.

As therefore there was no *Difference* to be observed, neither in *Colour*, *Smell*, *Taste*, *Consistence*, nor *Effects*, between the *reddish Spirit* drawn off from the *fætid Oil* of the *Blood*, and the *reddish Spirit*, both the *Artificial* and the *Natural*, above-mentioned, I therefore believe, that each *Drachm* of the *reddish Spirit* I am now speaking of, as also each *Drachm* of the *Natural reddish Spirit* distilled from the *Blood*, contains seven and twenty *Grains* of this *Salt*.

As to the *Quantity* of *Salt* which is inseparably mixed with the glutinous *Particles* of that *Oil*, which is obtained from the *fætid Oil* of the *Blood*, this, in my *Opinion*, may easily be discovered; for as that *Oil* both in its *fætid* *Smell* and *Acrimony* exactly resembles the *reddish Spirit* which is obtained from the same *fætid Oil* of the *Blood*, and besides tinges the *Tincture* of the *Flowers of Mallows* green, in the same *Manner* as the other, it necessarily

family follows, that each *Drachm* of it must contain, and have intimately connected with it, seven and twenty *Grains* of *Volatile Salt*; the same as is contained in that *reddish Spirit*, which is procured from the *fætid Oil* of the *Blood* by Distillation.

Having found out then, in the Manner above explained, the exact Quantity of *Volatile Salts*, which both the *Phlegm*, the *reddish Spirit*, and the *fætid Oil* carry along with them in Distillation, no Body, I think, can doubt of the just Proportion of the Quantities of the different constituent Parts of the human *Blood*. For they may be separated from one another without any Loss of Substance, and I have separated them myself with very good Success; you can likewise weigh them after they are separated, and judge of the exact Quantity of each from the Weight. But I think I hear some Body making this Objection; that the *Salt* extracted from the *Blood*, especially the *Volatile Sort*, is *fætid*, and therefore it retains in it a great many *Sulphureous* Particles, which cannot be weighed, and for that Reason their real Quantity cannot be discovered. I confess this Objection is very just, but the Quantity of *Sulphur* found in the human *Blood* is so very insignificant, that it is not worth mentioning.

And here it is not improper to give a short Account of the *Analysis* of the *Bile*, which I set about and perfected about three Years ago. For on the fifteenth of *February* 1696, I forced from it a *Phlegm* as limpid and pellucid as any Liquid can be, and after that a milky Liquor as white as *Milk* itself, then some other Bodies besides, which I shall not here mention. This *Phlegm* and milky Water I exposed to the Eyes of all who were with me, and I have it still by me; it is not at all spoil'd, but has lost a little of its Whiteness. I considered a long while with myself what this Water could be, and at last I was persuaded that, from the *Bile* which is diffused through the small *Intestines*, the *Chyle* extracts a *Sulphur* impregnated with an *acid Salt*, like the *Volatile* almost deprived of its *saline-acid* Particles, and therefore very gentle. Nor do I scruple to assert, that by that *Sulphur* impregnated with the gentle *acid-acid Salt*, the *Chyle* is rendered white, disposed to ferment within the Cavities of the *Heart*, and prepared to be converted more easily into *Blood*.

Hence it follows, that the *Bile* conveyed from the *Liver* to the *Intestinum Duodenum*, by the *Ductus Cholidochus*, supplies the Mass of *Blood* with a fresh *Ferment*, to repair and invigorate the *natural Ferment* of the *Blood*, (provided the *Bile* still retains its natural Disposition); and therefore conduces very much to the Duration of this *Ferment*. This Opinion, if it is not absolutely just, appears at least very probable, from the following Experiment. I mixed eight *Ounces* of *Spring Water*, having in it a few *Drops* of the *Spirit* of *Vitriol*, with a *Drachm* of warm *Bile* taken fresh from the *Gall-Bladder* of a *Wether* that was just killed, in the Neck of a *Glass Funnel*; and immediately the Water put on a milky Whiteness, and would have become still whiter, if I had mixed four *Grains* of the *Salt* of *Wormwood* with it.

After I had finished these Experiments, I took Notice of something I had observed before, *viz.* that a certain *Phlegm*, extracted from Bread,

which in distilling brings over with it a *Volatile acid Salt*, if it is mixed with *Bile*, in a sufficient Quantity, produces a Liquor of the Colour and Consistence of *Milk*: That *Pblegm* turns the Tincture of the *Turnsole*, and of the Flowers of *Mallows* red; and which is more, the red *Spirit* of *Bread* ferments longer both with the *fixed* and *volatile Salt* of the *Blood*; than any other *acid Liquor*; whence it must be unavoidably allowed, that a great Quantity of an *acid Salt* can be procured from the *Bread* which we mostly eat, which, together with an *acid-nitrous Air*, conduces very much to the raising and supporting the *Fermentation* of the above Liquor.

The Opinion
of the Col-
lege of Phy-
sicians at
Rome, con-
cerning Dr.
Vieussens's
Analysis of
Human
Blood; by
Ja. Maria
Lanius.
n. 264. p. 599.

2. In order that there may no Intricacies occur to us, in candidly examining the Account you have sent us of the *Chemical Analysis* of the *Blood*, together with the Inferences you have drawn from it, we desire you will give us Leave to reduce that full and methodical Account of your Experiments, chiefly to two *Problems*, which shall be the Subject of this Answer. We must enquire then, in the first Place, whether besides the *acid*, *alkaline*, *Volatile*, and *Fixed Salt*, there is any *acid Salt* likewise; and whether that *acid Spirit* which you drew off by *Art* from the *Blood*, existed in it before, while it circulated in the Body? And in the next Place, whether the *Proportion* which the *constituent Parts* of the *Blood* bear naturally to one another, as to *Weight* and *Quantity*, can by any *Art* be reduced to certain *Rules*?

As to the first *Problem*, we confess with you, that it is a very palpable Mistake, that an *acid Salt* cannot be separated from the *Blood*: For whoever supposes this, must suppose that there is no *Acid* in the Mass of *Blood*. But that there is, even *Hippocrates* himself has observed; and which is more than the Authority of any Author, a great many Reasons, and very obvious Experiments, very plainly evince the Truth of it. For we take in with our Meat and Drink, both *Sea Salt*, and several different Kinds of *acid Salts*, which, although in a natural State, they are in a great Measure dulcified and volatilized by the *Alkaline* ones, yet in Diseases it frequently happens, that being restored to their native *fixed* State, they are secreted from the *Blood*, and thrown out of the Body, in the Form of *Sweat*, *Spittle*, *Urine*, and other *Excretions*, which are evidently *acid* to the Taste. Nor does there seem any Room to doubt, that the *Sea Salt*, which is placed amongst the *Acids* in People in Health, likewise exists in the *Blood*. For if you put a little *Blood*, as it comes out of a *Vein*, upon a Plate of *Salt*, and allow it to dry spontaneously, it affords a very curious Spectacle with a Microscope, exhibiting two different Species of *Salts*, one of which has its Crystals of the Figure of *common Salt*, and the other of the Figure of a *Volatile Salt*. Besides, the *Blood* dried in a Furnace, and then exposed to the Fire, catches the Flame with a Crackling like that of *Sea-Salt*, as the famous *Boyle* has observed in his *History of the human Blood*, who, in *Tit. 22*. speaking more expressly of that History, he says, That by a strong Calcination he had extracted three or four *Drachms* of the *Fixed Salt* of the *Blood*, which he found to be like *Sea Salt*, according as he expected. Thus then the Existence of an *acid Salt* in the *Blood*, being perceivable

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perceivable even to the naked Eye, it may justly be concluded, that the *acid Salt*, by the Assistance of *Chemistry*, may doubtless be extracted from the *Blood*. Besides, as there is no Body, even the greatest Novice in *Chemistry*, who will exclude a *fatid Oil* from the *Blood*, so likewise no Body can deny the Existence of an *Acid* in the *Blood*, as a *sulphureous Acid* enters into the natural Composition of *Oil*.

The only Doubt which remains with us upon the Subject, seems to be this; whether that Liquor, which is composed of an *acid Salt* separated by a particular *Analysis* from the *fixed Salt* of the *Blood*, and an irritating *Spirit*, stronger, you say, than the *Spirit* of *Vinegar* itself; whether, I say, that Liquor is produced wholly and solely from the *Blood*? Or whether it does not rather owe a Part of its *Acidity* to other intervening Bodies joined with it in the Process? For although some of the *Chemists*, out of an implicit Faith in their Preceptors, constantly affirm, that in *Chemical Distillations* none of the Particles of Fire are entangled with the Bodies distilled; yet, the ingenious and well experienced *Boyle*, treating of the *Chemical Analysis* of the *Blood*, owns very freely, that he was not sure, but in repeated Distillations some Particles of Fire might be associated with the Particles of the distilled Liquor. And as every Body knows, that Fire is a *sulphureous Acid*, you cannot help suspecting, that the *acid Spirit* which is drawn off from the *Blood* by the violent Heat of a Reverberatory Furnace, must at least have some Mixture of igneous Particles combined with it. Neither can this Objection be mitigated by what you hint, *viz.* calcining the *Blood* in the Rays of the *Sun*, &c. For you know very well, that they are both Fire themselves, and excite it in other Bodies. But that *Asbes* exposed to the Air after Calcination, should imbibe much *Salt* from the *Acid* of the surrounding *Atmosphere*, is to me, I confess, not easy to be conceived.

But let us pass over this, laying it down for certain what we are still in doubt about, concerning the Admixture of fiery Particles with distilled Bodies, and the Attraction of the *acid Spirit* from the Air. Let us come to that about which all the *Chemists* unanimously agree, and which you likewise own in a Treatise you have published, *viz.* that all the *Bolar Earths* have an *acid Spirit*, which can be drawn off by the Retort upon distilling them alone, without the Admixture of any other Body; who then that considers attentively the Method by which you separate from the *fixed Salt* of the *Blood*, a *Spirit*, more *acid* than the *Spirit* of *Vinegar*, will not presently suspect that this strong *acid Spirit* is not produced from the *fixed Salt* of the *Blood* only, but from the double Portion of *Bole* mixed with it in Distillation? And for this further Reason, that the *Chemists* find they can draw off from *Sea Salt*, for Example, a greater Quantity of *acid Spirit*, the greater that the Proportion of *Bole* is, they mix with it. It is therefore very true, that the Mixture of *Bole* conduces very much both to the Production and Increase of the Quantity of the *acid Spirit*; and it is impossible for any Body to affirm, that the *acid Spirit* produced by the Help of *Chemistry* from the *Bole* and *fixed Salt* of the *Blood* mixed together, is wholly derived from the one or the other.

But

Sceptical
Chemist,
Hist. S. K.
Part 4.

But here you will say to us, if you are firmly persuaded that there is naturally a greater Quantity of *Sea-Salt* than of the rest in the *Blood*, at least shew me the Method whereby its *acid Spirit* may be drawn off, without the Addition of any other Substance. That I may not seem to make a Secret of any Experiments, I must freely own to you, that upon considering that the *Bole* is made use of in distilling of *acrid Salts*, on Purpose to hinder their being fused by the Fire, and consequently prevent the Ascent of the Spirits, I immediately thought, whether the *Earth* of the *Blood*, after every Thing else except the *Sea-Salt* is drawn from it, might not, by separating the Particles of the *Salts*, very well supply the Place of *Bole*, in extracting the *acid Spirit* of the *Blood*. In order to find out this, a very industrious Artist here, *Franciscus Pirotti*, took the *Fæces* of the *Blood*, which were left in the Bottom of the Retort after all the *Volatile Parts* were drawn off, and which were impregnated, especially with the *Sea-Salt*, and put them by themselves into a low Glass Retort. And the Process being carried on according to Art, I was not at all deceived in my Expectation; for by the Heat of the Reverberatory, there was raised up a *Fume*, which was collected in the Bottom of the Receiver, into Drops of a Liquor moderately *acid*, which did not effervesce in the least with other *Acids*, but evidently with *Alkalies*. And in this Operation it is not to be doubted, that the *Acid* procured from the above *Caput Mortuum*, belongs really to the *Blood*, seeing there was no foreign Body, except Fire, joined to it.

Wherefore, as I hinted above, I will not dispute with you, that the strong *acid Spirit*, which you obtained from the *Blood*, was not in some Measure produced from the true *Salt* of the *Blood*. For I am of your Opinion, that the *fixed Salt* of the *Human Blood* is not of a simple Nature, but compound, *viz.* an *Acid* and *Alkali* joined together. And since such is the Texture of a *fixed Alkaline Salt*, that closely cohering by the Heat of the Reverberatory, it will rather vitrify than allow one Particle to ascend, as *Hoffman* has likewise observed, hence may easily be removed a Difficulty, which might occur to People less versed in *Chemistry*, concerning the Distillation of the *fixed Salt* of the *Blood*, *viz.* whence happens it, that from the *Ashes* of the *Blood*, which are apparently *Alkaline*, you can only distil an *acid Spirit*: Because the Particles of the *Alkaline Salt* are more fixed, and almost vitrified in the Retort, while those of the *acid Salt* are put into Motion and carried upwards.

I come now to consider the other *Problem*, which though you have been at a great deal of Pains, made a great many Experiments, and have shewed a great deal of Ingenuity in attempting to resolve, yet I very much doubt whether you have got the better of every Difficulty about it, or will ever be able to do it. For although the *Proportion* between the Constituent Parts and the whole Mass of the *Blood*, could be discovered in any individual Person, yet to be able to find out one universal and certain Rule of that *Proportion*, which should agree with the *Blood* in all Persons, seems to me to have more the Appearance of Truth, than of the Truth itself in it. And indeed, in my Opinion, there are a great many Arguments which
make

make it quite impossible for us to find out this *Proportion*. In the first Place, it is an indisputed *Axiom* amongst all *Mechanicks* and *Arithmeticians*, that the true *Proportion* of the Weight of Parts to the Whole, or of Aggregants to the Aggregate, cannot be known, without knowing likewise the Weight of the Whole, and of the Parts, or the Weight of the Aggregate and of the Aggregants. But here, to lay aside all Prepossession in the Affair, there is no Body endowed with Sense and Reason, but must acknowledge the Difficulty and Impossibility of demonstrating these Weights. For as to the Whole, for Example, that is, the whole Mass of *Blood*, who is there that does not see, that there is not the same certain and determined Quantity in all, when it is extremely hard to find it out in any one Body? And hence it is that some Writers have admitted eight Pounds of *Blood* in a *Man*, some twenty, some two and twenty, some more, and some less. Neither is it possible to overcome this Difficulty of finding out the true Weight of the *Blood*, as not only the Diameters of the containing Canals differ from one another in every Individual; but, which is more, the whole Mass of *Blood* cannot be taken from a Man, even if his Throat was to be cut, and therefore the whole cannot be weighed. For there are so many Turnings and Windings of the Canals, so many Recesses in the *Viscera*, and especially the Vessels of the *Vena Portarum*, which are distant from the *Cava*, are so large, that there is a great deal of *Blood* left in the *Abdominal Viscera*, even in Animals that are killed, and afterwards hung up by the Heels upon the Shambles.

Nor is that Subterfuge of any Force to weaken the Strength of my Argument, *viz.* that in order to find the *Proportion* between the Whole and its Parts, it is sufficient to know the particular Weight of one Part like the Whole, and then to find out the particular Weights of the different Principles which compose this Part: Because, in this Case, we could just as well find out the Rule of *Proportion* between the *Blood* and its *Principles*, if we knew exactly the true Weight of any *Portion*; as the *Blood*, and the particular Weights of the *Principles* composing that *Portion*; for (whatever may be the Validity of this *Hypothesis* in *Fluids*, which have a certain *Specifick Gravity*) there is a very great Difficulty in determining the true Weight of one *Portion* of the *Blood* like the Whole, and in discovering the same *Proportion* in each of the different *Principles* of which this *Portion* is composed. And in the first Place, because the *Specifick Gravity* of the *human Blood* is more hard to determine, than any one could well imagine, as the great *Boyle* has demonstrated after *Sanctorius*; for it varies in the same Person according to the different Season of the Year, and even the Time of the Day, and according to its being taken away sooner or later after eating. And does not likewise the *Arterial Blood* differ considerably in its *Specifick Gravity* from the *Venal*, and the *Blood* in the *Vena Cava* from that in the *Vena Portarum*? We therefore can never be certain neither of the Weight of the whole *Blood* in all, or in any particular Person, nor of the true *Specifick Gravity* of any *Portion* of the *Blood*, with respect to the whole Mass.

In the last Place, the Weight of the particular Parts which compose either the whole *Mass* of *Blood*, or any certain Portion of it, can far less be determined, because by the Addition of new Bodies, *viz.* the Fire, *Bole*, or something *acrid*, or by the exhaling of some of the native Particles, it must necessarily happen, that some of these Parts should fly off insensibly into Air, whereby their former and natural Weight, and consequently their true *Proportion* with one another, must very much vary. And for this Reason we find, that the industrious *Boyle* above cited, when he endeavoured to make an accurate Distillation of the *Blood*, yet upon weighing separately the different Bodies he had extracted from it, he found an evident Defect of a good many *Drachms*. And therefore he very justly calls it a Paradox, which *Chemists* impose upon us, *viz.* that in accurate Distillations, the Bodies drawn off or separated, make up exactly the Weight of the Whole. Neither do I assert this entirely upon the Credit of *Boyle* and other Authors of Veracity; for I myself have found, after as careful a Chemical *Analysis* of the *human Blood*, as I was able to make, that the Weight of the Parts, when they were separated, was by no Means equal to that of the Whole. For out of seven *Ounces* and seven *Drachms* of *Blood*, there wanted more than Half an *Ounce* after Distillation; and I make no manner of Question, but the very same Thing happened in the Experiments which you made.

As then we cannot discover the true Weight. neither of the whole *Blood*, nor of the different Parts of it, we can therefore have no Hopes of finding out the true *Proportion* that is between these different Parts.

But besides the Impossibility of finding out by Art the certain Weight of the Whole, and of the different Parts of the *Blood*, there is still another which arises from the Nature of the *Blood* itself: Which as it is different in every particular Person, it is in vain to expect to find out a *Proportion* between the *Blood* and its Parts which shall agree in every Body. For, as *Hippocrates* says, Nature differs from Nature, *viz.* according to the different Diet, Age, Countries, Seasons, Sex, Passions of the Mind, Exercises of the Body, and especially the Structure of the *Viscera*, and the Force of Ferments, there arise different Constitutions in Men, which plainly indicate different *Proportions* of the Component Parts of the *Blood* in different Subjects. And hence it is that the Manners as well as the Diseases of Men, not only widely differ from one another, but are even changed. Nor needs there much Argument to prove the easy Variation of the Component Parts of the *Blood* in one Person from another, when, according to your Assertion, a single *Grain* and a Quarter of the *Volatile Salt* of *Human Blood* is sufficient to disturb a whole Pound of distilled Water, and so produce a new *Proportion* in it, as 1 to 11525. These Differences of the *Blood* in different Constitutions, which no Body can deny, are sufficiently confirmed from *Wine* and *Milk*, which being Heterogeneous Fluids, and very analogous to *Blood*, are altered in such a Manner in their Component Parts, from the Climate, Soil, Season of the Year, and Age, that they can admit of no true Rule of *Proportion*, agreeing with each of them.

To conclude, I would earnestly desire you, leaving general *Hypotheses*, to consider carefully the *Proportion* you have mentioned, of *one Drachm* of *Fixed Salt* to *fifty Pounds* of *Blood* from which the *Salt* was extracted, (for I pass by here, considering so many *Pounds* of *Blood* taken from the *Veins* not of one Person, but of several, and perhaps likewise sick, which must alter very much the natural *Proportion*) and compare this *Proportion* with that of five *Scruples* of the same *Salt* which *Boyle* got from one *Pound* only of *Blood*; and you will find, which is surprizing, these *Proportions* differing so much from one another, as that the *Quantity* extracted by *Boyle* is almost ten Times the *Quantity* of what you got in *Proportion* to the *Quantity* of *Blood*. And at *Rome* we find the *Proportion* differing very much both from *Boyle's* and yours. But whether the Cause of these Differences is to be attributed to the different Dispositions of the different *Portions* of *Blood*, or the different Ways of managing the Process at *London*, *Montpelier* and *Rome*, I leave to others to determine; which ever the Case is, my Argument will still stand good: For whether the Difference is owing to the different Temperaments of the *Blood* in different Persons, or to the different Methods of the Artists in making the Experiments, there still remains an insuperable Variety to render that *Proportion*, which we want to discover, doubtful.

XVI. A *Child* (about a quarter of a Year old) at *Littleshall* in *Shropshire*, about *Candlemas* 167 $\frac{1}{2}$ was taken with a *Bleeding* at the *Nose* and *Ears*, and behind the hinder-part of the *Head*, where there was nothing at all of any *Sore*: This lasted for 3 Days; at the End of which, the *Nose* and *Ears* ceased *Bleeding*: But still *Blood* came, as it were *Sweat*, from the *Head*. Three Days before the *Death* of the *Child* (which was the *sixth* Day since she began to *bleed*) the *Blood* came more violently from her *Head*, and streamed out to some *Distance* from it: Nor did she *bleed* only there, but upon her *Shoulders* and at the *Waste*, in such *Quantities*, that the *Linnen* next her might be wrung, it was so wet; and every Day required clean *Linnen*. She for 3 Days *bled* also at the *Toes*, at the *Bend* of her *Arms*, at the *Joints* of her *Fingers* of each *Hand*, and at the *Fingers* Ends; and in such measure, that in a quarter of an *Hour* the *Mother* hath caught from the *Droppings* of the *Fingers*, almost so much as the *Hollow* of her *Hand* would hold. All the *Time* of this *Bleeding* the *Child* never *cried* vehemently, but only *groaned*; though about 3 *Weeks* before, it had such a violent *Fit* of *Crying* as, the *Mother* said, she never heard. After the *Child* was dead, there appeared in those *Places* where the *Blood* came, little *Holes* like the *Prickings* of a *Needle*.

This Account I had from the *Mother* of the *Child*, who is a very sober *Woman*; and she told it me with *Tears*. She also told me, that the *Blood* was not thin, like *Water*, but of that *Thickness* as *Blood* usually is; and that she and others believed there was little or no *Blood* left in the *Body* of the *Child*.

A strange Kind of Bleeding in a little Child; by M. Sam. du Gard. n. 109. p. 193.

A Periodical
Evacuation of
Blood at the
End of the
Fore-finger ;
by Mr. Ash.
n. 171. p. 989.

XVII. *Walter Walsh*, an Inn-keeper in *Trym*, born in *Ireland*, of a temperate Diet, sanguine Complexion, and pleasant Humour, in the 43d Year of his Age, *Anno 1658*, about *Easter*, was seized with a great Pain over all his Right Arm; a great Heat, and Redness in his Right-hand, and a Pricking in the Point of the *Fore-finger*, whereon there appeared a small *Speck*, as if a little Thorn had run in: And supposing it such, he opened it, whereupon the *Blood* spun out in a violent, but small Stream. After it had spent its Violence, it would cease for a while, and only drop, and then spring out with Violence again, continuing thus for 24 Hours, till at last he fainted away, and then the *Blood* stanch'd of itself, and his Pains left him. From that Time, during his whole Life (which continued 12 Years) he was frequently troubled with like Fits, seldom having a Respite of 2 Months; and they never returned oftner than in 3 Weeks. He rarely *bled* less than a Pottle at a time; the oftner the Fit came, the less he *bled*; and the more rarely it assaulted him, he *bled* the more: Whenever they endeavoured to *stanch* the *Blood*, it rais'd most exquisite Tortures in his Arm; no Remedies that were ever used, proved in the least effectual; he had no other Distemper that troubled him; neither Season nor Weather wrought upon him; he had no outward Accident that at first brought the *Bleeding*; Drinking more than ordinary made him more apt to *bleed*; he had no Child after his first Seizure. These frequent Fits brought him at last very low, infomuch that towards his latter End he *bled* but little, and that too but like diluted Water. He died of this Distemper on *Feb. 13, 1672*.

An Eruption
of Blood at
the Glandula
Lachrymalis;
by Dr. Clopt.
Havers.
n. 208. p. 51.

XVIII. An icterical discontented Woman, having a Desire to die, wholly rejected the help of Medicine, and within 3 Months being well nigh her End, there happened an *Eruption* of *Blood* out of the *Glandula Lachrymalis* of one of her Eyes, without any external Injury. There was an Evacuation of ʒij . of *Blood*, within the Space of 30 Hours. About a Week after the same Sluice was opened again, and she *bled* till she died.

An admirable
Essence for
stanching
Blood; by M.
Denys. n. 94.
p. 6039.

XIX. Here [in *France*] hath been found out an admirable *Essence*, which being applied to any *Artery* whatsoever, stops the *Blood* instantly, without any need of binding up the Wound. We first experimented it upon *Dogs*, of whom I have cut the *Crural* and *Carotid Arteries*, and the Thigh itself; and the *Blood* stopped in a little while, the Wound healing without any *Scar*, *Suppuration* or *Cicatrice*. We have also made Trials upon *Men*, of whom the *Temporal Arteries* were opened; and upon others, whose Hands and Face had been cut, and it succeeded with them as well as it did upon *Dogs*.

This *Liquor* works not only outwardly, but also being taken inwardly; for it stops the Loss of *Blood* in *Fæminis*, inveterate *Fluxes* of *Blood*, upon *Hæmorrhoides*, and other Hemorrhagies.

Experiments
made with
this Liquor;
by Dr. Walt.
Needham, n. 95. p. 6052.

XX. 1. *May 30, 1673*, A *Dog* had the Skin of his Neck slit open, and flay'd by Mr. *Serjeant Wiseman*, so that the *Jugular Vein* lay bare. He then

with

with his Lancet opened it, and immediately applied to it a Button-pledget of Lint dipt in the *Styptick* sent from *France*. This being done, he took up the *Muscles* on the other Side of the Throat, and divided them till he came to the *Carotid Artery*. This he likewise opened with his Lancet, and applied a Pledget after the Manner aforesaid. These Pledgets being kept on by Pressure of the Thumb about a quarter of an Hour, were then taken off. The Vessels *bled*, but not freely: Whereupon the Pledgets were changed for fresh ones, and kept on a quarter of an Hour more; being then first let loose, and afterwards taken off, the *Vein* and *Artery* were knit and soldered together.

2. The same Day a Patient, whom *Serjeant Wiseman* had newly dressed with a *Caustick Stone* in the Neck (upon some *scrophulous* Swellings) was brought back to us in a Coach, having *bled* all the Way, to the wetting almost of a whole Sheet. The Vessel lay so deep, that it was hard to reach it. However, *Mr. Wiseman* dipped two Pledgets in the Liquor aforesaid, and thrust them into two Orifices whence the *Blood* came. It was immediately stopped, and the Neck dressed up without any considerable Bandage.

3. 1. The same Day a young Woman's Breast being cut off by the same Chirurgion, the *Arteries* were stopped, by holding the like Pledgets in the Mouths of them, whilst the Dressings were fitted for the Breast. The Pledgets being then thrown off, the *Blood* continued stancht, and the Mouth of the *Arteries* remained close.

2. The Woman, whose Breast I cut off, *May 30, 1673*, laboured under a *Cancer* ulcerated. She was weak and much indisposed, by reason of the frequent *Bleeding* from a Vessel out of our Reach. About 2 Hours after the Account given above by *Dr. Walter Needham*, she was taken with a *Vomiting*, and her Breast *bled*. I was sent for, and found her swooning. I took off the Dressings, and perceived one of the *Arteries* to *bleed* a little. I applied the *French Essence*, and stopped it, but doubting the ill Consequence, if it should *bleed* again in the Night, I secured that *Artery* by the Touch of a hot Iron.

By *Mr. Rich. Wiseman. ib.*

4. *June 11, 1673*, A Dog's *Crural Artery* was cut quite across with an Incision-knife, before the *Royal Society*, by *Dr. Needham*. The Blood gushing out copiously, a Lint, dipped in the same *Liquor*, was applied to the Wound, and held upon it a little while; when, by reason of the great Glut of *Blood*, that could not be well wiped away for want of a Sponge (which made the Experimenter conjecture the Application had not been exactly made) the Lint was changed for a fresh one dipped in the *Liquor*, and kept on about half an Hour, and being then let loose, the *Blood* was soon stancht; whereupon the Dog, being unbound, licked the Wound, and walked away without any Ligature.

5. *Jun. 18, 1673*, *Mr. Denys* himself being come to *London*, made another Trial before the *Royal Society*. In the *Crural Artery* of a Dog was made an oblique wide Cut, and the *Liquor* in the usual Manner being applied to

By *M. Denys. Ib.*

it, the *Blood* was *stanch'd* in 7 *Minutes*, and the *Dog* being then let loose, but yet kept quiet for 23 *Minutes* longer, he then arose and let fall the applied *Compress*, and went away without any *Bandage*.

By ——— 16.

6. *Jan.* 20, 1673, Two *Calves*, of the bigger Sort, were brought into the *Banqueting-house* by the *King's* Command. The *Crural Artery* of one of them being laid bare, it was cut open long-ways with a *Lancet*, and presently a *Lint* dipped in the said *Essence* applied to the *Wound*. The *Blood* was *stopped* in about a quarter of an *Hour*: But the *Animal* being big and strong, and striving continually to get up, the *Artery* broke out again; whereupon a fresh *Lint*, dipped in this *Healing-water*, was laid on again. The *Blood* was at length so *stopped*, that about the End of 2 *Hours* the *Beast* arose, walked about the *House*, without losing any *Blood* more, though the *Wound* had no *Bandage* on it. Of the other *Calf*, the *Butcher* quite cut off one of his *Legs*, as high as he could, and the *Blood* rushing out impetuously, a *Compress* of *Lint*, dipped in the *Essence*, was presently applied to the *Part*. Here more *Care* was taken than before, of keeping the *Animal* quiet; and about the End of a quarter of an *Hour* the *Blood* was found perfectly *stanch'd*. Several of the *King's* *Physicians* and *Chirurgions* did examine the *Wounds*, after the *Blood* was *stopped*, and found them clear, without any *Escarr*; and his *Majesty*, who was present at these *Experiments*, declared himself publickly to be very well satisfied with it.

By ———

n. 99. p. 6079.

7. The *King* having given *Order* that *Mr. Denys* should be desired to communicate the *Secret*, a *Quantity* of it was made in his *Majesty's* own *Laboratory*, of which *Trials* were made upon 3 *Calves* at *Whitehall*, *July* 12, 1673, a *Leg* of each of them being cut off, as high as was possible, and the *Blood* of them *stopped* with this new *Liquor*, to the *Admiration* of all the *Spectators*: For this *Water* having been prepared with more *Exactness* than ever, the *Effect* of it was so quick and powerful, that the *Blood* was *stopped* in 4 *Minutes* of *Time*; the *Calves* by their *Motion* making the *Pledgets* to fall off, that had been put on the *Parts* cut, and not a *Drop* of *Blood* appearing.

By ———

n. 95 p. 6074.

n. 96. p. 6078.

8. 1. *July* 1673, The *Leg* of a poor *Woman* (labouring under an inveterate *Scurvy* and the *King's-Evil*, in the *Hospital* of *St. Thomas*) was cut off, because of a *malignant Ulcer*, not suffering her to sleep *Day* or *Night*. Immediately afterwards, the *Arteries* were dressed with some *Linnen Pledgets* dipped in the *astringent Liquor*, with a *Compress* upon it, and a *Bandage* keeping all close against the *Arteries*. The *Success* was, that the *Blood* was *stanch'd* without any other *Dressing*: And instead of complaining, as those are wont to do who have a *Limb* cut off, and the *Mouths* of whose *Arteries* are burnt with an hot *Iron*, or a *Caustick*, to stop the *Blood*, this *Patient* looked very chearful, and was free from *Pain*, and slept two *Hours* after, and also the *Night* following, and from that time found herself still better and better, without any *Return* of *Bleeding*, or any ill *Accident*.

2. *July* 5, 1673. In the same *Hospital*, the *Leg* of a *Seamen* was cut off, because of a *Wound*, accompanied with a *Fraçture*, made by a *Cannon Bullet*. After the *Part* was dressed, as above, with *Linnen* dipped in the *Essence*, the *Blood* was *stopped* in less than half a quarter of an *Hour*. There

was

was made a Bandage, that pressed the Linnen against the cut *Arteries*; and without any other Thing, the Patient found himself so eased of the Pains he felt before, that he *slept* two or three *Hours* after, and all the Night following.

Next Morning, the *Dressings* of the Woman, as well as the Man, were taken off in the Presence of the Physicians and Chirurgions, who were sent by the *King* to see the Operations; and they all did acknowledge, that no *Wounds* could look more fair and ruddy; there appearing no *Escarr* at all, nor any more *Blood* than if there had never been any *Veins* or *Arteries* opened in that Part.

9. The *Royal Stiptick* Liquor was used in the Engagement against the *Dutch*, 1673, by the Chirurgions of the Earl of *Offory*, Sir *Edward Spragg*, and Sir *John Berry*, and others, with admirable Success. A very good Physician in *Yarmouth*, several credible Persons also in *London* and other Places (some of whom have taken it *inwardly* themselves) do give the like Commendation of it, for *stopping Bleeding* upon *Eruption*, or Apertion, of a *Vessel* in the *Lungs* or other *internal Parts*.

By _____
n. 97. p. 6115.

XXI. 1. A large *Dog* being provided, an Aperture was made through the common *Integuments* of his *Abdomen*, whence the *small Guts* were extruded; after an Incision made in one of them according to its Length, they were again reduced; the *Wound* in the *Abdomen* being stitched up, a Solution of this *Powder* was applied; the *Dog* continued without any ill Symptoms, and became perfectly well in a few Days after. The like Experiment I have made on another *Dog*, who, in like manner, recovered without the Application of any Medicine.

Experiments made with Mr Colbatch's Styptick; by Mr. Will. Cowper.
n. 208. p. 42.

2. The *Leg* of a *Dog* was amputated 3 Inches above the *Patella*; the Expende of *Blood* from the *Arteries* was great, which did partly proceed from the Unaptness of the Applications which were prepared; but after two or three Attempts, the *Flux* of *Blood* was *stopped*, and such a Bandage made use of as was necessary only to keep on the *Dressings*: The *Dog* continued without any considerable *Flux* of *Blood*, and the next Day he was found on his three *Legs*.

The diseased Arm of a Man in *St. Bartholomew's Hospital* was amputated above the Elbow; but for above a quarter of an *Hour's* time many successless Applications of this *Stiptick* were made, and at length a small Tent dipped in the *Powder* itself, inserted into the Extremity of the *bleeding Artery*, before the *Flux* of *Blood* would admit the Application of Bandage. Five *Hours* after, a fresh *Flux* of *Blood* appeared, and strict Bandage was applied. The same Morning, the above-mentioned Amputation was made, a Boy about 12 or 14 Years of Age had his Leg also taken off below the Knee, to whose Stump divers successless Applications of this *Stiptick* were also made, before it was bound up, and in less than an *Hour* after, a fresh *Flux* of *Blood* happened, and strict Bandage was added. Some *Hours* after these Operations, both these Patients suffered extravagant Pains: Three Days after the Applications were taken off; and had any Person, a Stranger to what had been

been done, seen the Stumps, he would have supposed nothing less than an *actual Caustery* had been applied, or could have occasioned such large *Escarrs*, and so horrid an Appearance; which did sufficiently denote this *vulnerable Powder* to be a *violent Caustick*.

Trials of *Stipticks* on the Bodies of *Quadrupedes* have been commonly practised, to commend them to the Publick; but it is not without Cause that Pretenders to such Remedies have made choice of younger Animals, as *Dogs* and *Calves*, &c. for that Purpose. But since the only Standard of their Use is their Success on the *humane Bodies*, we ought to make our Experiments on those Animals, whose Magnitude and Age bear a Proportion to it. For nothing is more obvious in wounding the *Arteries* of living Animals, than that the Protrusion of their *Blood* bears a Proportion to their Bulk; and in Dissection, the *Arteries* of the *Fetus* are remarkably thinner than those of an *Adult*; and those of *aged* Bodies grow still thicker, and frequently become *cartilaginous*, and at length entirely *boney*; of which *Dr. Tyson* and myself have several Pieces.

Some Animals
having Lungs
yet wanting
the Pulmonary
Artery; by
Dr. Swam-
merdam. n. 94.
p. 600.

XXII. In my Dissections of late, I have met with some Animals, which although they have *Lungs*, yet Nature has denied them a *Pulmonary Artery*, so that the *Blood* is immediately distributed from the *Heart* through the whole *Body*, without undergoing any previous Circulation or Conquassation in the *Lungs*. No Body, I believe, will deny that *Frogs* have *Lungs*, since *Malpighius* published so many curious Discoveries about them, and *Walter Needham* has evidently proved they respire. In these amphibious Creatures however the *Pulmonary Artery* is wanting. Wherefore neither does their *Blood* circulate through the *Lungs*, nor is it strained nor elaborated there; being sent immediately from the *Ventricle* of the *Heart* through the whole *Body*, without touching the *Lungs*, which seems to me to be no bad Argument, amongst others, for restoring the Doctrine of the *Liver's* being a *Viscus* of Sanguification.

However, in the external Coat of the *Lungs* of *Frogs*, there is a plain *Artery*, (analogous to the *Bronchial*, or rather *Pulmonary Artery*) which is spread over their Surface in a surprizing manner, like a wonderful Network, and penetrates gradually the internal *Vesicles*, with its most minute Branches, and there it anastomoses (according to my Opinion) with the *Pulmonary Vein*, as you may even discover with the naked Eye. This *Vein* is twice as large as the *Artery*, and is situated in the Cavity of the *Lungs*, especially about the Mouths and the Interstices of the *Vesicles*, from which it sends out to all the Cells, and to the surrounding Coat of the *Lungs*, a great many capillary and almost invisible Branches.

Those Animals which I suspect to have the same Structure of the *Lungs* with *Frogs*, are *Toads*, *Lizards*, *Serpents*, the *Chameleon*, *Tortoise*, the *Water-Salamander*, and any other Animals, whose *Lungs* are *membraneous*, if there are any other.

An Aneurisma of the Arteria Aorta; by *Mr. Lafage*. n. 267 p. 695.

XXIII. In the Year 1685, a Servant to my Lord *Culpeper*, got a Fall which caused him a heavy Pain in the Breast for a while. About a Month after

after this Accident, a Musket burst in his Hands, and gave so violent a Recoil against his Right Side, that it made him spit Blood immediately, and continued for 6 Months. A Year after he began to feel a Pulsation on that Side, and then he spit Blood again, which continued, but only in the Spring and the Fall, till he died. He bled likewise by the Nose twice a Year, for a Month every time. In 1695, or 1696, a Tumour began to appear under the Right Nipple, which growing by little and little, came to an extravagant Bigness, and at last, after using some emollient Ointments upon it, of its own Accord, it broke suddenly, and he soon after died. Mr. Lafage opened the Body, and found that two of the Cartilages of the Ribs were worn off, by the continual Pulsation of the Tumour: Part of the Sternum Bone was also worn off, by the same Cause. The Dilation of the Artery began precisely on its Trunk next to the Heart, before it divided itself into the Ascending and Descending Trunks; and though there is but a little Place, yet it did dilate itself so excessively, that the Bag did fill up the whole Cavity of the Thorax on the Right-Side, and pressed the Lungs so much, that they were thereby much diminished; the Bag by the Outside did adhere to the Mediastinum, to the Diaphragma, the Pleura, and to the Sternum, in which it had digged two great Holes, so strong was the Impulsion. The inside of that Bag was lined, almost all over, with Bony Laminæ, some larger, some lesser, like so many Shells; the Heart was mightily relaxed, insomuch that it was twice as large as it ought to be; and amongst its Fibres there were some Stones, like them which are sometimes found in the Lungs of scrophulous Bodies.

Fig. 63. A, The Heart, B, The Aorta, next to the Heart, where the Aneurisma began. C C, The same dilated, making the Bag of the Aneurisma. D, The Descending Aorta. E E, The two Axillary Arteries. F F, The two Carotid Arteries. Explanation of the Figures. Fig. 63.

Fig. 64. A, The Heart. b b b, The Valvule Semilunares, in the Bag. Fig. 64. C, The Aorta Descendens. D, The Orifice of the Aorta into the Bag. E E, The two Axillary Arteries. F, That Part of the Bag where it broke. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. The Bony Laminæ in the Inside of the Bag.

Fig. 65. a a a a, The Sternum Bone. B, Its superior Part. C, Its inferior Part. D D, Its Right-Side. E E, Its Left-Side, in which the Cartilages of the Ribs G G, were wanting. H H, The Place of the same Bone worn off by the Aneurisma. Fig. 65.

XXIV. In the Dissection of a Woman, who died some few Days after she was brought to Bed, M. Gayant having discovered the Ductus Thoracicus upon the 7th and 8th of the Vertebra's descending from the Back, inserted a Quill into the said Ductus, and having tied it upon the Quill, he did blow into it: Whereupon the Ductus was filled with Wind from the Quill unto the Subclavial Vein. This Wind issued at the Ascending Cava, which had been cut: To prevent which, I compressed with my Fingers the Vena Cava and the Ductus Thoracicus together, and M. Gayant having blown afresh into it, we perceived that the Emulgent Vein was, on the Left-side, filled with Wind, A Communication of the Ductus Thoracicus, with the Emulgent Vein; by M. Pecquet. n. 25. p. 461.

and that thereupon the Body of the *Vena Cava* also filled itself from the *Emulgent* into the *Iliques*. This Wind seemed to us to come from the Left *Kidney*, and to insinuate itself into the *Emulgent Vein*, and thence into the *Cava*. To clear this the more, we lifted with the Hand the *Lungs* that filled the Left Cavity of the *Thorax*, and having cleansed this Cavity with a Sponge, M. *Gayant* did blow into the *Ductus Thoracicus*, whilst I compressed the *Vein* and the *Ductus* with my Fingers upon the 3d *Vertebra*, descending from the Back: And we saw the Wind insinuate itself under the *Pleura*, by a Trace, which raised it suddenly as often as we did blow. This Trace appeared from the 4th *Vertebra* descending into the *Diaphragm*, and made us conclude that there were under the *Pleura* a Channel of Commerce coming from the *Ductus Thoracicus*, and passing to the *Emulgent Vein* by this Cavity of the *Thorax*.

Vid. in Sect.
XXV. 2. F.

This Channel of *Communication* we perceived to come from the *Ductus Thoracicus*, at the Place of the 4th *Vertebra* of the Back. But to be surer of it, I compressed with my Fingers the *Ductus* upon the 5th descending *Vertebra* of the Back; and M. *Gayant* having blown into the Quill, which was upon the 7th, the Wind passed not to the *Kidney*, nor to the *Emulgent Vein*; which made us conclude, that the *Communication* was not beneath the 5th *Vertebra*. Then I compressed with my Fingers the *Ductus Thoracicus* and the *Vena Cava* upon the 3d descending *Vertebra*; and the *Emulgent* swelled, when M. *Gayant* blowed into the Quill: Which gave us more strongly to believe, that the Place of the *Ductus Thoracicus*, whence goes the Channel of Commerce with the *Emulgent*, was between the 3d and 5th *Vertebra* of the Back. And to be the more assured thereof, M. *Gayant* split the *Ductus Thoracicus* upon the 3d *Vertebra* of the Back, and having blown into it at the Quill, the Wind came out at the *Axillary Vein*, and the *Ascending Cava*; but the *Emulgent* swelled not at all.

Blood passeth
where the Air
will not.

We also made the following Experiment, which seemed very curious. M. *Gayant* having blown into the *Aorta*, whereof all the Branches that had been cut were tied up, it swelled immediately, and the *Emulgent Artery* grew Tumid at the same Time: But the Wind that was protruded thorough the *Emulgent Artery* into the Left *Kidney*, returned not into the *Emulgent Vein*; which taught us, that the *Blood* often passeth where the *Air* does not. For the *Blood* of the *Emulgent Artery*, which goes to the *Kidney*, returns thorough the *Emulgent Vein* in the *Vena Cava*, pursuant to the Rules of the *Circulation* of the *Blood*: But in this Experiment the *Wind* could not pass that Way. And we had another Proof thereof in the *Lungs* of a Woman which we formerly dissected, where we saw, that the *Air*, which was propelled thorough a Quill into the *Vena Arteriosa*, which is the *Artery* of the *Lungs*, returned not thorough the *Arteria Venosa* (which is the *Vein* thereof) into the left *Ventricle* of the *Heart*, though by the *Circulation* the *Blood* pass there with Ease; and even *Milk*, which having been let in by this *Vena Arteriosa*, returned easily the same Way.

XXV. 1. The Discovery made about 20 Years since by M. Pecquet of the *Ductus Thoracicus*, seemed not sufficient to clear up all the Difficulties to be met with in the new Opinion, which this Channel hath occasioned, concerning *Sanguification*.

It might be said, among other things, that there appears no Reason why Nature should carry the *Blood* into the *Subclavials*, and thence make it descend by the Trunk of the *Vena Cava* (A) unless it be to keep the *Chyle* from entering all at once, and altogether pure, into the *Heart*; and that the Mixture which is made of the *Chyle* with the *Blood* along this Way, may dispose the *Chyle*, by a Kind of contagious *Fermentation*, the more easily to receive the Character of *Blood* in the *Heart*: But that this might be more conveniently done, the *Ductus Thoracicus* being inserted into that Trunk of the *Vena Cava* which ascends to the *Heart*, because that this Way is shorter, and is equally favourable to this Commixture.

It might also be objected, That supposing this Commixture were of Importance, the *Ductus Thoracicus* should communicate with the inferior Trunk of the *Vena Cava*, as well as with the superior, to the End that the Moiety of the *Chyle* being mixed with the *Blood* that comes from on high, and the other Moiety with the *Blood* that comes from beneath (B) it might the more easily be altered by this Commixture. And this Objection seemed the more rational, because it being very likely that the *Blood*, which returns from the Parts in which it hath received some Impression in penetrating their Porosities, communicates to the *Chyle* these same Dispositions, there was reason to desire, that the *Blood* which reascends, might in some Degree impress the peculiar Character of the inferior Parts, as that which comes from the upper Parts impresses upon it that which belongs to it. (C) Add hereunto, that the *Blood* which reascends to the *Heart*, must be more perfect than that which descends, because it comes from being purified in the *Liver*, *Spleen* and *Kidneys*; so that it is capable to give (D) to the *Chyle* good Impressions. (E) Lastly, it might be said, that, supposing it be necessary that not only a Proportion of the *Chyle* pass through the *Heart*, to give it some Kind of Refreshment, but also that all the *Chyle* be conveyed thither for to be converted into *Blood*; the small Orifices, which the *Ductus Thoracicus* hath in the *Subclavials*, seem not to be large enough for that Purpose.

The Observations that have been lately made, by searching carefully the Passage of the *Ductus Thoracicus* in the Body of a Woman, did shew, that these Difficulties were well grounded. For, it hath been found by divers Experiments, made about this Matter, that there ascends at least so much *Chyle* through the Trunk which is beneath the *Heart*, as there descends thro' that which is above it.

These Experiments confirm those which were made some Years ago, and are clearer and ampler than the former. For the Communication which the first Time appeared to be only with the *left emulgent Vein*, hath been found this second Time not only with this *Vein*, but also with the two *lumbar Veins* which are inserted in the Trunk of the inferior *Vena Cava*. The Manner

A Communication between the Ductus Thoracicus and the inferior Vena Cava; by M. Pecquet: n. 85. p. 507.

Vid. Sup. Sect. XXIV.

of finding this *Communication* was thus: After there had been shewed the *Commerce* of the *Ductus Thoracicus* with the *Right Ventricle* of the *Heart*, by an *Injection* of *Milk*, which having been syringed into the Beginning of this *Channel*, issued in great *Quantity* through this *Ventricle*, we tied the *Trunk* of the *Vena Cava* above the *Heart*, so that nothing might pass that way; and the *Trunk* of the *Emulgent* and that of the *Vena Cava* having been opened above, longwise, some *Milk* ready to boil, was (G) injected into the *Emulgent* through the *left Lumbar Vein* (which we have ever observed to come from the *Emulgent*) and at the same time we saw it come away through the other *Lumbar*.

This *Experiment* having been several *Times* repeated without our being able to see the *Track*, which we had formerly observed under the *Pleura*, we resolved to attempt a more easy, and more certain *Method* of discovering this *Branch*, than the usual *Dissection* of the *Vessels* (H). This *Way* was to syringe into the *Trunk* of the *Ductus Thoracicus* a *Composition* that might run into it being hot, and which, by being refrigerated, might become solid enough to afford a greater *Facility* to follow and trace the *Channels*, in the *Cavity* of which it should be thus hardened. And this *Design* succeeded in *Part*: For the *Composition* filled the whole *Ductus Thoracicus*, and ascended as far as into the *Subclavial*; but there passed nothing into the *Channel* that makes the *Communication* sought for, though *Care* was had to warm the ambient *Parts* by several *Injections* of warm *Milk*, to the *End* that the *Composition* might not harden before it had penetrated into all the *Conduits*: We also tried to inject the same *Composition* through the *Lumbar* that issues out of the *Trunk*, if its *Valves* would permit it; but they stopped all that we endeavoured to make pass that way, and neither the *Milk* nor the *Wind* would ever enter there. (I) By this *Contrivance* we very distinctly saw the *Figure* and the whole *Structure* of the *Ductus Thoracicus*, and we found, that that *Ductus* did ascend unto the *Right-side* of the *Heart*, keeping one and the same *Size*, which was no more than $\frac{1}{4}$ of an *Inch*; that afterwards it was enlarged to $\frac{1}{2}$ of an *Inch* in *Diameter*; that in this *Enlargement* its *Tunicle* on the *Right-side* of the *Vertebrae* was, as it were, pierced by 4 small *Holes*, distant $\frac{1}{4}$ of an *Inch* from one another, and all disposed in a *Row*; into which *Holes* the said *Composition* had not been able to penetrate; that the same *Ductus*, after having re-taken its first *Size*, had two *Appendixes* fashioned like *Sacks*; that there was yet a 3d *Appendix* beneath the *Dilatation*; that the first and highest *Appendix* was of the *Form* and *Bigness* of a small *Phaseolus*; that the 3d, which was beneath the *Dilatation*, was like to the 2d; that they had a *freight Orifice*, and that the last was full of *Chyle* conssillate, so that the *Composition* could not enter there, as it had done into the other.

Annotations;
Dr. Needham.
Ibid.

2. A, This Reason for inserting of the *Trunk* of the *Ductus Thoracicus* into one *Place* alone, is as good as any that are afterwards given to prove the contrary. For all *Proofs* of this *Nature* are but loose *Conjectures* at best; the *Matter* admitting of no other *Demonstration* than what is *ocular*.

B, Till the lower *Insertion* be shewed, we are bound to believe that *Nature* thought the single *Commixture* of *Blood* and *Chyle* sufficient. The *Reinforcement*

inforcement of that Objection answers itself, being proposed in no other Terms than (*it seems very likely*) the whole Conjecture, having yet but very slender Foundation in Philosophy. And if there be any thing in the Notion of impressing Characters, it is more attributeable to the *Lympha*. See beneath at *D*.

C, That the *Blood* which re-ascends to the *Heart*, is purer than what descends from the *Head*, &c. it is a Notion that will not easily be granted; neither can it be made out by Experiment. I had myself compared the *Blood* of the *Jugular Vein* with that of the *Crural* in a Dog, and found no Difference. The Separations made by the *Kidneys* and *Liver* (if they prove any thing) prove the ascending *Blood* to be thicker than the descending, it having lost in those Places much of its *Serum* and *Lixivial Salts*, which are the great Instruments of Attenuation. But withal it is to be considered, that the *Blood* which ascends from the *Heart* to the *Head*, parts with much Excrement in the *Glandule Salivales*, and *Nostrils*, and the whole *Throat*; the Quantities of which are much greater than will easily be imagined. There is likewise a great Separation made in the *Brain*; which whether it be of the purest and best *Spirits* of the *Blood*, so as to leave it depauperated, or only of a *nutritious Serum*, such as is made in all the solid Parts, is hard to say. Only this may be certainly said, that the *Lympha* does wholly exonerate itself into the *Subclavial* and *Jugular Veins*, near the Place of the Insertion of the *Chyle*; whereby the whole *Chyle* is diluted, and the Mixture of it and the *Blood* facilitated. Which very *Phenomenon* is a greater Argument to prove, that the *Chyle* does wholly enter by that Passage, than any can be produced on the other Side: For we see all the *Lympha*, not only of the *Liver* and *Intestines*, but also of the lower *Limbs*, to pour itself into the *Receptaculum Chyli*, and not into any of the lower *Veins*: Whereas the *Lymphaticks* of the *Head*, *Neck* and *Arms*, think it sufficient to meet the *Chyle* at the Place of its Entrance; which same thing might have been done by the lower *Lymphaticks*, had they any *Chyle* to meet; the principal Use of the *Lympha* seeming to be, to serve the Uses of the *Chyle* and its Mixture with the *Blood*.

D, What Impressions are made on the *Blood* by the *Liver*, *Spleen*, *Kidneys*, &c. is uncertain; but if there be any such made, the *Liver* and *Kidneys* do so readily exonerate themselves into the *Vena Cava*, that the Impressions, be they what they will, are quickly conveyed to the *Heart* without any great Diminution of them. And whereas the Author mentions the Characters impressed from Parts, those (if any such be) may more justly be supposed to be conveyed in the *Lympha*, which Liquor seems to be a Product of those Parts curiously elaborated in the very Substance of them.

E, What is sufficient and not sufficient, must be judged of by Nature, and not by us. Yet if we consider the Time that is spent in carrying the *Chyle* up into the *Blood*, it is easy to believe, that a much greater Quantity of Liquor may be discharged by that *Ductus*, than is usually pretended to.

F, What those Experiments are, we should be glad to know. But the Experiment of 1667 (if I rightly remember it) was only a *Lusus Naturæ*, found by *M. Pecquet*, which I therefore call so, because neither he, nor any

Vid. Sup. Sect. XXIV.

one else hath found it since: Whereas the *Vasa Lacteæ*, and the Ways of ordering them, are so well known, that if any such thing were, it could not long be hid.

G, An Injection into the *Lumbary Vein*, with its Effects mentioned, can prove nothing but the *Inosculation* of the two *Lumbary Veins* with each other; which is acknowledged to be such in all the *Capillary Vessels* of the same Kind, viz. *Veins* with *Veins*, and *Arteries* with *Arteries*. But the Thing required here is, the Passage from the *Receptaculum* to the *Lumbary Vein*, or to any other *Vein* besides the *Subclavial*.

H, The Way of Syringing a Liquor which is apt to *Coagulation*, into the *Ductus Thoracicus*, &c. I think to be needless and unprofitable as to this Inquiry, when there is a more easy Experiment to be made, which is more demonstrative, viz. Open a Dog at a convenient Distance of Time from his Feeding, and then tie a Ligature upon the *Ductus Thoracicus* nigh the *Subclavial*, your *Receptaculum Chyli* will continue full 48 Hours, or longer if you please: So that if there be any such *Ductus*, it must remain likewise full with its own natural Liquor, and be all that while visible. But if there were any such *Ductus*, it would in a Quarter of the Time empty the whole *Receptacle*; whereas upon a Ligature you'll find the clean contrary, viz. all the *Lacteal Vessels*. (that are acknowledged to be such) fully distended: Which is a full Demonstration, that they have no Way of Evacuation by any other *Duct* than the *Thoracique*.

I, The other Use of the *Coagulating Injection* I applaud; though the same may be done by the Ligature abovesaid. However, the Event of the Experiment, made by the Learned *Pecquet*, makes against the Opinion of a *new Ductus*, and not for it.

The true Use
of the Lym-
phatick Ves-
sels; by M.
Louy de Bils.
n. 40. p. 79.

XXVI. The *Lymphatick Vessels* have two *Coats*, betwixt which there are innumerable very small and very fine Filaments, resembling the Moss of Trees without any *Valves*, containing a *nutritious Juice* conveyed into all the Parts of the Body, by a Motion thereof from the Centre to the Circumference; but returning through the inner Pipes (furnished with *Valves*) of the same *Water Vessels*; at which time it is no more to be called *Water* or *Dew*, but *Ferment*, the Vessels also deserving the Name of *Ferment Vessels*. This *Ferment* serves to help the *Blood*, and to *ferment* the same, being conveyed into it by a Motion contrary to the former, viz. from the Circumference to the Centre; which I have shewed to many in the *Jugular Glandules* taken out of a Dog; wherein I shewed them, that these *Lymphatick Vessels* carry their *dewy Particles* about the *Glandules*, between the two *Tunicles*, and that in the lowermost End of these *Glandules* the *Ferment Vessel* takes its Beginning, being enclosed in these *dewy Vessels*, and so constituting the inner Pipe together with the *Valves*, which are of another Form than hath been known hitherto.

To your *Quære*, Whether the said *Ferment Vessels* discharge at last all their *Ferment* into the *Ductus Thoracicus*, thence to be carried directly into the *Heart*, there to increase and to *ferment* the *Blood*; or whether they communicate their *Ferment* to other Parts also? I answer, that most of the Juice of
the

the *Milky Vessels* is discharged between the *Tunicles* of the *Veins, Arteries, Lymphaticks, Membranes,* and the *Vessels* in the *Mesentery*, to be conveyed into all the Parts of the Body, both Internal and External. For even in *Bearing Females* the *Fruit* is not nourished by any *Blood*, but by the *nutritious Juice* conveyed to it; as also by the *Moisture* contained in the *Amnion*, which is no *Urine* nor *Sweat* as some imagine; we having lately seen in the House of Dr. *Stalpart* at the *Hague*, in a new born *Child*, that his *Urachus* had no Cavity at all, through which the *Urine* could pass out of the *Bladder* into the *Amnion*. The remaining and least Part of the *Liquor* of the *Milky Vessels* is transmitted through the *Ductus Thoracicus* by the *Jugular Vein* into the *Blood*.

Besides these *Vessels*, there are yet others that do not exonerate themselves into the *Blood*, viz. the *Ductus Virsungianus*, which delivers itself into the *Duodenum*; and the *Ductus Salivales*, whereof the *Saliva* does no less, than the *Juice* in the *Ductus Virsungianus*, serve for *Ferment*, viz. the one in the *Stomach*, and the other in the *Intestines*. From whence you may easily conclude, not that I hold (as it seems I have been understood) that the least Part in the *Ferment Vessels* concurs to the making of *Blood*, but that the least Part of the *Juice* in the *Milky Vessels* is discharged into the *Blood*.

Concerning the other *Quære*, Whether also the Distribution of this *Ferment* is made through the *Testicles, Kidneys, Breasts, and Salival Glandules, &c.* I answer, That the *Salival Glandules* carry their *Spittle* or *Ferment* into the Mouth; and that the rest which returns back through the *Testicles, Breasts,* and other *Glandules* is carried to the *Cistern*.

XXVII. The Subject of this Paper was a Man of about thirty-five Years of Age, strong, of a *bilious* Habit, busied at the Time he was taken ill in gathering the Tithes, and by exposing himself to the Cold, after violent Labour, had probably the Pores of his Body too suddenly locked up. In the Beginning of the Disease he had a *Fever*, which came on with a Rigor, succeeded with Heat and wandering Pains, at first in the *Stomach* and *Intestines*, and soon after in the *Breast*. But these *Symptoms* were soon changed for others, the morbidick Matter falling entirely upon the *Back*, whence a violent Pain in the *Loins*, reaching as far as the *Hip*, and the Torment was so exquisite as to make the *symptomatick Sweats* run down from his *Hair* and *Face*. It would neither allow him to lie in Bed, stand erect, nor sit, but pressing his Belly against the Side of the Bed, with his Feet upon the Ground, by that Compression the Pain of his Loins seemed to be a little easier. But even with his Body thus inclined, he could not remain quiet as he wished to do; for being seized with Convulsions, he was first raised erect, with a rueful Countenance, and distorted Mouth, then he fell down upon the Ground, (unless there happened to be somebody by to prevent it) where he lay like a dead Person, unable to move himself, and as uncapable of rising as if he was an Infant. Thus prostrated, his Arms and Legs became stiff; so as it was not possible either to bend or extend them. His Mouth too was shut so close with *Convulsions* that it would scarce admit a Spoon. But these *Convulsions*,
with

*A convulsive
Rheumatism;
by Dr. Rob.
Pitt. n. 208.
p. 58.*

with which his *Back* and *Limbs* were seized, returned by *Paroxysms*, not periodically indeed, but sometimes sooner and sometimes later, according as the *Pain* was more or less violent. But let us bring him back again to that Position in which he found the most Ease, viz. the *Bed-side*, where he had such a grave solemn Look, as would have made any Body laugh to see him, if the Remembrance of the Misery he suffered had not rather excited Pity. Thus this wretched Man was tormented Day and Night, for about the Space of *three Weeks*, never lying in Bed, without Sleep almost the whole Time, from the exquisite *Pain* and frequent *Convulsions*. These were all the Symptoms which I could observe about him, otherwise he was well. He had no *Reachings*, the *Pulse* was strong and equal, the *Tongue* moist and covered with a white *Scurf*; his *Blood* was like that of a *pleuretick* Person, and his *Urine* like that of a Person in Health. What was done for him the first Week I cannot say, except that he was once blooded, had one *Glyster* and *Dose* of *Physick*, and a sufficient Quantity of *Laudanum* without any Effect. But all was in vain. At length I was called in, and as soon as I saw him in the Condition above described, I immediately ordered him to be plentifully blooded. Next Day I ordered a *Lenitive* for him, and after it had operated three or four Times, he could walk upright without Pain, and was free from Convulsions. But after it had done working the *Pains* and *Convulsions* immediately returned, and he to his former Situation the *Bed-side*. This however gave some Hopes, that by repeated Purging the Disease might be carried off, as the first *Dose* of *Physick* had produced such a Truce. The following Day, therefore, I ordered him *Resine* of *Julip*, and sweet *Mercury*, (as I had experienced the good Effects of this Medicine in Pains of the Loins) but contrary to Expectation he had not one Stool, though I added an Ounce of the Syrup of *Buckthorn* to the above. In order then that the Wedge might be sufficiently hard for the Knot, I increased the Dose of the Purge, making him take three or four Ounces of the Syrup of *Buckthorn*, every other Day. By this means his Belly was at last opened, and the Pains became gentler, and the *Convulsions* less frequent. I allowed him to drink as much *Whey* as he had a mind to; and after he was well purged, I could venture to give him *Laudanum* more safely, and in greater Quantity, in order to compose the Spirits, much disturbed both by the Disease and Medicines, and without locking up or confining the morbid Matter. Thus, at last, by repeating these *Purges*, eight or ten Times, the *Pain* and *Convulsions* both went off, and he quite recovered. In the meantime, to prevent a Relapse, I ordered some Nervous Medicines for him, to restore fresh Vigour to the Blood and Spirits: And I saw him lately very well, carrying a Burden upon his Shoulders. I had almost forgot to mention, that when he was recovering the Calves of his Legs swelled, but this yielded very easily to the last mentioned Remedies.

The probable
Causes of the
Pain in Rheu-
matism; by
Dr. Edw. Bay-
nard. n. 215.
p. 19.

XXVIII. Dr. Baynard was always of Opinion, that the Pains in a Rheumatism were not caused from any saline or acid Particles in the Blood, &c. but rather from the Clamminess and Density extending the Channels through which it passes, which Extension produces those sharp and pungent Pains, which
Rheu-

Rheumatick Persons so generally complain of. For although the proper *Coats* of the *Veins* and *Arteries* seem to be *indolent* in themselves, yet those thin *Membranes* which obfide them are of most exquisite *Sense*, and full of *Lympha-duets*, which being dilated and stretched, cause an *Inflammatory Symptomatical Fever*, with continual *Sweats*, the *Blood* being *Glutinous* and *Sizy*, as in *Quinsies* and *Pleurisies*, and all other *Inflammatory Distempers*. The *Fever* being increased by the great Store of *Alkalial Corrosive Salts* lodging in the *Blood*, causing *Thirst*, &c. and not diluted and washed off by *Urine*, which *Urine* is always thick, turbid and high-coloured, and almost, if not totally, devoid of any *saline Impregnations*. To prove which, he sent 6 *Quarts* of a strong Man's *Urine*, in the Height of a *Rheumatism*, to that ingenious Artist *M. George Mout*, who chemically Anatomized it, and found not above the 30th Part of those *Salts* usually found in such a Quantity of the *Urine* of a sound Person.

XXIX. Let *AB*, be a hollow Brass Cylinder, of a proper Thickness, whose Diameter is one *Inch* and its Length ten or twelve *Inches*; internally let it be polished as fine as possible, so as there may not the least Chink remain; and near its Bottom let there be a little Foramen *O*. Further let there be a Lid or Cover to it *EF*, (*Fig. 67*). and the Bottom *GH*, (*Fig. 68*) the first fastened to the *Cylinder* by two Screws, and the other by a metallick Cement. To the Bottom add the Note 1, 2, perforated in the Middle, and the external Part of it, after the manner of a Screw. Set the iron Rod *NN*, (*Fig. 69*.) of a proper Thickness, and of the Length of the *Cylinder*. At the Extremity of this let there be a Brass Plate *LM*, and two *Inches* higher up another *IK*, and the Space between filled up with Threads of Lint oiled, so as exactly to fill up the Cavity of the *Cylinder*. To these must be added too the Handle *H*. And now you have an Instrument not unlike a Surgeon's *Syringe*. Let there be made likewise the Brass Cylinder *OPQR*, (*Fig. 70*.) equal to the Size of the Figure, with two Wings *OS*, *PS*, perforated through its Axis with a large Hole, so as entirely being formed like a female Screw, the Male Screw of the Nose may be exactly received in it. Let the Foramen be enlarged from *R* and *Q*, as far as *TT*, then make a Shoulder *VV*, and a Plate *W*, perforated in the Middle, so as to be adapted and fastened to the Shoulder. Besides, let there be made a streight Cone perforated through the Axis, 1, 2, 3, (*Fig. 71*.) and let the Foramen be enlarged from 1, 2, as far as to 4 4, then make the Shoulder 5 5, so as exactly to fit the Cavity of the *Cylinder TT*, and stick firmly to it, and then make the Spring (*Fig. 72*.) of a Brass Wire winding in a spiral Manner round the *Cylinder*, of a sufficient Strength, and almost equal to the Diameter of the Cavity, 4 4 *VV*, only a little higher when it is left to itself, and let it have at its lower Extremity the Plate 7 7, of the same Diameter covered below with a Bit of soft oiled Leather, to shut up the Orifice of the Tube. Again, at the Top of the *Cupping-Glass* (*Fig. 73*.) make a round Perforation, into which put the Cone as far as the Wings *SS*, and let the Chinks or Fissures be filled with a Cement composed

The Pneumatick Engine applied to Cupping Glasses; by Mr. Tho. Luffkin.

n. 255. p. 288.

n. 259. p. 408.

Fig. 66.

Fig. 67.

Fig. 68.

Fig. 69.

Fig. 70.

Fig. 71.

Fig. 72.

Fig. 73.

Fig. 74.

posed of Rosin, Turpentine, and Quick-Lime; and last of all make the Stopper 6, 7, 6, 7, (Fig. 74) covered with oiled Leather at the Shoulder 7 7, whereby the Air, as soon as it is drawn out of the Glass (if there should happen to remain any Fissure at the Valve) may be excluded. Thus far concerns the Description of this Instrument; now I do not proceed to its Use and Application in Diseases, because that belongs properly to Physicians and Surgeons; I shall only add a few Things concerning the Manner of using it. The Thumb being closely applied to the *Foramen*, the Plate 9 9, (Fig. 75) is pulled up by the Handle to 10 10, but as the Air before filled only the Space 9 0 9, now it is so much rarified, or expanded, as to occupy the Space 9 9 10 10, that is three hundred times more; wherefore the Elasticity of the Air included in the Glass, overcoming the Elasticities of the Spring and Air included in the Cylinder, the Plate or Valve will be forced upwards, and remain open till such a Quantity of Air rushes into the Cylinder from the Glass, as to make the Elasticity of the Compliment of Air in the Glass, equal to the Elasticities of the Spring and Air now contained in the Cylinder; but the *Foramen* O being open, the Valve 1, will be close shut up by the Pressure of the external Air, *ceteris paribus*, according to the Force of the Spring and the Proportion which the Capacity of the Cylinder bears to the Capacity of the *Cupping Glass*. At three or four Suctions there will be exhausted $\frac{2}{3}$ Portions of Air, more or less. Now although the Elasticity of the Air, occupying the same Space, be according to the Quantity, yet the Resistance or Pressure of the Air, upon the Skin, under the Glass, will be to its Pressure upon the neighbouring Parts, as one to a Thousand; because, before the Air was exhausted from the Glass, the Resistance or Pressure upon the Part under the Glass, was the same as that upon the Parts without the Glass. I think it is worth observing, that the larger the Cylinder is, with a Spring of the same Force, the greater will be the Quantity of Air exhausted from the Glass; because the Air 9, 0, 9, is extended in a larger Space, and consequently has less Elasticity; wherefore the Elasticity of the Air in the Glass, bears a greater Proportion to the Elasticity of the Spring and Air contained in the Cylinder, and therefore a greater Quantity of Air will be extruded.

The Operation
of a Blister
when it cures a
Fever; by Dr.
Wil. Cock-
burn. n. 252.
p. 161.

XXX. There is hardly any one who has not seen a *blistering* Plaister, the great Ingredient whereof are *Cantbarides*, laid upon a fleshy Part, and after some Time, observed the *Scarf-skin* forced up with a Liquor, that oozed and issued out from within the Sphere of Activity of that Plaister: And if we consult the most of *Physick* Books, the Account is no better. Little or nothing more is said, even by Authors of the first Form, than any one may observe every Day; supposing only that he thinks that our Flesh, thus covered at any time with a *Blister*, is made up of many and divers Vessels out of which the discharged Water may come. I have therefore endeavoured to find a reasonable Account, *how the raising of Blisters may cure a Fever and its most terrible Symptom the Delirium, and that in 6, 8, or 10 Hours.*

To this End, I *first* employed *Microscopes* to look on the *Fly*, and its Powder, and to see if I could discover any *sharp Instrument* in these warlike and wounding Creatures. But the *Fly* became a very delightful, but too large a Survey for me; and the Powder begot nothing for my Sight but a dark Cloud; and whatsoever else I found, I could meet with no *Arms*. I then turned half a *Pound* of *Cantharides* into a *Retort*, and there came over with the least Sand-heat, and in a very short time, vast Quantities of Bodies so very small, that I was not able to discern their Shape. And though I proceeded in the usual Way, on the like Occasions, the whole Operation was performed very *soon*, and so *hastily*, that very little *Salt* stuck to the Neck of the *Retort*, and the *Volatile Salt* shot in most delightful *Crystals* in the *Receiver*. And of the whole 8 *Ounces* of *Cantharides*, there were only two *Ounces* and 5 *Drams* left as a *Caput Mortuum* in the *Retort*. When the *Liquor* came to be purified, the smallest Heat brought it over suddenly, *Oil*, *Salt* and *Spirit*; so that they could not be parted, till by a repeated Operation with *Brick-dust*. I mixed the *Spirit* with *Salt* of *Wormwood*, *Spirit* of *Harts-horn* and *Sal Armoniac*: But it did not ferment, contrary to the Expectation of most Authors. Then I turned it over upon *Spirit* of *Vitriol*, where it did ferment very strongly, and yet better with *Spirit* of *Nitre*; with which also I did mix the *Spirits* of *Sal Armoniac* and *Harts-horn*; but they neither fermented so long, nor with so great an *Ebullition*: From whence it is evident, that it is not only *Alkaline*, but a great deal more than any one of these I have now mentioned.

The *internal Use* of these *Flies* in Physick having been lately controverted with much Heat, I shall here give some *Hints* whereby to state the Question fairly; and such as if used as *Topicks* in the Controversy, will soon put an End to it among thinking and sober People. The great Thing challenged is this, That we may see *Cantharides*, which have been reputed *Poison*, now so corrected, that they become not only innocent, but prodigious Instruments of Health. For the clearing of this, first settle what a *Poison* is; and next, since *Death*, or no *Circulation* of the *Blood*, is its Consequence, we must find as many Kinds of *Poisons*, and Ways of *dying* natural, as there are Ways of stopping the *Blood's Motion* in the Course of Nature, or by Medicine; which is either, by its own *Rarefaction* to a Degree, its *Coagulation*, or lastly, by *letting it out* in such a Quantity that the remaining Part gives not animal *Actions*; and as all, or any of these, may be *sudden*, or produce their Effects in *Time*, we shall have *evident Poisoning* or *Poisoning* for a *Time*; of which we have many Histories. Again, it may be asked, Of which of all those *Cantharides* are? And of all I believe they may be found entirely or most especially of the third Sort. After this, we shall be led naturally to enquire, if they be corrected, or, in plain *English*, if they have left their *wounding Power*; and this is the Fact, of which we may inform ourselves, by applying a *Plaster* of *Cantharides* so corrected, to a Place exposed to *Air*. This will settle the Fact of *Correction*, and in Circumstances much to the Advantage of the *correcting* Side, because there the *Skin* and *Vessels* are much harder than those to be met with within the Body; and if they *blister* then,

much more when *internally* given. The Possibility of their being *corrected*, and of their becoming useful, may not be doubted of: But then it is our Reason, in this Way, that must be Judge. Add to all this the common Observation, that a common *Blister* sometimes makes *Bloody Urine*, and compute what Quantities enter the *Plaiſter*, and then what Quantities of small Parts may be sent from them that are thus mixed; next calculate what probable Distribution may be made of these Parts to the *Kidney*; and then you'll find that Parts that are nearer, and as susceptible, must be *wounded* too, and produce all the ill Effects that are supposed, and commonly seen. But if all this can happen by so small a Quantity of the *Powder* that goes to the *Plaiſter*, and is confined by other *viscid* Ingredients of it, what must be the Consequence of this *Powder* when it is taken inwardly, and in Substance? But it is *corrected*, and we are told with *Camphire*: The most unfit *Corrector*, so far as I can expect in Reason, or even imagine. But still our Reason may be frail; and so it may, and really is so, to a great Degree: But then to help it, I had two *Plaiſters* applied, each of them with *Cantbarides*, and one of them with as much *Camphire* as *Cantbarides*. The next Morning we found that *Plaiſter* wherein the *Cantbarides* were mixed with *Camphire*, to have quite as good Effects as the other where there was none. The Consequence of which is, that if *Cantbarides* said to be *corrected* make a *Blister*, when applied to any external Part of the Body, that they are to be thought not to be *corrected*.

But leaving these Particulars, I shall proceed to prove the Way of a *Blister's* working when it cures a *Delirium*, and a *Fever*. And here I shall only suppose,

1. That there are very *Mobile* or *Volatile* Parts in *Cantbarides*, &c. that can be determined into our *Flesh*, with a Force sufficient to make their Way thorough the Sides of any *Vessels* that are in the *Lines* of their *Direction*, so long, and in that Proportion, that their *impressed Motion* does continue.

2. That all Sorts of *fluid Bodies* contained in the Cavities and Channels of these *Vessels*, may be transmitted, according to the Conditions of Separation of *fluid Bodies* running in *Vessels* of that Sort, and the Wideness of the *Emissaries* made by the *wounding* Particles of *Cantbarides*, or any such like *blistering* Substance.

Next I should proceed to make some Suppositions, from the Nature of a *Fever* and a *Delirium*: But that I may be better understood, I shall first hint some general Things about them.

Fevers, in respect of Time, either remain after the same manner, from the Sickening till the sick Person is freed of his Disease, or not: If the first, they are called *continued Fevers*; but if the sick Person continues evidently in a sickly Way, and yet has great Reliefs, and is respited from his Illness for a Time, the *Fever* is said to *intermit*, or that it is *intermitting*. These Diseases are perfectly well discovered by the *Quickness* of the *Pulse*, which is the Fault of the *Pulse*, and the *Pulse* cannot be so but by the *Faultiness* of the *Blood*, either in *Quantity*, *Quality*, or its *Motion*. Neither can it offend either in *Quantity*, or in *Quality*, but it affects its *Motion*. Hence we may suppose that

that

that a *Fever* is an universal heightened *Circulation* of the *Blood*, and that a *Delirium*, *b. e.* that unconnected, incoherent, and ridiculous Way of *Imagination* and expressing ourselves in a *Fever*, is entirely the Effect of this greater *Motion*.

These Things being supposed, the Question may be stated thus ; How *wounding* by *Cantharides* makes our *Pulse* not so *quick*, and consequently our *Blood* to have a more slow and natural *Motion*? That this great *Effect* does not proceed from the *Pain* of a *Blister* is evident ; because *Pain* very often brings a *Fever*. That the Particles of the *Cantharides*, mixed with the *Blood*, should induce this Quiet by a peculiar Sort of *Fermentation* they make in the *Blood* is very precarious ; for I have shewn in another Place, from Hints of an eminent *Member* of the *Royal Society*, and perhaps the greatest *Chymist* that ever lived, that there is no such thing as a *chymical Fermentation* in our *Blood*. And the Quantity of *Lympha* that is thereby separated from the *Blood*, is acknowledged by most *Physicians* to be too weak a Cause for so great an *Effect*. I shall therefore proceed to enquire after a better *Solution* of this astonishing *Phenomenon*.

*Vid. Sea-sick-
nesses ; Part
I. p. 47.*

The *Pulse* is nothing but the Side of an *Artery* that is distended by a certain Quantity of *Blood* that is determined through its Cavity, by a certain *Motion* every time the *Heart* is contracted, and that touches and beats up our Finger, when we lay it on a Place where we may be sensible of this Affection in the *Artery*. We say this *Pulse* is more frequent, not so much that it beats oftner than any other Body's, but that it beats quicker in the same Person when he is said to have a *Fever* than before, when he was reputed to be in perfect *Health* ; so that a *Physician* is obliged to know the natural *Pulse* of every Person, before he can judge by the *Pulse*, that any one is sick. And how that may be done I have shewed at Length, in a Book some time ago. Howsoever, in this our Case, the *Pulse* is quicker, and there is no *Pulse* but when the *Heart* is contracted ; and the *Heart* being a *Muscle*, and contracted at every *Pulse*, is either the chief or only Cause that determines and stretches the Sides of *Arteries*, and makes a *Pulse*, or a very extraordinary Measure of such *Distensions* : But it has the greatest Share in propelling the *Blood* round the whole Body, in respect of the *Help* of the *Arteries*, which they are supposed to give by their *Restitution*, after their extraordinary *Distension*. Be it how it will, both their Actions are by *Contraction* (though afterwards I take no Notice of that of the *Arteries*) and no *Contraction* in *Muscles* was ever supposed by any sober Man to be performed, but by an Influx of *Spirits* into the Fibres of the *Muscles* so contracted. So that now our Question changes thus, How *wounding* by *Cantharides* makes the *Contraction* of our *Heart* weaker ?

The *Contraction* of *Muscles*, and consequently of the *Heart*, being by the *Spirits* that flow into them, as I have said before ; therefore whatsoever weakens the *Contraction* of any *Muscle* (suppose the *Heart*) must either be such a thing that can hinder the *Separation* of these *Spirits*, or intercept them in their Channel of *Conveyance* to that *Muscle*, after they are separated. The *Spirits* are known, by *anatomical Experiments*, to be separated from the *Blood* in the *Brain* : Now, whatsoever hinders the *Separation* of the *Spi-*

rits from the *Blood*, must either hinder that Rarefaction of the *Blood*, that comes by being broken down into small Parts, and makes them *Spirits* in their proper Place, or the *Blood* of that Fineness that is necessary for it to be perspired; *b. e.* a Body that affects the *Blood* so as not to separate *Spirits*, must be of a Nature to make its Parts more compact in their Contact; to have their Contact with a greater Nisus, and consequently to have its Parts less separable. The next Way is by affecting its Motion so that it discharges great Quantities out of the *Blood*. By these Means the Quantity of *Blood* being lesser, it gives fewer *Spirits*, when it is broke down; and is not so capable to be so comminuted, because of the Parts of *Blood* not pressing so much one upon the other, in the whole Course and Time of Circulation. Or, Thirdly, by some Means that affect the Parts that transmit these *Spirits*; so that now no *Spirits* can be separated, or in a smaller Quantity.

If we apply the Wounding by *Cantbarides*, or its Effects, to all these Ways, we shall find, that in the first Consideration, the *Lympha* separated in a *Blister* is nothing at all concerned, and that the stupendous Effect might possibly be produced without any such Discharge. But if you go further, and suppose the *Cantbarides* got into the Mass of the *Blood*, without any Gathering of *Waters*, you cannot suppose that the Parts of *Cantbarides* that are so subtle, so alkaline, and which, by other Experiments, make the *Blood* so fluid, can be any great Enemies to the Rarefaction of the *Blood*, which makes *Spirits*, and fits them to be separated; or any considerable Instrument in lessening the Rarefaction, which is requisite and absolutely necessary, by the first Condition. Neither are they, in their Nature, fit Instruments for the 3d: Besides that, we find no Signs and no Marks of such an Interruption, either in the *Brain* or any where else. The 2d Condition for hindering so great a Preparation, and so great a Separation of *Spirits*, is the Effect of all Evacuations. So that, by the by, Evacuation is the great Indication for the Cure of a *Fever*, and is a great deal more evident than any supposed *Poison*, or *Malignity* supposed to be discharged, by supposed *Alexipharmicks*, that are supposed *Antidotes*: Yet this Effect by an Evacuation is granted, and by the Way of working will be found unable to discuss all the *Phænomena*, in doing it in so short a Time as in the State of our Proposition.

Let us therefore enquire if a *Blister* that makes small Wounds, and cures a *Fever* in a short Time, can produce this its Effect in the only Way we have left us; and that is by wounding that Channel that carries those *Spirits* that contract the *Heart*, give us a quick *Pulse*, and a *Fever*, with all its Attendants, *Deliriums*, &c. If this Supposition is allowed of, no doubt but that any the least Quantity of animal *Spirits* let out by such Wounds, in a very little Time, will proportionably weaken the *Heart's* Contraction, and give us a slower *Pulse*, which is all we want; and which is more, this slower Contraction, which is known by our slower *Pulse*, determining the whole circulating *Blood* with less Force, the Parts of *Blood* do not comminute themselves so much as when the Motion was more rapid; and, by Consequence, there is not such a Disposition for separating small Parts in the *Brain*, that afterwards they

they may be derived through the *Nerves* into the *Heart*. But moreover, the lesser Motion continuing for some little Time, or 2 or 3 *Minutes*, in a Velocity something like our natural Motion, all the *Secretions*, which are performed in such *Degrees* of *Velocity*, will again begin to be done as before. If therefore we can put little *Emissaries* on the *Nerve* that is more especially concerned in the *Heart's Contraction*, we shall hinder any *Preparation* in the *Blood* for separating so great a Number of *Spirits*; which is one great Requisite: Nay, we shall make *Secretions* of that Sort, and in that Way, as in Time of *Health*; and if there be but *Secretions*, the *contriting* Parts, and those to be broke down, shall have no such close *Contact*; and therefore that extraordinary Quantity of *Spirits* shall not be prepared in the *Blood*; and if they are not prepared, they cannot be separated from it; or a moderate Quantity of *animal Spirits* shall be conveyed into the *muscular Fibres* of the *Heart*: Or, again, which is the same thing, its *Contraction* shall be *natural*; and all this may be done, or begin to be done, in two or three *Minutes*.

But how we shall apply a *Blister*, that may wound the conveying *Nerves*, is the only Question that remains. To do this we must remember, that the 8th Pair of *Nerves*, which serves for the *Heart's Contraction*, has its Rise from the Sides of the *Medulla Oblongata* behind the *Processus Annularis*, by several Threads which join together, and go out by the same Hole that the *Sinus Laterales* discharge themselves into the *Jugulars*: And since the Union by the *Atlas* is not so firm and compact as in the other *Vertebrae*, it is evident, that there is no extraordinary Hindrance, why some of these wounding Parts may not come at that *Nerve*. But if you reflect again, that this *Nerve*, or considerable *Branches* of it, run superficially enough on the *Neck*, you will have less Difficulty to apprehend how some of them are wounded, and to understand how these miraculous *Effects* do happen, and are produced: Or, it is easy to understand how the small Parts of *Cantbarides* can wound the 8th Pair, or, by wounding its *Branches*, derive from the *Nerve* itself, and lessen the Motion of its *Liquor*. Or, it is not hard to apprehend how wounding by *Cantbarides* hinders the Disposition of separating *Spirits*, and intercepts them in their Way to the *Heart*; how they make its weaker *Contraction*, and a slower *Pulse*. Or again, it is evident, how the small *Emissaries* made in this Way can cure a *Fever*, and a *Delirium*, in a shorter Time than is supposed in the *Proposition*.

From this Discourse we may deduce these *Corollaries*. 1. That the Operation of a *Blister* is great and sudden; That the wounding of this *Nerve*, or a *Branch*, is so absolutely necessary for curing a *Delirium* and a *Fever*, that whatsoever *Mischief* the applying of vast Numbers of *Blisters* over all the Body may do, yet the main End is neglected, if you forget a large one high on the *Nape* of the *Neck*. That if there is no *Vesication* after the laying on a strong *Plaster*, it necessarily establishes a new and prodigious *Hardness* in the *Skin* and *Vessels*, and a *Thickning* of the *Blood* for a further total Stop.

Observations
on epidemical
Distempers;
by Dr. Tho.
Molyeux.
n. 209. f. 105.

XXXI. About the Beginning of *November* 1693, after a constant Course of moderately *warm* Weather for the Season, upon some *Snow* falling in the Mountains and Country about the Town, of a sudden it grew extremely *cold*, and soon after succeeded some few Days of a very *hard Frost*; whereupon *Rheums* of all Kinds, such as violent *Coughs* that chiefly affected in the Night, great *Defluxion* of thin *Rheum* at the Nose and Eyes, immoderate Discharge of the *Saliva* by spitting, *Hoarseness* in the Voice, Sore Throats, with some Trouble in Swallowing, Wheasings, Stuffings, and Soreness in the Breast, a dull Heaviness and Stoppage in the Head, with such like Disorders, the usual Effects of *Cold*, seized great Numbers of all Sorts of People in *Dublin*.

Some were more violently affected, so as to be confined a while to their Beds; those complained of *feverish* Symptoms, as Shiverings and Chills all over them that made several Returns, Pains in many Parts of their Body; severe Head-aches, chiefly about their Fore-heads, so as that any Noise was very troublesome; great Weakness in their Eyes, that the least Light was offensive; a perfect Decay of all Appetite; foul turbid Urine, with a Brick-coloured Sediment at the Bottom; great Uneasiness and tossing in their Beds all Night: Yet these Disorders, though they much frightened both the Sick and their Friends, usually without Help of Remedy, would abate of themselves, and terminate in universal *Sweats*, that constantly relieved. This more violent Degree of the *Cold* was more apt, I found, to fall on such as were given to Excess in either eating or drinking, or inclinable to a *scrophulous* Disposition of Body, than on those that were more temperate, and less subject to Obstructions.

When the *Cold* was but moderate, it usually was over in 8 or 10 Days: But with those in whom it rose to a greater Height, it continued a *Fortnight*, 3 *Weeks*, and sometimes above a *Month*; one way or other it universally affected all Kinds of Men; those in the Country, as well as City; those that were much abroad in the open Air, and those that stayed much within Doors, or even kept close in their Chambers; those that were robust and hardy, as well as those who were weakly and tender; Men, Women, and Children of all Ranks and Conditions, the youngest and the oldest; though I think if it were favourable to any Sort, it most spared those that were aged, among whom I knew several that were not the least troubled with it, yet it seized so universally, that not one in 30, perhaps I might safely say more, escaped it.

As it first appeared towards the Beginning of *November*, so it seemed to arrive to its *greatest Degree of Violence*, and spread most *universally* about the Middle of it; and by the Beginning of the *Month* following it very sensibly *abated*; so that very few then complained of their *Colds*. So that in the Space of 4 or 5 *Weeks* it had its *Rise, Growth, and Decay*; and though from first to last it seized such incredible Numbers of all Sorts of Men, I cannot learn that any one truly *died* of it, unless such whose

Strength was before spent by some tedious Fit of Sickness, or laboured under some heavier Disease complicated with it.

I find that about *November* and *December*, 1691, by some short Notes I took then, *Coughs* were more than ordinarily frequent here in *Dublin*, though nothing comparable to what they were lately: They chiefly then affected young Children, whose *Coughs* usually turned to a violent *Chin-Cough*, yet at this Time, among all the Variety of *coughing* Children, I have not met with more than one that was troubled with a *Chin-Cough*, and that too was but in a slight Manner: Which minute Differences in the Way of *Epidemick* Distempers operating in our Bodies, clearly shew, that their *Causes* cannot be ascribed only to the sensible *Alterations* of the *Weather*, or the manifest Qualities of *Heat*, *Cold*, *Moisture* or *Driness*, highly predominant in the Air, according to the vulgar Solution of them; but they proceed from something more nice and latent than all this.

But to return to our *General Cold*: It was further remarkable for its *vast Extent*. It seized them at *London*, *Oxford*, and all other Places of *England*, as *universally*, and with the same *Symptoms* as it seized us in *Dublin*; but with this observable Difference, that it appeared 3 or 4 *Weeks* sooner in *London* than in *Dublin*. It also reached the *Continent*, and infested the Northern Parts of *France*, as about *Paris*, *Flanders*, *Holland*, and the rest of the *United Provinces* with more *Violence*, and no less frequency, than it did in these Countries; so that I believe no *Epidemick* Distemper was ever observed to *extend* so far.

No Example of any *Epidemick* Distemper seems in all Respects to come nearer in Competition with our late general *Cold*, than the *Transient Fever* in 1688. This short Sort of *Fever* was first observed in *Dublin* about the Beginning of *July*; and it so *universally* seized all Sorts of Men whatever, that I then made an Estimate not above one in fifteen escaped. It began, as generally *Fevers* do, with a Chills and Shivering all over, like that of an *Ague*, but not so violent, which soon broke out into a dry *burning Heat*, with great *Uneasiness*, which commonly confined them to their Beds, where they passed the ensuing Night very *restless*: They complained likewise of *Giddiness*, and a *dull Pain* in their *Heads*, chiefly about their Eyes, with unsettled *Pains* in their *Limbs*, and about the Small of their Back, a *Soreness* all over their *Flesh*, a *Loss of Appetite*, with a *Nausea* or Aptness to vomit, an unusual *ill Taste* in their Mouth, yet little or no *Thirst*: And though these *Symptoms* were very violent for a Time, yet they did not continue long: For about the 2d *Day* of the Distemper, the Patient usually of himself fell into a *Sweat* (unless it was prevented by letting *Blood*, which, however beneficial in other *Fevers*, I found manifestly retarded the Progress of this) and if the *Sweat* was encouraged for 5 or 6 *Hours*, by laying on more Cloaths, or taking some *Sudorifick* Medicine, most of the Disorders before-mentioned would entirely disappear, or at least very much abate. The *Giddiness* of their Head, and Want of *Appetite* would often continue some Days afterwards, but with the Use of open fresh Air they certainly, in 4 or 5 *Days* at farthest, recovered these likewise, and were perfectly well. This transient Disease was so favourable,

favourable, that not one in a thousand died of it: And by the Middle of *August* it wholly disappeared; so that it had run its full Course through all Sorts of People in 7 *Weeks* Time. It also spread itself all over *England*, and raged as generally in *London* as in *Dublin*, and with the same Concurrence of Symptoms. But it began to be taken Notice of at *London* about the Middle of *May*, and it continued there till the latter End of *June*; so that it did not shew itself here till it had wholly disappeared there. And it was very remarkable that in *England*, as well as here, a short Time before this *General Fever*, a slight Disease, but very universal, seized the *Horses* too, and shewed itself by a great *Defluxion* of *Rheum* from their *Noses*; which shews the Cause of spreading *Distempers* to be so prevalent, that it works not only on the finer and more delicate Composition of *Human Bodies*, but affects even the more strong and gross Frame of the most robust Animal Productions in Nature.

From these *Histories* one may probably gather, That spreading *Epidemick Distempers* take their Progress from *East* to *West*. But this should be further confirmed by more frequent Observations, before one may safely determine any thing in this Matter. However this is certain, that the *Plague* and *Pestilential Fevers* rage more frequently in the *East*, towards *Constantinople* and the *Levant*, than in these more western Parts of *Europe*; as if that seemed a more natural *Clime* for their *Rise* and *Propagation*.

Exotick Diseases propagated by Trade and Infection; by Dr. Lister. n. 165. p. 793. Plague. Small-pox.

XXXII. 1. The *Plague* is properly a *Disease* of *Asia*, where it is *Epidemical*, and is never bred amongst us, but comes to us by *Trade* and *Infection*.

2. The *Small-pox* also is an *Exotick Disease* of the *Oriental People*, and not known to *Europe*, or even *Asia Minor*, or *Africa* at all, till a *Spice-Trade* was opened by the latter Princes of *Egypt* to the remotest Parts of the *East-Indies*, whence it originally came, and where it rages more cruelly at this Day than with us.

The like I think of the *Griping of the Guts*, that it is a peculiar *Disease* of the *West-Indies*, and yearly received from thence, for this Reason, that it is none of the *Tormina Ventris* of the *Antients*; and therefore called by a new Name, by such as have writ of it; and also for that it is yet scarce known in any Part of the *North* of *England*, or *Mid-land Counties* thereof.

An Experiment concerning the Plague; by Dr. Jo. Bapt. Alprunus. Pb. Col. n. 2. p. 17.

XXXIII. No *Poison* is greater than that of the *Sickness*; our outward Senses are not affected by it, and our Understanding does not comprehend it; it is *Aërial* and *Volatile*, and it is fixed and coagulated when it concretes into *Buboes*. Hence I conceived that the Way for me to penetrate into the most latent Quality of this *Pestiferous Venom* was by *Chymistry*; not with *Knives*, but *Glasses*; not with *Iron*, but *Fire*. This horrid Undertaking (for the Glory of God, for the Favour of my Prince, and the Good of my Neighbours) I set upon without Dread. Having lanced a *pestilential Boil* of M. *Godfrey Reshel*, I collected the *virulent Matter*, and putting it in a *Retort*, and luting a *Receiver* to it very close, I applied Degrees of *Fire*; at first came over a
Water,

Water, then a more fat and oily Matter, and at last a *Salt* ascended into the Neck of the *Retort*. The *Fire* being removed, and the *Glasses* separated, there came forth so great a *Stench*, that a thousand Wounds exposed to the Summer-Heat could not have paralleled it. And though I thought I had sufficiently armed my Senses against it, that is, my Ears with Cotton, my Nose with Pessaries, my Mouth with Sponges, all dipt in Vinegars and Treacles, yet, as if touched with a Thunderbolt, I was struck with a violent Trembling of my Body. To make short, having broken the *Glass*, I gave some of this horribly stinking Salt to M. *Reshel* to taste, and then tasted it myself, and it was found to have an *Acrimony* as great as *Aqua Regis*.

Hence no Wonder, that so many are afflicted with continual *Vomiting*, so that they can keep neither Meat nor Drink, since their Stomach is continually irritated to this Expulsion by a poisonous Quality so sharp.

Hence no Wonder, if from the Sharpness of this *Venom* agitating the Humours, and urging the expulsive Faculty to a continual Perturbation of the Belly, a *Diarrhœa* is often caused, which follows the Patient to Death.

Hence no Wonder, that from this sharp Matter, such piercing Pains are felt in *Buboes*, and such Burnings in *Carbuncles*.

Hence no Wonder, why the best Remedies (and as it were the Anchors of Safety) are *Sudorificks*, allaying the *Acrimony*, and driving it out through the Pores; for I found those always which sweat, were in a hopeful Way of Recovery; but those which did not, were almost all taken off. I therefore ordered *Sudorificks* to be repeated every 8 Hours, and strengthening *Cordials* every Hour.

My usual *Sudorificks* for the better Sort were, *Species Diamosci*, *Diambrae*, *Liberantes Pannonicæ Rubrae*, *Extractum contrayervæ*, *Lapis Bezoar*, *Unicornu Marinum* (my *Specifick Powder*) *Sal C. C. volat.* *Succinum volat. conchæ* *Perlar. Volatil.* *Aqu. cord. temp. cum Moscho* *Scorzon. Cardui Bened. Syr. Scordii, Corallor.*

For the meaner Sort, *Species Cor. temperat.* *Electuar. de Ovo, Antimon. Diaphoret. Bezoarticum minerale Joviale cum Aquis supradict.* & *Syrup.*

My *Cordials* for the richer Sort were, *Confect. Alchem. de Hyacinth. magist. Ferla. Hyacinth. Granator. cum Aquis è toto Citro, Saxon. Sale, &c.*

For the meaner Sort, *Coralia rubra contusa, Confect. Alchem. incomplet. cum Aquis tormentil. Cardui bened. &c.*

These were in general the Medicines used in this Distemper, but with Variety, according as the Age, Temperature, and Condition of the Patient required.

But because no *Alexipharmack* is sufficient in this Contagion, therefore, grounding my Judgment upon the Principles of *Harvey* about the Motion of the Heart, and the Circulation of the Blood, and some other of *Bartoline* and others, I concluded, this *Pestiferous Venom*, attracted by the Breath or Pores, by the Circulation of the Blood, to be carried to the *Axillary* and *Inguinal Glandules*, &c. where, if it long stagnates, it concretes in *Buboes*, which tend to *Maturation*; but if it opens itself a Way, and passes with a natural Motion of the Blood, and so is carried to the Heart, then *Death* ensues.

A Preservative
against
this Contagion.



Therefore not only for myself, but for two other Friends, I made *Incision* with a Lancet *in Inguine dextro & sinistro*, and put in a *Seton*, to the End, that by this artificial Way the *Venom* might find a Passage. This I often tried with good Success, great Quantity of Matter always voiding that Way, but more notably when I was any Way touched with *Pestilential Strokes*, or Alterations. By the Help of which, I kept myself in good Health during the *Contagion* which raged here at *Prague* in 1680.

An Universal
Preservative
against Infec-
tion; by Dr.
Jaco. Joh.
Wenceslaus
Dobrzensky
de Nigro
Pont. Ph.
Col. n. 2. p. 20.

XXXIV. Whosoever converses with Patients affected with any *Disease* whatever, if he would preserve himself from *Infection*, must be sure, so long as he abides within the Sphere of the *Steams*, never to swallow his *Spittle*, but to spit it out. For this Author conceives that to be the Part which first and most easily imbibes the *Infection*, and by that, swallowed, the *Infection* is carried, as by a proper Vehicle, into the *Stomach*, where it works those dismal and fatal Effects.

This Sentence of his he grounds both upon his own Experience, long tried for his own *Preservation*, and on divers Reasons set down by way of Aphorisms from this *Hypothesis*; viz.

That most *Diseases*, especially *Pestilential Fevers*, are *infectious*; that this proceeds from a *seminal Ferment*, which is emitted by the Patient by way of *Steams* into the encompassing Air, and so *infects* all things within a certain Sphere or Distance: This drawn into the *Mouth* by the *Breath* is apt to *infect* the *Saliva* or *Spittle*, which, being *swallowed*, *infects* the *Stomach*, and so the rest of the Body; but being *spit* out, frees the Body from *Infection*. And therefore he conceives that strong *smelling* and strong *tasting* Substances kept in the *Mouth*, and chewed to promote *Spitting*, are of very good and necessary Use for *Physicians*, *Chirurgions* and *Apothecaries*, &c. that are necessitated to visit *infected* Persons.

An Hydro-
phoby; by
Dr. Mart. Li-
ster. n. 147.
p. 162.

XXXV. *James Corton* (of *York*) a very strong and well built young Man, was bit with a *mad Dog* in the Right Hand; the Wound healed of itself, and the Thing was forgot. After about 5 or 6 Weeks, he complains of *Pain* all over his *Bones*, but especially his *Back* and round about his *Stomach*, looks very *pale*, *hollow-ey'd*, &c. The 3d Day after this Complaint, viz. *Sunday Mar. 11, 1687*, he called for burnt *Brandy*, drank it, went to Bed and vomited it up: After this he had a *restless Night*, and in the Morning found himself very ill, with a strong *Rising* in his *Stomach*, and though no *Thirst*, yet an *Impotence* to *Drink*, and even to swallow his *Spittle*, which was Death to him, as he often said. *Diascordium* and a Bottle of *Cordial-Water* was brought to him by an Apothecary that Morning: The *Diascordium* he took, but was not able to *drink* of the *Cordial* one Spoonful. Thus on *Monday Morning*; about one o'Clock that Day, I first saw him, and found him upon his Bed, his *Pulse* very *slow*, and sometimes *unequal*, but not unless frightened from the *Rising* of his *Stomach*; his *Flesh* *cold*, his *Tongue* not dry, but flexible and *moist*, a little *white*. I caused him to rise off the Bed, and set him full in the *Light*; and then, because he mightily complained of I know not what

what Sicknefs about his *Stomach*, I offered him of the *Cordial*, but he *started* and *trembled* at the Approach of it. This I exceedingly admired; wherefore I called for a *Glass* of *Wine* or *Water*, and a *Tumbler* of *Water* was brought me up, which I gave him to *drink*, but he vehemently *started* at it, and his *Stomach* swelled and *rose* after I know not what odd and strange Manner; and I could then find his *Pulse* very *trembling* and disturbed. I still urged him to drink, but as I put it forwards to his Mouth, he the more *affrighted* drew back his Head, and *sighed*, and eyed it with a most ghastly Look, not without *Screeking* and Noise: This soon convinced me that it was *Aquæ Pavor*. I forthwith ordered a *Vein* to be opened in the Arm which was *bit*, caused the *Wound* to be *scarified* and drawn with *Vesicatories*, and the same Plaister to be applied to the Neck and Legs and the Inside of the Arms: I ordered the usual and famed *Antidotes* to be given him, as of *Theriaca*, *Cinis Cancrorum*, *Ruta*, *Agaricus*, &c. in *Bolus's*: For it is to be noted, that solid Things in a Spoon he could take, but yet not without much *Trembling* and *Fear*, and *Caution*, and an earnest Request that no Body would suddenly offer them to him, but give them into his Hand gently; and then he would, by Degrees, steal his Hand softly towards his Mouth, and of a sudden chop the Spoon in and swallow what was in it, *velut Canis ad Offam*; and this he did more greedily and readily than any other Man could do. Of these *Antidotes* in *Bolus* he took a *Dram* every *Hour*, and always in this Manner, for at least a Dozen Times taking; and likewise *Drink* was proffered him in the Night, but he could not see it without *Horror*, and the same Motions from his *Stomach*. Nay, he did affirm, that as often as he by Chance swallowed any *Spittle*, it went to his Heart, even as though he should die that very Moment. This Night passed wholly without any *Sleep* or Rest.

Tuesday Morning I viewed his Blood, which was, both as to the *Serum* and *Cake*, well coloured, and in such Proportion as is usual in healthful Persons, and of good *Consistence*. He had now a *violent Fever* upon him, and a very *quick Pulse*. *Water* was offered him by my Order, but in vain, he begging he might die unmolested; nothing being such a *Terror* to him as the approach of any *Drink*. I then, with much Difficulty, perswaded him to cast himself cross the Bed upon his Belly (for he had his Cloaths loosely about him) hanging his *Head* over the other Side; perswading myself that this Posture might be advantageous to his *drinking*, since that in the erect Posture of a Man he could not so much as endure the Approach of Liquor. In this Posture then of a *Dog*, he suffered a large Bowl filled with *Small-beer*, to be brought under his Head, and imbracing it with Raptures of Joy, he declared he was infinitely refreshed with the Smell of it; that he now saw it with Delight, and assured us he should be able soon to *drink* it all off. And he that now thought himself a dying Man talked pleasantly, and said many passionate Things to his Brother, Wife, &c. wonderfully extolling this Invention, and thanking me for it. He endeavoured with great Earnestness to put down his Head to it, but could not; his *Stomach rose* as often as he opened his Lips: At length he put out his Tongue, and made towards it as though he would *lap*; but ever as his *Tongue* never so little touched the

Surface of the *Beer*, he started back *affrighted*; and yet all this while was pleased with the Thoughts of *drinking*, and would not suffer the Maid Servant to take it away from under his Head; and if she did a little withdraw it, he said he followed it, by the Smell with Delight, snuffing with his Nostrils. After a long Time being mightily foiled, he alledged that the faint Smell of the *Small-beer* hindered him from *drinking*, and therefore desired a Bowl of *Ale*, which was brought him: But after much striving, and exerting his *Tongue* a thousand times, he could not *drink* of it; and *lapping* with great *Affrights*, as often as his *Tongue* touched it, he started back with his Head, bringing it down again gently to the Bowl a hundred Times, but all in vain. And in this Posture, what upon his Belly, and what upon his Hands and Knees, he kept himself at least an *Hour* thus tantalizing himself; but it was not in his Power to *drink*. We then gave him a Quill, which consisted of 2 or 3 Joints, the one End in his Mouth, the other in the Liquor; but he could not manage it, nor *suck*, no more than a *Dog*. I perswaded him to give over, and lie down, which he did; and not long after my going away he fell into a *Convulsion Fit*, *bit* and *snarled*, and *caught* at every Body, and *foamed* at the Mouth. After this *Fit* was over, he took an *Elleborism* in a *Bolus*, which was taken like the rest, and very willingly by him: It wrought about 3 or 4 Times very plentifully, and he declared himself wonderfully at Ease by it; but yet now and then fell *convulsed*, and then always insensible. And after 4 *Hours* I returned to him again, and found the Minister with him; he talked very sensibly to him, and prayed very earnestly with him, saying the Prayers after him, and desired the *Sacrament*, which in these Circumstances could not be given.

He was again solicited to *drink*, and he now readily enough put himself into the former Posture, and with as much Earnestness as ever used all the little Shifts to *drink*, while the Bowl was under his Head; but all in vain. He had a little Silver Tumbler filled with *Drink* put into his Hand; which suddenly, when he had as it were stolen it near his Mouth, he would have thrown it into his Throat, as he did the *Bolus's*; but it hit against his Teeth and fell into the Bowl. I cannot say he ever went to *stool* or made *Water* all this Time, and therefore had a *Clyster* given him; but upon parting with it, which he did immediately almost as soon as given, he *died convulsed*: But his not *making Water*, as well as a troublesome *Priapisme* which he complained of when upon his Knees, might proceed from the *blistering Plaisters*, as well as from his *Disease*.

That nothing may be omitted which relates to this Case; The Day after his *Interment* I accidentally met with his Cousin Mrs. S. who told me that her Daughter was in Fear, for just that very Day *Fortnight* before his Death she had been at his House, and he would go Home with her to her Mother's; that she remembered his Hand *trembled* and his Body *shaked*, that he was in a *cold Sweat*, and in a great Disorder, so that she asked him what he ailed? He told her, that after his Work (for he was an Upholsterer) it had been of late usual with him: And which was remarkable, the very *Dog* which *bit* him, came at that Time along with him, to her Mother's House, and was alive and well at the Man's Death. To

To this we may add, that Mr. *Widdow*, a Mercer, doth affirm, that about the very Time that Mr. *Corton* was thought to be *bit* with Mr. *Sutton's* Dog, a black Dog, which he verily believes to be the same, came and *bit* a *Whelp* of his in his Shop. The next Day the *Whelp* ran mad up and down the House, and *bit* both him and the Maid in the Leg, and died that very Day. About a Month after he was *bit*, he found himself not well, and was troubled with a *Pain* at his *Heart*, and had a *Fearfulness* and *Trembling* upon him, and got no Rest for 3 *Nights*; upon which he had himself *blooded*, and found himself better: His *Maid* doth not yet complain of any Harm.

It is very hard to give any probable Reason of this *Aquæ Pavor*: What *Galen* (*de Theriaca*) says of their much coveting *Water*, because of the intolerable *Thirst* upon them, agrees not with our Case: For this Man would often say, that he was not *thirsty*, which also appeared by the *Moisture* and *Flexibility* of his *Tongue*. Nor was he *distracted*, as *Galen* would have them, but all the Time in his Wits, and discoursed rationally. What *Julius Palmarius* means by the 3d *Paroxysm* of an *Hydrophobia*, I cannot understand: For this Man had the Disease upon him continually from the first Moment to his *Death*, which was near 48 *Hours*, without any *Intermission*. *Dioscorides* treats of it most soberly, and is to be credited; *Quidam, qui jam Aquæ metum sentirent, sumpto Helleboro, simulac primum Morbi impetum experirentur, sanati sunt: Nam & jam vitio tentatos nemo unquam servare potest.* This very well agrees with our Case; the latter Person, who had a Sense of the *Evil*, had it prevented by *bleeding*; but our Man, who had the *Evil*, that is, the *Aquæ Pavor* upon him, not *bleeding*, or the most famed *Antidotes*, or even *Hellebore*, could in the least save, though not very untimely given him.

*D. Morbis
Contagiosis.*

The Case indeed so rarely occurs, that it cannot be observed in all due Circumstances, in order to its clearer Understanding, and consequently *Cure*; we shall venture however, to lay down some few Things to solve it by.

First, That *J. Corton* had some of the *organick Parts* of his Body transformed into, or affected after the Nature of a *Dog*, especially the *Gula*, *Tongue*, &c. so that what was offered to him in the *erect* Posture of a *Man* was very *frightful*, as well as difficult for him to take, because against his new Nature, as much as it would be for us to get a *Dog* to *drink* standing upon his hinder Legs. But yet this is not all, for when he was turned upon his Belly, and would have acted the *Dog*, he yet could not *drink*; and though he frequently put out his *Tongue* and *lapped*, yet he could not endure to take any thing into his Mouth of *Liquor*, as though something had hindered him within. Therefore we may imagine he was also *convulsed* in those Parts, or swelled; but this we cannot grant, for the contrary does plainly appear, because he could cast any thing into his Mouth and swallow it; as he did very many times stiff *Bolus's*, more nimbly as to the Swallow, than any Man reasonably could be supposed to do, that was so weakened.

Secondly,

Gal. de Locis
Affect. lib. VI.

Secondly, That his *Spittle* was *envenomed*; for as oft as he swallowed it (his *Stomach* vehemently abhorring it) it went to his Heart (as we say) and was even present Death to him. And so liquid Things coming nearer to the Consistence of *Spittle*, might the rather *movere Salivam*, and therefore give him a greater *Terror* and Difficulty to swallow, than *solid* Things. And that his *Spittle* chiefly was *infected* with the *Venom* of the *Dog*, seems probable from these Reasons also. 1. Because the *Dog* bit him, whose *Spittle* alone to be *venomous* to the Touch, there are many credible Instances in *medical History*. 2. He was almost like a *Dog* in the Mouth, *viz.* where are the proper Organs of the *Saliva*. 3. The *Bite* of a *Man* so bitten is alike *infectious*; but otherwise *innocent*.

But it may be asked, how comes it to *infect* his *Spittle*, and not other *Humours*, and the *Blood*. I answer; the *Blood* in Part was undoubtedly affected, as the *Symptoms* arising before the *Aquæ Pavor* (which yet is the only true *Pathognomic* of the *Disease*) demonstrate. Again, the *Blood* is not one *Liquor* (as is generally thought) but many distinct *Liquors* circulated together in one Set of common Vessels; and so it might *infect* that *Liquor*, which it was most a-kin to, as the *Saliva* of a *Dog*, to the *Saliva* of a *Man*.

An Hydro-
phoby; by
Dr. Roger
Howman.
n. 169. p. 916.

XXXVI. On *Wednesday* at Evening, *Oct. 1. 1684*, I was called to a Patient at *Norwich*, who about *6 Weeks* before had been bitten with a *Mad Fox* on the *Right-hand*: He began to be indisposed the *Saturday* before with *running Pains*, yet so well as to be abroad next Day at Church. On *Monday* his *Pains* grew more troublesome, and the *Day following*, much worse, especially on his *Right-hand*, *Arm*, *Shoulder* and *Back*, but not to *Confinement*: On *Wednesday* (I know not by whose Advice) he took a Dose of the common *purging Spirit* of *Scurvy-grass*, which gave him *7 or 8 Stools*, and made him very faint, and weak; so I found him; and complaining that he could not use his *Right Hand* (it beginning to be *paralytical*) though his *Pains* very much abated there, and where else they had been most troublesome, excepting only on the lower Parts, or Small of his *Back*, where they soon after vanished also. He told me he bled freely at the *Wounds* the *Fox* had made, and that they *healed* without any farther Trouble, than now and then a little *girding Pain* on that *Hand* and *Arm*; and farther said (to please his Friends) he had taken a white Powder of an Apothecary, and believed himself in no Danger of what was feared (for I had discovered the Danger I apprehended in his Condition.) Tho' the *Aquæ Pavor* did not yet appear, his Heat was much encreased, and his Pulse *intermitted* every *5th* or *6th* Stroke, but on the *Right Side only*; which I again and again examined, finding no Variation: He also looked ghastly and thin, but his Eyes sparkling and fiery. I prescribed the best temperate *Antispasmodic* and *Antiparalytic* Remedies I knew, to be mixed with the *Specificks* of common use in an *Hydrophobia*. Thus much on *Wednesday* at Night. Next *Morning* he complained his Night had been *restless*, that then he had wholly lost the *Use* of his *Right Hand*, and tho' the *Pains* were more abated, yet he was very hot and uneasy: His *Pulse* then

was much stronger than over Night, but *intermitted* on the *Right Side only* as before: His Countenance was somewhat more ghastly, yet his Veins very full, as in *Initio & Augmento Febris*, and no *Hydrophobia* appearing, I advised him to bleed 6 or 7 Ounces at the Left Arm (the Right being *paralytical*) and the Continuance of what I had prescribed before: He bled 8 Ounces very freely, the *Blood* well coloured, but very thick. After I left him, the great *Symptom* appeared, and in my Absence, another was consulted, who gave him many Remedies. At my Return out of the Country on *Friday* at 6 at Night, his *Heat* was very great, and his *Pulse* very high, and *intermitted* then on *both Wrists*, and if any thing were offered him to *drink standing or sitting*, he *started* as if his Head would have fallen backwards off his Shoulders, but when *laid* upon his Pillow, could (though with great *Difficulty* and *Uneasiness*) now and then get down a Spoonful. He looked then very thin and ghastly, and seemed shy, or afraid of every Body that came suddenly near him, telling them that they stifled him, or stopped or hindered his Breath in coming so hastily to him. His *Reason* was all along very good, and (as some observed) better than in his Health: His *Voice* was broken and imperfect, as theirs whose Tongue and other Organs of Speech are growing *paralytical*. I saw him again at 10 that Night when all *Symptoms* were growing worse; yet he could then walk out of one Chamber into another, with very little Help, but between 12 and 1 next Morning he *died*, without any *convulsive* Motions, Sighs or Groans; as if in a Moment there had been a total *Paralysis*.

From this Relation it is most observable, 1. That as the *Pains* (which were like those in the *Rheumatism*) abated, the *Paralysis* and *Fever* increased. 2. As the *Fever* increased, the *Intermission* of the *Pulse* grew more frequent, though the *Pulse* were much *stronger*; but why it *intermitted* first on but *one Side*, is not easily accounted for. 3. That the Imperfection of *Voice*, as well as the Difficulty of *Swallowing* were the Effects of the *Paralysis*, may probably be allowed, and be a satisfactory Reason why the Person Dr. *Lister* mentions, could not use the *Quill* which was given him to *suck* with. 4. That his thin ghastly Aspect, the Defect of Spirits and tonic Vigour (if I may so call it) was from a *paralytical* Original, is not unreasonable to conjecture. 5. That the *Paralysis* chiefly affected the *Muscles* of the *Head* and upper Parts, may be partly collected from his Inability to hold his Head *steady* at the Approach of any *Liquor*; the *Fever* thence arising, causing him to *start*, and his *Head* so to fall backwards, as if it would fall off his Shoulders. 6. And that his lower Parts were less affected, is probable, because, 2 or 3 *Hours* before he *died*, he could *walk* out of one Chamber into another, even when his *Voice* was hardly intelligible.

XXXVII. In the Year 1688, there was brought to us for Cure a Child of about 3 Years of Age, who had just then received a large *Wound*, upon the *Masseter Muscle* by the *Bite* of a *Mad-dog*. The *Wound* we treated with *Digestives* for some Time, *Sutures* were forboren, though otherwise necessary, that the *Sanation* thereof being deferred, the contracted *Venom* might

*A Child bit
by a mad
Dog; by Mr.
J. Turner.
n. 297. p. 24.*

might have the freer Egress thereat. There was in short Time discharged a very laudable Pus, and the Wound *incarned* as fast as we could desire. In about 3 Weeks Time we had *incarned* and brought over a very firm and seemly *Cicatrix*; and in about 2 Days after *cicatrizing* the Wound, the Child was seized with a *Fever*, a disorderly *Pulse*, and *Palpitation* of the *Heart*: The Night ensuing he grew *delirious*, and the succeeding Day the *Malignity* had made so virulent an Impression upon the animal Spirits, as did excite very strong Irritations in the Members of the Body by *convelling* of their muscular Fibres. Neither was the *Brain* and its Parts freed from the same morbid Taint, which manifested its Ferocity in a most strange and unusual *Distortion* of the *Eyes*, from a confused and irregular Expansion of the *optick Nerve*, attended with an extraordinary *Fierceness* in the whole Visage, continual *Vigiles*, and a constant *Trepidation*, with a reiterated *snatching* up of the lower *Mandible*, making Signs as if he would have bit at any thing that was offered him. His *Voice* was uttered with a *Canine Hoarseness*, and had an extraordinary resemblance to the *Barking* of a *Dog*. He was moreover infested from that Time with a *Singultus* and a *Foaming* at the *Mouth*. He was no sooner sensible of the *Reflection* of a *Looking-glass*, which out of Curiosity I presented before him, than he *threw* his *Head backwards* with great Violence, and continued *barking* and *snapping* at every thing near him: In the Evening, notwithstanding such *Alexipharmacks* as had been exhibited, he sunk under the Oppression of these cruel *Symptoms*. I was not permitted to open him; but the *Abdomen*, I perceived, was excessively *inflated*, his Limbs *convulsed*, and the Superfice of the Body of a *livid* Colour; the Muscles of the Face were drawn into such a Form as did nearly represent a *spasmus Cynicus*.

Two Boys in
Ireland bit by
a mad Dog;
by Mr. Ke-
nedy. n. 242.
p. 246. n. 243.
p. 308.

XXXVIII. About the last of *October*, 1679, it happened that 2 Boys of 10 and 9 Years old, of a sanguine and cholerick Complexion, did touch and handle the Head of a *Dog* which had been wounded by a *mad Dog*, but by the *handling* and *washing* of his *Wound* by the Children, the *Dog* so wounded was healed, and did not become *mad*. But about *May* 1680, the Children became *unwell*, and were seized with a *paining Grief* towards the *Bottom* of their *Bellies*, which did grind and torment them with *Pain* and *Trouble*, which ascended gradually upwards towards their *Navel*: And about the 1st of *July*, together with the foresaid *Grief*, they were taken with a slow *Flux*, and *fainting Fits* by Times, when the foresaid Pains assaulted them. After they had continued thus for a Time, their *Pain* and *Grief* ascended towards and above the *Stomach*; whereupon followed very violent and *convulsive-like Motions* in their Bodies, especially about the *Stomach* and *Belly*, by which they were tossed and tumbled and disturbed in the whole Body, with some *Foaming* at the *Mouth*, in the Interim of their *Fits*: Now and then these *Symptoms* continued and increased until the latter End of *August*, that they were taken with the *Fear of Water*, and could not endure to look into any *liquid Thing*, until the Cup was covered, but forthwith would have fallen down as *dead*, and so would have lain a
little

little Time as in a *swooning* or dead *Fit*; and then would have tumbled and tossed in the foresaid violent Motions and Distractions of their Bodies, *moaning* and *groaning*; and ordinarily, the eldest especially, *snarled*, *barked*, and endeavoured to *bite* like a *Dog*. They continued in this *Fit* for an *Hour* sometimes, and sometimes less, and so came out of the *convulsive-like Motions*, lying as it had been in a *Swoon*, a little before they came out of the *Fits*, and when they did come out of the *Fits*, would have crept away in a *feared* Manner from any who had been by them: And thus within an *Hour*, or little more, they came so out of their *Fits*, that they were also *well*, and as much themselves as ever. They remained under these *Symptoms* until the Middle of *September*, every Day taking the said *Fits*, in which they could not *speak*, and in their Intermissions were as towardly and as well in their Wits as ever: And it was observable that they *both* took the *Fits* and came out of them at the same Time. But about the Middle of *September*, about which Time especially the *Barking* or *Snarling* like a *Dog* came, they became more *wild*; so as for some *Days* now and then, even whilst out of their torturing *Fits*, they would not endure any *Company*, no not so much as to come near one the other, and thus continued of this Disposition for a *Week*; and then the Eldest drew near his Father, saying as one surprized, Father, *I am well*; and so he and the other became forthwith *well*, and could look into *Water* without any *Fear*, and so continued to be *well* for 3 or 4 *Days*, and after that fell *ill* again, and remained *ill* 6 or 7 *Days*; at the End whereof they both became *well* as formerly on a *sudden*, and from that Time continued *well*; only the Eldest, about the End of *January*, had some *Fits* like the former.

Observe, that in *August* there were *Doses* of *Antimony* and *Mercurius Vita* prescribed together with *Antidotes* of *Venice Treacle*, Powder of *Crabs Eyes*, and other Things.

XXXIX. 1. R Agrimony Roots, Prinrose Roots, Dragon Roots, single Peony Roots, the Leaves of Box, of each a Handful; the Star of the Earth (or *Lychnis Viscosa flore muscoso*, Casp. *Baubini*; or Spanish Catch-fly) two Handfuls; the Black of Crabs Claws prepared, Venice Treacle, of each one Ounce: All these are to be beaten and bruised together, and boiled in about a Gallon of Milk, till the Half be boiled away; then put it into a Bottle, unstrained, and give of it, about 3 or 4 Spoonfuls at a Time, to the Dog or Beast, three Mornings together, before new and full Moon. It will be necessary the Day before you administer the Medicine, to take away a little Blood. Some of these Roots and Herbs being difficult to be gotten in the Winter, they may be gathered in their Season, and being dried and well powdered, may be given mixed with the Crabs Claws and Venice Treacle, with Sallet Oil or Butter, and it will do as well.

For Men or Women that are bitten with Mad-Dogs; take the same Ingredients in the same Quantities, and the Roots and Herbs being bruised all together, with the Crabs Claws and Venice Treacle; let them be infused warm into two Quarts of strong White Wine, for at least 12 Hours. This

Cures for
Mad Dogs or
any thing bit
by them; by
Sir Robert
Gordon.
n. 187. p. 298.

being strained, the Party bitten is to take about a *Quarter* of a *Pint* Evening and Morning, 3 *Days* before the *new* and *full Moon*; it may be sweetned, either with *Sugar* or some *Cordial Syrup*.

Several Re-
ceipts for the
Bite of a Mad
Dog; by Sir
Theod. May-
ern. n. 191.
p. 409.

2. 1. Take *Virginia Snake-Root* and *Flowers of St. John's Wort* gathered in their *Prime*, equal *Parts* of each; let them be made into a very fine *Powder*. The *Dose* is from a *Scruple* to a *Dram*, and to be taken in any Sort of *Decoction* prepared with *Specificks*. To a *Horse* give two *Drams*, to a *Dog* from 1 to 1 $\frac{1}{2}$ *Dr*. This before the 9th *Day* after the *Bite*.

2. Take *Leaves of Rue* picked from the *Stalks* and bruised, 6 *Ounces*; of *London Treacle* (or which is better, *Venice Treacle*) *Garlick* pilled and bruised, and fine *Filings* of *Tin*, each 4 *Ounces*; put them in 4 \mathcal{H} of *Canary*, or good *white Wine*, or in case of a nice or hot *Constitution*, into the same *Quantity* of *strong* and well worked *Ale*, in an earthen *Vessel* well stopped. Then let there be made a *Digestion*, or gentle *Boiling* thereof in *Balneo*, for 4 *Hours*, shutting in the *Steam*, then press it and strain it. The *Dose* is from 2 or 3 *Ounces* (and in some *Persons* more) to be taken every *Morning* for 9 *Days*. The Party bitten must fast for 3 *Hours* after it, and the *Dregs* that remain after *Expression* must be bound upon the *Wound* received, renewing it every 24 *Hours*. N. B. That the 9th *Day* after the *Bite* must not be let slip, before this *Medicine* be taken, lest the *Poison* seize the *Blood* too strongly. It must be given cold, or at least only a little aired. A double *Quantity* may be given to a *Beast* soon after the *Bite*.

I never found this *Remedy* to fail. *Theo. de Vaux*.

3. Pluck the *Feathers* from the *Breech* of an old *Cock*, and apply it bare to the *Bite*, and do this upon each of the *Wounds*. If the *Dog* were *Mad*, the *Cock* will swell and die, and the *Person* bitten will do well; but if the *Cock* dies not, the *Dog* was not *Mad*. If the *Wounds* be very small, it is requisite to open them with a *Lancet*.

4. Let the Party be 9 *times* plunged in the *Sea*, while he is *fasting*, as soon as may be after the *Bite*. Let the bitten *Part* be washed with a *Lie* of the *Ashes* of *Oak-wood* and *Urine*, and apply a *Cataplasm* of *London Treacle*, *Alliaria*, or *Hedge-Garlick*, *Rue* and *Salt*.

Take dried *Rue* and *Scordium*, each 2 *Dr*. *Virginia Snake Root* 1 $\frac{1}{2}$ *Dr*. *Flowers of St. John's Wort* 3 *Dr*. fine *Filings* of *Tin* and *Garlick* cut small, each 4 *Dr*. *London Treacle* one *Ounce*: Let them be all beaten and exactly mixed together, adding *Syrup* of *Lemon Pills* as much as suffices to make it into an *Electuary*; divide this into 9 equal *Parts* to be taken every *Day* one, drinking after it a small *Draught* of good *strong Ale*. Let him walk upon it, and not dine till 4 *Hours* after. Use as little of the aforefaid *Syrup* of *Lemon Pills* as may be; and if that be not at hand, a *Syrup* made of *Malaga Wine*, adding as much *Sugar* as it can dissolve, may serve the *Turn*.

Make up of this *Electuary* 4 $\frac{1}{2}$ *Ounces* at a *Time*, that so the *Dose* may be half an *Ounce*.

3. 1. I have sent you some of the *Herb* you desired. You must look for it in dry Grounds; light and sandy Ground, where Sheep feed, doth commonly afford it; but my *Uncle* preferred that which grows on good Ground before any other. It is a sort of *Jews Ear*, which grows on the Ground as close as may be to it, being flat on it; the Moss and Grass groweth up about and amongst it. To use it you must dry it in an Oven, by the Fire, or in the Sun; then powder it, and pass it through a Renge or fine Sieve, the which mixed with the like Quantity of fine beaten and powdered *Pepper*, is the *Composition*. When given to a *Dog*, the *Dog* must first be *blooded*, and then *washed* well all over, the *Dog* being kept from Meat a convenient while before; then mix it well in a convenient Quantity of *Milk* or *Broth* warm. If it be for any *Cattle* it must be also *blooded* and well *washed*, and given with a *drenching Horn*, and the *Dose* may be proportioned to the Bigness or Strength of the Creature that is to take it. 1. To a *Man* or *Woman* it must be given after *Blood-letting*, and well *washing* the Face and Hands, or Place that may be *bitten*, or all the Cloaths that a Person had on him or her, when *bitten*, to *wash* away the *Snivel* or *Drivel* that comes from the *Mouth* of a *Dog*, or other Creature when *mad*; for that is the only Reason for *washing*. A *Man* or *Woman* may take it in warm *Milk*, *Beer*, *Ale*, *Broth*, or how he best likes it, fasting, *two* or *three* several *Mornings* to make sure.

A Cure for
the Bitings of
a mad Dog;
by Mr. Geo.
Dampier.
n. 237. p. 49.

After a *Dog* hath *bitten* *Man* or *Beast*, it will not appear or begin to grow *mad* till after a *Full* and *New Moon*, or *New* and *Full*; but when it begins to be *mad*, it is very hardly *cured*. Therefore when you know any thing to be *bitten*, or suspect it to be so, use the *Remedy* as soon as may be after, and then, when given in Time, it prevents all Signs of *Madness* at all, which hath made some indiscreet People say, it did no good, they believe it would have done well enough without it: But my *Uncle* hath fully confuted that Mistake several Times, by not *drenching* a *Dog* of small Worth in a Gentleman's Cry of *Dogs*, which hath died *mad*, and not one of the rest sick, but have followed their Master's Game rather better than before; and indeed being ingeniously prepared and given, it is a most *noble* and *infallible* *Medicine*. I was with my *Uncle* when a *Dog* had gotten in amongst a whole Herd of *Cattle* at *Charminster* by *Dorchester*, and had *bitten* some, which growing *mad*, and feeding together with their Fellows, when *mad*, the *Drivelling* of them *infected* many more, and the *Distemper* continued almost all the Summer amongst them, still one or two dying and *infesting* more. The *Murrain* was at first suspected, and the *Cattle* were *drenched* for that Disease. But my *Uncle* being sent for, he found 3 or 4 sick, which he could not *cure*, but ordered all the rest to be driven 3 or 4 Times through the great River, and all put from the same Pasture, till after it should rain a good Shower or two, which would *wash* away the *Snivel* from the Ground, and then *drenching* them, prevented any farther Evil, for not one was sick afterward. The whole Herd was near 250, and about 40 died.

2. The *Simple* or *Herb* mentioned is not *Jews Ear*, but the *Lichen Cinereus Terrestris*, described by Mr. Ray. It grows commonly in barren Places all over *England*. The Weight of one single *Dose* of this *Simple* and the *Pepper*

A Remark;
by Dr. Hans
Sloane. lb.
p. 52. Hist.
Plant. p. 117.

Pepper mixed communicated to me by Mr. Southwell, with Mr. Dampier's Leave, is near $\frac{1}{4}$.

Persons sup-
posed to be stung
by Tarantula's;
by Dr. T. Cor-
nelio; n. 83.
p. 4066.

XL. A judicious Person related to me, that being in the Country of *Otranto*, where the *Tarantula's* are found in great Numbers, there was a Man who thinking himself stung by one of them, shewed in his Neck a small *Speck*, about which, in a very Short Time, there arose some Pimples full of a ferous Humour; and that, in a few Hours after, that poor Man was sorely afflicted with very violent *Symptoms*, as *Syncopes*, very great *Agitations*, *Giddiness* of the Head, and *Vomit*; but that, without any Inclination at all to *dance*, and without all Desire of having any *musical Instruments*, he miserably died within two Days.

The same Person affirmed to me, that all those that think themselves bitten by *Tarantula's* (except such, as for some Ends feign themselves to be so) are for the most part young wanton Girls (whom the *Italian* Writer calls *Dolci de Sale*) who by some particular Indisposition falling into this *melancholy Madness*, persuade themselves, according to the vulgar Prejudice, to have been stung by a *Tarantula*. And I remember to have observed in *Calabria* some Women, who, seized on by some such Accidents, were counted (according to the common Belief of that Province) to be possessed with the Devil.

This brings to my Mind a terrible Evil, which often enough is observed in *Calabria*, and is called in their Language *Coccio maligno*. It ariseth on the Surface of the Body, in the Form of a small *Speck*, of the Bigness of a Lupin. It causeth some *Pain*, and if it grow not soon red thereupon, it in a very short Time certainly kills. It is the common Opinion of those People, that such a Distemper befalls those only that have eaten Flesh of Animals dead of themselves; which Opinion I can from Experience affirm to be false. So it frequently falls out, that of many strange Effects we daily meet with, the true Cause not being known, such an one is assigned, which is grounded upon some vulgar Prejudice. And of this Kind I esteem to be the vulgar Belief of the Cause of that Distemper, which appears in those that think themselves stung by *Tarantula's*.

A contumaci-
ous Jaundice,
attended with
an odd Case
in Vision; by
Mr. Samuel
Dale. n. 211.
p. 158.

XLI. I here send you an Account of my Patient *Grace Dennys*, of *Banted Magna*, in this County of *Essex*. About *Christmas* 1689, after much Grief and Trouble of Mind in the foregoing Autumn, the *Jaundice* began to appear upon her; for which, after having about 9 Months used many Medicines, which were told her by divers of her Friends and Acquaintance, but without Success, she in *Sept.* 1690, applied herself to me, to whom I administered divers Medicines, famous in the most celebrated Authors for the Cure of the *Jaundice*, and which I had often used with Success in the Cure of that Disease, yet to her they were of no Benefit. After which she had the Advice of several learned *Physicians* in the Country, and likewise some in *London*: But all that could be done for her hath not yet had any Effect; for her Disease yet continues, and her Body which used to be plump and fleshy, is now become lean and emaciated, almost like a Skeleton, and her Appetite is little and depraved.

In May 1691, After an extraordinary *menstrual Flux* for about 3 *Months*, she began, as soon as the *Sun* was down, to be deprived of her *Sight* by Degrees until it was quite dark; when although never so big a Fire or many Candles were in the Room, yet could she not discern the Object, (except a small Shining of Light) and so she remained until the *Morning* as one stone-blind, when by little and little, as the *Light* increased, her *Sight* returned, until the *Sun* arose, and then she recovered her perfect *Sight*.

And in this Case she continued until *August* 1692, when being returned from *Epsom*, where she had been drinking the *Waters* for about a *Month*, her *Sight* returned to her again, so that she could see in the *Night* perfectly. Thus she continued until *January* following, when an extraordinary *menstrual Flux* again seizing her, her *nocturnal Sight* likewise left her, and she became *blind* again as formerly.

In *July* 1693, she was seized with a *Fever*, when her *Sight* again returned, and continued for about a *Month*, and then left her as formerly; so that now in *October* 1693, she hath her *nocturnal Blindness* and the *Jaundice* likewise continues.

XLII. One Mr. *Morely* of *Bury St. Edmonds*, in an *asthmatick* Distemper, was advised by some to take down a Spoonful of good *English Honey*; which being done, the Patient fell into an universal *Swelling*, as if he had swallowed the worst of *Poisons*: Mr. *Goodrich* (who is my Author) prescribed a common *Sudorifick*, which in competent Time relieved him. And that they might be assured that there was nothing amiss in the *Honey*, they afterwards got the like Quantity at another Place, which was given with the very same frightful Event, and the Party was cured with the same Kind of *Sweat*.

Diets Instances of Peculiarities both in Men and Brutes; by Dr. Nath. Fairfax. n. 29. p. 549.

The like Example hath been more than once related to me by a very credible Person of a noble Lady in *Ireland*, who having received a small Hurt on her Leg, and the Chirurgeon (unknown to her) mingling in the Application he made to it, a little *Honey* (for which she had an utter *Aversion*) the Place affected did soon after rankle and grow so bad, that the Lady was constrained to send for him that had applied it, who being acquainted with her *Antipathy* to *Honey*, immediately removed that *Plaster*, and applied another with good Success.

By Mr. Oldenburgh. ib.

2. Mr. *Twisse*, a Minister of *Metigham* in *Suffolk*, about 40 Years of Age, having been accustomed for some time to drink warm or rather hot *Beer*, being abroad about *Midsummer*, took off a Cup of cold *Beer*, after he had taken a Pipe of *Tobacco*. He soon after found himself sick and vomited, and coming Home his *Vomiting* grew worse, and he was constrained to betake himself to Bed. Next Day he grew yet worse, and could find no Help by Physick, but yet died the very next Morning. And yet I am informed that the same Party could drink cold *Wine*: So that it was not the *Coldness* of Particles, sensible to the Touch, that killed him.

By Dr. Fairfax. ib.

3. Madam *Mary Brook* of *Yoxford* hath such an *Aversion* to *Wasps*, that whilst their Season of swarming about in Houses lasteth, she is forced to confine herself to a little close Chamber, and dares not then come out to Table,

leif

lest their coming there should put her into such *Distempers*, as *Cheese* doth those who have an utter *Antipathy* against it.

4. Mrs. *Raymund* of *Stowmarket*, whenever she hears *Thunder*, even afar off, begins to have a bodily *Distemper* seize on her; she grows faint, sick in her *Stomach*, and ready to vomit. At the very coming over of it, she falls into a down-right *Cholera*, and continues under a violent *Vomiting* and *Looseness* as long as the *Tempest* lasts. And thus it hath been with this *Gentlewoman* from a *Girl*.

5. I know a *Woman* in *Stowmarket*, who during her *Green Sicknefs* was invited by her *Pica* or *Longing* to suck the *Wind* out of *Bellows*, which as often as she could, she took into her *Body* with open *Mouth*, forcing it in, by blowing with her own *Hands*, the *Bellows* inverted: I know another that was for *crackling Cinders* under her *Feet*. From which *Kind* of *Instances* I am inclined to doubt, whether that *Distemper* begins at the *Deprivation* of the acid *Liquor* in the *Stomach*, and not rather at the *Uterus*, which next infects the *Brain*, such *Kind* of *Things* gratifying the *Fancy* some *Ways* misled more than the *Appetite* natural any *Ways* depraved.

6. Something like to this is to be found in *Brutes*. In *May* 1667, a *Grey-bound Bitch* at *Britewell Hall*, about 5 or 6 *Days* before she cast her *Whelps*, had such a wild *Kind* of *Hunger* (though she was fed sufficiently every *Day* with usual *Food*) that finding another *Bitch's Whelps*, she devoured them all, and fell next upon the *Bitch* herself, who made a *Shift* to get from her. From this, and from a *Sow's devouring* whole *Litters* of *Pigs*, I am prone to think otherwise of the *Longings* of *Teeming Women*, than is the common *Opinion*.

Several Observations on different Maladies; by M. Gaillard.
n. 233. p. 717.

XLIII. 1. There was seen at *Toulouse*, about the *Year* 1685, an *Infant* who had 2 *Heads*; one was a *Sort* of a *Bag*, resembling the *Hood* of a *Benedictine Monk*, and was fastened to a *Neck* of the same *Length* with the *Neck* of the other *Head*. Mr. *Peter*, sworn *Surgeon*, opened it in *Presence* of Mr. *Bayle* and Mr. *Corboneau*, the *Waters* being let out, the *Swelling* vanished; the *Neck* did not so, that *Part* of it which was next to its *Original*, and which had about the *Length* of *two Inches and an Half*, was made up of *Flesh*. This *Child* lived 15 *Days*.

2. In the *Suburb* of *St. Cyprian*, near to the *Hospital* of *St. Joseph of Grace*, Mr. *Soye*, a skillful *Surgeon*, having opened the *Daughter* of a *Cap-maker*, dead of the *King's Evil*, *April* 1685, remarked, that the *Glands* of the *Mesentery* were petrified, most of them were about the *Bigness* of a *Wallnut*, and others of a *small Nut*; in some of them, being opened, he found about a *Dozen* of *Stones*.

3. Mr. *Bousquet*, *Citizen* of *Toulouse*, being dead, on the 8th of *March* 1686, of a continual *Fever*, and a *Spitting* of *Blood*, accompanied with a *Difficulty* of *Breathing*, Mr. *Delpech*, sworn *Surgeon*, opened him, and found in the *Right Kidney* 3 little *Stones*, and some *Gravel*: Going down the *Ureter*, which was much enlarged, he found a *Tough Stone*, of the *Bigness* of a *Bean* lodged towards the lower *Orifice* of the same *Passage*: The *Lungs* stuck to the *Pleura*, to the *Mediastin*, the *Diaphragm* and *Pericardium*: The *Windpipe* was full of *Blood*; there was seen in the *Left Lobe*, and the

back Part of the *Lungs*, a *Bony* Substance 2 *Inches* long, and half an *Inch* broad: There were two *Polipuses* in the *Heart*, one in each *Ventricle* of the Bigness of a *Pigeon's Egg*, whose *Roots* were 10 *Inches* long, the *Vena Cava*, both *ascendent* and *descendent*, was covered at its *Entry* into the left *Ventricle* of the *Heart*, with a *Bony Matter*.

4. Mr. *Soye* having in *May* 1689, opened the *Vena Basilica* of the *Right Arm* of *Madam de St. Paul*, a *Religious* of the *Hospitalers* of *Paris*, observed a little *black Blood* that stopped the *Orifice* he had made, and being willing to take it away to open the *Passage*, he found that it was a *Polypus* 10 *Inches* long.

5. In *Sept.* 1687, the *Sieur Soye* having in the *Hospitalers* opened a *Servant Maid*, aged between 25 and 26, which was from *Time* to *Time* seized with a *bloody Flux*, he found the *Colon* and Part of the *Mesentery* ulcerated. The *Mouth* of this *Ulcer* was so great, that one might easily thrust in his *Fist* at it. It was stopped with a *Clue* of *Worms* greater than it.

6. There happened much about the same *Time* a *Passage*, singular enough, in that *Monastery*, M—— having stopped on a sudden a *Flux* of *Blood* in *Madam Maria*, who had her *Catamenia* (though she had a continual *Fever* and a *Bleeding* at the *Nose*) before he had used general *Medicines*, she fell all on a sudden into an *Apoplexy*, and dying quickly after, M. *Soye* opened her, and found in the lateral *Sinus*, which divides the *Brain* from the *Cerebellum*, a *Clot* of *Blood* as big as a *Hazel-Nut*. All the *Vessels* of the *Brain* were very much swelled and full of *clotted Blood*; as for the *Ventricles*, they were full of a *serous Humour*, being about the *Quantity* of a *Setier*.

7. *Madam le Gendre*, who died a *Maid* of 18 *Years* old, about the *End* of *Nov.* 1693, was subject to great *Head-achs*, and almost continual *Faintings*, and *convulsive Fits*; and the two last *Years* of her *Life* she was so strongly seized with them, that she became *blind* of them, and continued in that *Condition* two or three *Months*. After *Death* she was opened by M. *Soye*; and when he came to the *grey Substance* of the *Brain*, he found above the *Ventricles*, between the *cortical Substance* and the *callous Body*, a *Lump* of *Flesh* resembling the *Stomach* of a *Goose*. Immediately after the *callous Body* in the foremost *Ventricles* did appear an *Ulcer*, from which came out about a *Setier* of *Matter*.

8. In the *Beginning* of *Sept.* 1695, M. *Soye* opening the *Gall-Bladder* of a *Widow* of 19 *Years* old, he found there a *Stone* altogether like a *Hen's Egg*; that Part of the *Liver* which was near, was hurt, and her *Matrix* scirrhus. She had for 2 *Years* the *Yellow Jaundice*.

9. The same M. *Soye* having in *Sept.* 1696, opened a *Child* of M. *Roye* *Notary*, found in the *Ventricles* of the *Brain* a *Setier* of *Water*.

10. In another *Child* of Mr. *Hugonien*, *Woollen Draper*, which he opened much about the same *Time*, and which was about 2 *Years* old, he found in the *Right Ventricle* of the *Heart*, a *Polypus* as big as a *Pigeon's Egg*, and in the *left Ear* *coagulated Blood* of the Bigness of a *Wall-nut*: He found moreover in the little *Lobe* of the *Lungs* two *Ulcers* very distinct, from each of which there issued a *Setier* of *Matter*. The *Ureter* of the *Left Kidney* was distended

diftended an *Inch*, and its Passage stopped by *Pblegm*, so hardened that scarcely could a Knife cut it.

11. Madam *de l' Etcarre*, about 26 Years of Age, and subject to great Diseases, was opened in the Beginning of *Oct.* 1695, by M. *Soye*: He saw the Vessels that brought the Blood to the *Membranes* of the *Brain* were greatly swelled, and full of *Polypus's*; of them we drew out 12, some 4 *Inches* long, and some 3.

12. In the Beginning of the Year 1697, the Wife of M. *Mafoc*, Merchant, being 40 Years old, who had 4 or 5 Children, had the same *Symtoms* which happen to Women near their *Labour*. M. *Soye* was called to her, and seeing that she suffered such a Loss as happens to Women before their bringing forth, or upon some Hurt, made ready for *laying* of her. We saw presently a *false Conception*, which appeared at the inner Orifice of the *Matrix*: This he pulled out, perceiving it loose from its Ligaments. This *false Conception* was of the Bigness of a Goose Egg, and shaped like a *Kidney*: There was also so great a Similitude between the Structure of the *Kidney* and this Mass of Flesh, that the Fibres were wholly alike. This Woman said, that this *false Conception* had been *two Years* in her *Matrix*. After it was out, she had the same *Loss of Blood* as in her other *Lyings-in*, and keeping to the same Course as she used in such Occasions, she had no bad Consequences of it.

13. There was observed in a Child newly born, and in due Time, that it had nothing of the *Bone* in the Hind-part of the *Head*, the *temporal Bones*, nor of the *frontal Bone* as far as the *Eyes*; so that the *Eyes* made an Appearance of two Horns, which the Calves have when they come in the World, which standing much out, made the Child's Face very *monstrous*. In the *temporal Bones* there was nothing seen but what enclosed the *Organ* of *Hearing*: Upon laying the Hand upon it, was felt the *Beating* of the *Arteries*, and the Vessels which watered the *Pia* and *Dura Mater* were seen distinctly, as if the *Bone* had been taken off. This Child *lived* in this State 4 or 5 *Days*.

14. Mr. *Soye* the younger, a Surgeon, having opened a young Girl, found her *Matrix* so *schirrous* that it seemed to be made but of one Piece.

15. The same observed since such a Thing in a Girl 2 Years old, that died of an *Apoplexy*; he found also 4 *Glands* in the *Mesentery* of this Maid, each as big as a Wall-nut. He has since seen that the *Mesentery* of a Child 7 or 8 Years old, was made of 2 *Glands* each of the same Bigness.

16. Mr. *Barriere*, Sworn Surgeon, found in a Girl 11 or 12 Years old, instead of a *Matrix*, a very thin *Membrane* placed where the *Matrix* is. The *Vagina* in the outward Orifice was shut up hermetically; *i. e.* the Cover was of the same Piece with the *Matrix*.

17. Mr. *Carlan*, Sworn Surgeon, having observed in a Man a *Swelling*, as big as a Pullet's Egg, upon the Place called *Fontanella*, and covered with *Hair* like the rest of the *Head*, applied to it *Emplastrum de Betonica*, by Order of M. *Dufaur*, Professor of Surgery, and the *Swelling* disappeared.

XLIV. Papers of less General Use, omitted.

1. **S**everal *Anatomical Inventions* and Observations asserted to their proper *n. 35. p. 672.*
Authors; by Dr. Tim. Clark, viz.
1. Of the *Vasa Lactea*, to *Ascellius*.
 2. Of the *Ductus Toracicus*, to *Pecquetus*.
 3. Of the *Vasa Lymphatica*, to *Bartholinus* and *Rudbeckius*; yet these *Lymphaticks* were observed, in the *Testicles*, by *Jolive*, some Time before.
 4. Of the *Circulation* of the *Blood*, to *Harvey*, not to *P. Paulus Venetus*.
 5. Of the *Injection* of *medicated Liquors* and other things into the *Veins* of *Animals* to *Sir Chr. Wren* about the latter End of the Year 1656, if not to *Dr. Potter* about 18 Years before.
 6. In the *Prosecution* of this last kind of *Operations*, both *Dr. Clarck* and *Dr. Henshaw* attempted, about that Time, the *Transfusion* of *Blood* from one *Animal* into another, but unsuccessfully, till *Dr. Lower* hit upon a more practical Method, and performed the *Operation* at *Oxford*. An. 1666.
 2. Several *Historical Passages*, concerning the *Invention* of *Injection* into *n. 7. p. 128.*
the *Veins*, and *Transfusion* of the *Blood* of *Animals*; by *Mr. Oldenburgh*. *n. 27. p. 489.*
Where the *Invention* of the first is given to *Sir Chr. Wren*, and the *successful* *n. 28. p. 523.*
Practice of the Latter, to *Dr. Lower*; except this Honour may be allowed to *n. 37. p. 731.*
Libavius, who indeed describes the *Operation* upon *Men* plainly enough (in
his *Defensio Syntagmatis Arcanorum Chymicorum, &c.* p. 8. *Edit.* An.
1615) but it is only to mock at it.
 3. *Queries* and *Trials* proposed by *Mr. Boyle* to *Dr. Lower*, to be made *n. 20. p. 357.*
by him, for the *Improvement* of *transfusing Blood* out of one *live Animal* *n. 22. p. 385.*
into another.
 4. A *Letter* from *M. Gasper de Gurye de Montpoly* to *M. Bourdelot*, con- *n. 28. p. 517;*
cerning necessary *Circumspection* to be used in the *Practice* of *Transfusion* up-
on *Men*.
 5. The *cautious Proceedings* of the *English* in the *Practice* of *Transfusion* *n. 28. p. 521;*
upon *Men*.
 6. A printed *Letter* of *M. Gadroys* to *M. Bourdelot*; being an *Answer* to *n. 30. p. 559.*
a *Paper* of *M. Lamy*, and a *Vindication* of the *Transfusion* of *Blood* from his
Objections.
 7. A printed *Paper*, written by *J. Denis*, touching a late *Cure* of an *n. 32. p. 617.*
inveterate Phrensy by the *Transfusion* of *Blood*; and the *Proceedings* of the *n. 36. p. 710.*
Court of Justice at *Paris* upon the *Death* of the *Man*, after he had under- *ib. p. 712.*
gone that *Operation* twice or thrice. *n. 54. p. 1075.*
 8. *Experiments* of *Stanching Blood* with the *Royal Stiptick*; extracted *n. 95. p. 6054.*
from *M. Denis's 11th Conference*, printed in *French* at *Paris*, *Apr. 30,*
1673.

XLV. Accounts of Books omitted.

1. **M**emoirs for the *Natural History* of *Human Blood*, especially the *n. 154. p. 428.*
Spirit of that *Liquor*; by the *Hon. Rob. Boyle, Esq;* *Lond. 1683.*
2. *Apologia pro Circuitione Sanguinis, qua respondetur Emilio Parisano,* *n. 173. p. 1105.*
Medico

- Medico Veneto: Auth. Geo. Entio. Editio altera, auctior & accuratior. Lond. 1685, in 8vo.
- n. 58. p. 1200. 3. Job. Sig. Elsholtii *Clysmatica Nova*; sive Ratio in Venam Sectam Medicamenta Immittendi. Coloniae Brandenburgicae, 1667, in 8vo.
- n. 4. p. 75. 4. Diatribæ Tb. Willistii, M. D. & Profess. Oxon. de *Febribus*, Vindicatio: Authore Rich. Lower.
- u. 12. p. 210. 5. Dr. Sydenham's *Methodus Curandi Febres*, propriis Observationibus superstructa.
- n. 123. p. 568. 6. Observationes Medicæ circa *Morborum Acutorum* Historiam & Curationem; Auth. Thom. Sydenham, M. D. Lond. in 8vo.
- n. 197. p. 657. 7. Novæ Hypotheseos, ad Explicanda *Febrium Intermittentium* Symptomata & Typos excogitatae Hypotyposis: Una cum Ætiologia Remediorum, speciatim vero de Curatione per *Corticem Peruvianum*. Accessit Dissertatiuncula de *Intestinorum Motu Peristaltico*. Auth. Gulielmo Cole, M. D. Lond. 1693, in 8vo.
- n. 199. p. 717. 8. ΠΥΡΕΤΟΛΟΓΙΑ; seu Exercitationes de *Morbis Universalibus Acutis*. Auth. Rich. Morton, M. D. Lond. 1692, in 8vo.
- n. 217. p. 123. 9. Archibaldi Pitcarnii, M. D. Dissertatio de *Febribus*.
- n. 73. p. 2210. 10. Dissertationes duæ Medicæ de *Veneno Pestilenti*: Studio Caroli de la Font, M. D. in Acad. Avenion, Prof. Primar. Amstel. in 12mo.
- Ib. p. 2212. 11. Franc. de le Boe Sylvii, M. D. Oratio de *Affectus Epidemici*, Anno 1669, *Leidam* Depopulantis, Causis Naturalibus. Ludg. Batav. 1670, in 12mo.
- n. 81. p. 4028. 12. Λοιμολογία, sive *Pestis* nuperæ *Londini* Grassantis Narratio Historica. Auth. Nathan. Hodges, M. D.
- n. 101. p. 14. 13. *Medicina Militaris*; or a Body of *Military Medicines* experimented, by Raymundus Mindererus: Englished out of High-dutch, Lond. 1674, in 8vo.
- n. 136. p. 918. 14. Tractatus Medicus de *Morbis Castrensibus* Internis. Auth. Job. Valentino Willio. Hafniæ, 1676, in 4to.
- n. 226. p. 475. 15. An Account of the Nature, Causes, Symptoms, and Cure of the *Distempers* that are incident to *Sea-faring People*; with Observations on the Diet of the *Seamen* in his Majesty's Navy; illustrated with some remarkable Instances of the *Sickness* of the *Fleet*, during last Summer, Historically related. By Will. Cockburn, M. D. 1696, in 8vo.
- U. p. 478. 16. A Continuation of the Account of the Nature, Causes, Symptoms, and Cure of the *Distempers* that are incident to *Sea-faring People*: Illustrated with some remarkable Instances of the *Sickness* of the *Fleet*, during last Summer, Historically related. To which is prefixed an Essay concerning the Quantity of *Blood* that is to be evacuated in *Fevers*; being the 3d Part of the Work. By Will. Cockburn, M. D. Lond. 1697, in 8vo.
- n. 228. p. 545. 17. Marcelli Malpighii *Opera Posthuma*, Fig. æneis illustrata: Quibus præfixa est ejusdem *Vita* à seipso scripta, Lond. 1697, in Fol.

C H A P. VI.

The Bones, Joints and Muscles.

I. I Have lately seen in *France*, Part of an *human Skeleton*, consisting of the *Os Ilium*, the *Os Sacrum*, the 5 *Vertebræ* of the *Loins*, 10 of the *Back*, 5 entire *Ribs* on the Right Side, and 3 on the Left; the Bottoms or Ends of the other were closely united to the transverse *Apophyses* of their *Vertebræ*: The *Vertebræ* of the *Neck*, the *Claviculæ* and *Sternum* were wanting. All these *Bones*, which naturally are 38 each separate and distinct from another, were here so straightly and intimately joined, their *Ligaments* perfectly *Bony*, and their *Articulations* so effaced, that they really made but one uniform continuous Bone; so that it was as easy to break one of the *Vertebræ* into two, as to disjoint or separate it from the other *Vertebræ*, or the *Ribs*, or the *Os Sacrum* from those of the *Iliæ*. Nor could I observe any greater Distinction between all the *Bones*, than is usually seen in adult Persons between the *Os Pubis*, the *Ischion* and *Ilium*, which are but one entire Bony Substance. The Roots of all the *Ribs* made but one equal, smooth, and plain Superficies with the *Vertebræ* and their *Apophyses*. The *Oblique Apophyses* of all the *Vertebræ* were so confounded and lost, that it was not possible to observe any Marks of them. The *Cartilagineous* Edge of the *Vertebræ* themselves was turned to perfect *Bone*. But when I had sawed two of the *Vertebræ* asunder at the *Commis sure*, I found this Uniting did not enter above two Lines deep, and that afterwards their Middles were separated as they usually are, and touched each other only at the Edges, which was raised up a little above the middle Part. On the left Side, at half a Finger's Breadth from the *Vertebræ*, two *Ribs* were joined together for the Space of an *Inch*, and afterward ran separated and parallel like the rest, to the *Sternum*. The Figure of this *Trunk* was crooked, and making Part of a Circle, the *Spinæ* making the Convex, and the Inside of the *Vertebræ* the Concave Part of this Segment. The Direction of the *Ribs* was unnatural; for instead of terminating at the *Sternum* in parallel Semicircles nearly Horizontal, their Extremities, where they reached the *Sternum*, dipped so much down toward the *Hypogastrium*, as to touch the Sides of the *Ossa Ilium*.

This *Trunk* had been found in some Church-yard or Charnel-house, as appeared by its dark, red Colour and Driness, and seemed to be of a grown Person, the *Bones* being of a Proportion and Thickness equal to those of old Men. The *Vertebræ* of the *Loins* were larger than those of the *Back*, as they naturally are; there was no unnatural Bunching out; their Joining together very regular; no one *Vertebra* standing out beyond the other, either before, behind, or on the Sides. The Cavity for the *Spinal Marrow* had no Fault, but its bending Figure. The *Bones* of the *Os Pubis* were

The Bones of a Skeleton united, without Jointing or Cartilage; by Dr. Bern. Connor. v. 215. p. 21.

separated as usually. The *Socket*, or Cavity of the last *bastard Rib* on the Right Side being smooth and polished, seemed as if that *Rib* had not been so firmly united as the rest. In the Extremity of the *Ribs* next the *Sternum*, the usual Cavities for the *Cartilages* to move in, were observable, which, as it seems by this, were not *Bony*, nor continuous with the *Ribs*. It is hard to give a mechanical Reason of this so secret and hidden a Matter. That these *Bones* were thus united after the Death of the Person in the Ground is hardly to be allowed. Pure Earth, being made up only of friable porous irregular Particles, can but suck up the superficial Moisture of the *Ligaments* of this *Trunk*, otherwise, by Evaporation in the Sun, *Ligaments* and *Cartilages* would become *Bony*; and the Earth is never so styptick as to procure so intimate an Union. If you will say the Earth was impregnated with some Principle capable to produce this Effect, it must be either *Water*, *Sulphur*, or *Salt*; neither of which seem proper to cement *Bones*: All knowing that *Water* and *Sulphur* are so far from hardening *Ligaments*, that they rather soften and relax by their slippery and fluid Particles. Nor are *Alkali's* or *Acids* capable to turn them to *Bone*: For *Alkali's* being bristly, stiff, and inflexible, are properer to separate than unite, as is seen by putting a Piece of *Ligament* into any *Alkaline Salt*. And, Secondly, *Acids* are most proper to break the Texture, and divide even the hardest Bodies, and upon Experiment *Cartilages* are dissolved in them: Besides, could this Effect have been produced in the Earth, why was not the whole Body turned to *Bone*?

As to the *crooked* and *bending Shape* of this *Skeleton*, it is reasonable to suppose that it proceeded from the first Formation of the *Fætus* in the *Womb*, from the *Egg's* not having sufficient Room, or being accidentally pressed by some *Abscess* in the *Womb* or elsewhere; so that the *Carina* of the *Back-bone*, instead of running straight, was bent into a Circle, and kept the same Figure when at full Growth that these *Bones* had taken when soft and tender. Hence the Situation of the rest may be fairly deduced; as the drawing down of the *Ribs* and *Sternum* to the *Ossa Ilium*. And from these *Vertebræ* and other *Bones* being thus pressed upon each other, and so rendered unmoved, the Cause of their being united into one *Bone* might be this, The *Pores* of such tender Parts being easily stopped, so that the Blood and other Humours could not pass, and upon that Account the *Cartilages* of the *Vertebræ* becoming dry, united into one Piece. By the same Reason the *Ribs* being pressed against the *Vertebræ* for several Months, and without Motion in the *Womb*, could receive and admit little or no Moisture between them; whence their *Cartilages* became hard and united, and in Time *Bony*, as several other *Bones* of the Body do, though they were but *Gristles* when in the *Womb*.

From this Construction of the Parts it necessarily follows, that the Body of this Person must have been *immoveable*; that he could neither *bend* nor *stretch* himself out, rise up nor lie down, nor turn upon his Side, having only the Head, Feet and Hands *moveable*. If it be objected, that *Respiration* could not be performed when the *Ribs* were thus *immoveable*, this Difficulty may be obviated by observing, how little Motion of the Breast is necessary

necessary to continue the *Motion* of the *Blood* through the *Lungs*, as is visible in *Hysterick Fits*, &c. Again, the *Ribs* of this *Skeleton*, though fixed at the *Center*, might yet be moved at the *Ends*, and so the *Thorax* enlarged by a much less *Strength* than that of the *Muscles* used for that Purpose: Besides, the *Diaphragm*, the chief *Organ* of *Respiration*, in this Subject was free in the acting. But it is likely this Person *breathed* very *short*, the *Quickness* of the Returns supplying the Defect of a large Draught of *Air* at once: And possibly the *Foramen Ovale* might continue open, and that by it and the *Arterial Canalis* the *Blood* might pass from the *Cava* to the *Aorta*, but a Part of it passing through the *Lungs*, as I have lately observed in a Girl of 4 or 5 Years old, in whom the *Foramen Ovale* was but half closed up, and in the Form of a *Crescent*.

To this may be added another Observation of the *Bones* of the *Thigh* and *Leg*, growing together in an adult Person, the Place of their *Joining* being much more *Solid* than any other Part. These *Bones* were so *bent* at the *Knee* as to make an acute *Angle*, yet were they without any *Exostosis*, *Rotteneis*, *Fracture*, or unnatural *Figure*. It is more surprizing to find the *Knee*, whose *Motion* is free and large, to be thus *united*, than the *Ribs* of the *Skeleton* whose *Motion* is obscure and scarce sensible. Some thought that this might proceed from an *Ulcer* in the *Knee*; but an *ulcerous* Matter is very unfit for the *joining* of the *Bones* together; and I have observed an *Ulcer* in the *Knee* making such *Havock*, that the *Thigh* and *Leg* hung together but by the *Skin*. These *Bones* seemed too sound to suppose the Person had a wooden *Leg*, which by continual kneeling upon, might make the *Bones* unite: Besides, this Accident is no more likely to befall a Person using a wooden *Leg* than any other, since the *Musculi flexores & extensores Tibiæ* act alternately in each *Step*, which is sufficient to hinder the growing together of the *Joint*.

This Union of the *Bones* seems also to proceed from some Accident in the *Womb*; perhaps the *Knee* of this *Fætus* being too much bent and pressed against the *Thigh-bone*, was hereby united, after the same Manner as we have before explained that of the *Back-bone* and *Ribs*.

Fig. 76. *a a a a*, *b b b b*, *c c*, The *Vertebræ* of the *Neck*, *Back* and *Ossa Ilium*, all joined together. *d d d d*, several of the *Ribs* united to the *Back-bone*.

Fig. 77. *g g g*, The Place where the *Os Femoris* and *Tibiæ* were united.

Explication of the Figures.

Fig. 76.

Fig. 77.

II. 1. *Nicholas Brodes*, of 30 Years of Age, having been afflicted for the Space of 10 Years with an incessant *Head-ach* (which for the last 12 Months before his Decease had been more violent than formerly, and deprived him of his *Sight*) upon the 15th of *March*, 1697, was received into the *Hotel Dieu*: After his Head was shaved, there appeared a large *Tumour*, which extended itself over the hairy *Scalp*. In the *Midst* of the left *Parietal-Bone*, there was the *Pulsation* of an *Artery*, and a small *Fluctuation*, the rest of the *Tumour* being exceeding hard. *M. Dupré* fearing this might be an *Aneurism*, was unwilling to open the *Tumour* till he was constrained to it, by the importunate Intreaties of the Patient, who chose rather the Hazard of his Life,

Bony Excrescencies on a Human Skull; by M. Dupré. n. 251. p. 138.

Life, than any longer to endure so exquisite a Torment. As soon as an Aperture was made, there issued out a Quantity of thick concremented Blood, which wet the Bolsters at every Dressing. The 3d Day he felt a hard Body with his Probe, loose in the Flesh, which being taken out, appeared to be a small Fragment of a *Bone* exfoliated, resembling a small Comb-brush. Upon the 4th Day the Patient died. In dissecting the Head, the *tumified* Part of the *Skull* appeared to rise more than an Inch above the sound *Bone*. The whole Swelling of the *Cranium* was made up of several Substances, not unlike little *Horns*, or innumerable small hollow Cones, with their Points downwards; besides a great Number of *bony Fibres*, straight, stiff and pointed, resembling the *Teasels* used by Cloth-workers. In the next Place there were several *Holes*, some of which perforated the *Skull*, others not. There was no Distinction of the *Sutures*. The *Meningies* were mortified and confounded together, and in Part adhered to the *bony Excrescencies* of the left *parietal Bone*; nevertheless the *Brain* was found and entire. The Inequalities of the inner Surface of the *Cranium* resembled melted Metal poured down from a considerable Height, on a light moving Sand; or the Inside of a *Grotto*, in which the Stones jet out in an irregular Manner. The whole Left Side had lost its natural Figure, and the Right had only a few Impressions made by the beating of the *Arteries* of the *Dura Mater*.

There was no Appearance, on an exact Search, of any *Venereal Distemper* to be found, whence these *Excrescencies* might be suspected to proceed. It is therefore probable that the Blood-Vessels of the *Diploe* might be burst by some accidental Blow on the Head, or eroded by some Acidities of the Humours, and the Blood be extravasated in its Cells: This stagnating, and by Degrees arriving to a very high Degree of Corruption, it is not much to be admired that the more ponderous Part (by its great Acidity) should dissolve the contiguous *Bone*; and after it has penetrated that, by eroding such nice and sensible *Membranes*, as the *Pericranium* and *Dura Mater*, cause exquisite Pains.

To explain these Irregularities of the *Skull*, it may be considered, that its upper Plate is composed of *Strata* of *Bony Fibres*, lying parallel to each other, and of an arched Figure. Now when the volatile Acid sublimes, and dissolves one End of the *Bony Fibre*, it must, by its Elasticity, spring up and become erect on the other. If more of these happen to have those Ends which remain on the *Cranium* around one Point, they form the small *Cones* above-noted, by Means of a *Viscous Water* which cements them together, and fills up their Interstices: On the contrary, if they start separately, they form a *Capillary* Appearance.

Remarks on
these Excrescencies; by
Mr. William
Cowper.
ib. p. 140.

2. *Excrescencies*, not unlike this of the *Skull*, have been observed in most other *Bones* of the Body (the *Os Petrosum*, *Incus*, *Malleus*, *Stapes*, &c. not excepted) and the Disease is commonly called *Spina Ventosa*. It is remarkable, that the *Bones* of *Children* and young Bodies (especially their Appendages) are more subject to the like Accidents than those in Years; by reason their *Fibrillæ* are much softer and apt to extend, whereby that Part of the *Bone* itself grows tumid, and frequently becomes *carious*; and this probably might give Occasion for imposing the Name of *Pædarthroca* on that Disease, which

is vulgarly called the *Joint-Evil*. When the *Cartilages* on the *Extremities* of *Bones* in their *Articulations* are eroded (and their *Appendages* thus diseased) the *Bony Fibres* sometimes germinate and *unite* both *Bones*, in such a manner that they afterwards appear to be one continued one, as I have seen in the *Hip* and *Thigh-bone*; and again, in the *Thigh-bone*, the *Tibia* and *Patella*, and frequently in the *Ossa Tarsi*, *Metatarsi*, and *Bones* of the *Toes*; many Instances of which are mentioned by Writers, in the *Vertebræ* and other *Bones*. This *Union* of *Bones*, at their *Articulations*, may also happen through a *Defect* of the *Mucilage*.

The *Germination* of *Bony Fibres*, after any peccant Matter has destroyed some of them and relaxed others, is no more surprizing than the *fleshy Inequalities* we commonly meet with in hollow *Ulcers* of the softer Parts, as in the *Membranes*, *Muscles*, *Glands*, &c. Besides the *Inequalities* on the *Surfaces* of *Bones* thus affected, and their being very much distended, I have frequently seen divers large *Holes* in them (besides those for the *Transit* of the *Blood-Vessels*) some of which have past quite through them. The like has been observed in both *Tables* of the *Skull*, as M. Dupré has taken Notice, where Part of the *Bone* has been dissolved into an *ichorous* Matter, which sometimes has happened, and the *external Teguments* not been injured.

Vid. Anat. of human Bodies. Tab. 93. and Introd.

III. 1. *Joseph Sbute*, Clerk, Parson of *St. Mary* (nigh *Plymouth*) in the County of *Devon*, Aged 81 Years, being a temperate Man, and of a healthy Constitution, perceiving that his Mouth, about 3 Years ago, was somewhat streightned, found that he had a *new Tooth* (the 3d *Grinder*) being the innermost of the upper Jaw in the right Cheek, which still remains firm.

New Teeth in 2 aged Persons; by Mr. Coleprens. n. 21. p. 380.

2. *Maria Stert* of *Benecliffe*, in *Plympton St. Mary* (near *Plymouth*) in *Devon*, aged about 75 Years, an healthy Person, having had 9 Children, about the 40th Year of her Age lost 3 of her upper *Incisors* or *Cutters*, the other drawn out, and so remained *Toothless*, as to them, for about 25 Years, when she perceived that a *new Tooth* came forth (without any Pain) next the *Canini* of the left Cheek: And about 2 Years after, another *Tooth* grew out likewise without Pain, close by the former. The first whereof never came to above half the Length of her former *Cutters*, the latter scarce breaking the *Skin*: Both which yet proved serviceable, till about 6 Weeks since, when she eating (no hard, crusty, or solid) Meat, that *Tooth*, which came out first, fell down into her Mouth, without any Looseness beforehand perceived, or any Pain; which had not a *Pbang* like other *Cutters*, but much less and shorter. The other abides firm, and is serviceable.

IV. In the *Pall-Mall* at *London*, lived one *Clarke* (called the *Posture-Master*) that had such an absolute *Command* of all his *Muscles* and *Joints*, that he could *disjoint* almost his whole Body; so that he imposed upon our famous *Mullens*, who looked on him in so miserable a Condition, that he would not undertake his Cure. Though he was a well-grown Fellow, yet he would

A remarkable Instance of an absolute Command of the Joints and Ancles; by — n. 242. p. 622.

appear

appear in all the *Deformities* that can be imagined; as *Hunch-back'd*, *Pot-belly'd*, *Sharp-breasted*. He *disjointed* his Arms, Shoulders, Legs, and Thighs, that he well appeared as great an Object of Pity as any; and he has often imposed on the same Company where he had been just before, to give him Money as a *Cripple*; he looking so much unlike himself that they could not know him. I have seen him make his *Hips* stand out a considerable Way from his *Loins*, and so high that they seemed to invade the Place of his *Back*, in which *Posture* he has an extraordinary large Belly. He turns his *Face* into all *Shapes*, so that by himself he acts all the uncouth, demure, odd Faces of a *Quaker's Meeting*. He began *young* to bring his Body to it; and there are several Instances of Persons that can move several of their *Bones* out of their *Joints*, using themselves to it from *Children*.

The great
Tendon a-
bove the Heel,
after an intire
Division of it,
stitched and
cured; by Mr
Will. Cow-
per. n. 252.
p. 153.
Fig. 78.

V. Feb. 1. 169⁸, I was called to *Tho. Wheatly*, a Carpenter, Aged 30 Years, who had totally *divided* the great *Tendon* of the *Musculi Gastrocnemii* of the Left Leg, about 3 Fingers Breadth above the *Os Calcis*. I found the upper Part of the *Tendon* withdrawn from the inferior at least 2 *Inches*. I was obliged to divide the external Teguments *a, b*, to come at the Ends of the *divided Tendon A, B*: This done, the first Needle *C* (with strong Silk in it well waxed) I passed through the Body of the *Tendon A*, about half an Inch above its divided Extremity: The 2d Needle and Silk *D*, was thrust thorough this upper Part of the *Tendon*, a little under the former, lest the two Threads, or Silks, should meet each other at their Decussation in the Middle of the *Tendon*. Afterwards both these Needles were passed thorough the lower Part of the *divided Tendon B*. The Foot being held extended, the two Ends of the *Tendon* were applied to each other, by the Assistance of the Ligatures *C, D*, which were so tied, as to keep the divided Parts close together, whilst the Foot remained in this Posture. After the 4 Ends of these Ligatures were cut off, I found it was necessary to bring the Sides of the divided Skin nearer each other with one single Stitch, a little above the Suture of the *Tendon*. This done, a Pledget of Lint dipt in *Balsam of Turpentine* was laid on the Wounds, and another large Pledget of Flax, armed with *Linimentum à Gummi Elemi* over it. After the Application of common Bandages, Bolsters, &c. I found it was necessary to place a thick Piece of Pastboard, of a convenient Arched Figure, on the Fore-parts of the Foot and Leg, to keep the Part inflected, and to prevent any Motion of it, which might break out the *Stitches* in the *Tendon*. He complained very much in passing the Needles through the upper Part of the *divided Tendon*; tho' its middle and internal Part at the Division was scarce sensible of the Touch of my Finger: But he had no Pain in passing the Needles through the lower Part of the *Tendon*. After 14 Ounces of Blood was taken from his Arm, I left him on his Bed. Six Hours after (which was about 8 at Night) I found his Pulse somewhat quicker than before: He then took an Ounce of *Syrup de Meconio*. The next Morning I found him in no ill Condition. He told me that he had got some Sleep that Night, but was often awakened with Twitchings in the Calf of

of the wounded Leg. The 3d Day after the Operation, I dressed the Wound with the same Applications as before, only using a Fomentation made of a Decoction of *Wormwood*, *Sage*, *Rosemary*, *Bay-Leaves*, &c. On the 4th Day after the Operation, I found the Applications on the Wound very wet with a serous Humour, commonly called a *Gleet*. On the 6th Day the Matter became somewhat thicker, and the Skin being a little distended about the Wound, I was obliged to divide the last mentioned Stitch, to admit of the free Discharge of the *Pus*, which on the two succeeding Days became much thicker than before, and the *Gleet* consequently lessened.

About this Time the two Ends of the *Tendon* were not a little dilated, and a white Slough appeared on it toward the upper Part of the Wound; on which, instead of the *Balsam of Turpentine*, I applied *Tincture of Myrrh*. Not many Days after, this Slough came off, and the two Ends of the *Tendon* were overspread with a *fungous* Flesh; by which I was assured, that its *Blood-Vessels* and nutritive Tubes were not compressed by the two first Ligatures. Afterwards I made use of drier Applications than before; sometimes using Lint only, and at other Times *Pulvis Terebinthinæ*. About 10 Days after the Operation, I found one of the two Ligatures in the *Tendon* hanging loose, which I divided and drew out. Two or 3 Days after, I found the other Ligature loose also, which in like manner I removed, the Part all this while being kept inflected by the Past-board above-mentioned.

I was often obliged to apply gentle *Escharoticks*, to lessen the *Fungus* on the *Tendon*. In less than 30 Days after the Operation, he went abroad very lamely. And not many Days after, he told me he had walked round *St. James's-Park*; on the 26th of *March* following (which was within 8 Weeks after the Operation) he walked from his Habitation in *Witch-street*, without *Temple-bar*, to *Greenwich*, and returned in a few Hours. He has since recovered all the *Motions* of his *Foot*, and shews very little Lameness in Walking, and is not in the least incommoded at his Trade.

It is a common Opinion, that *stitching* divided *Tendons* is hazardous, if not impracticable; and though the Authority of some *Writers* would have prevailed with me, in some measure, to have an Opinion of the Success of such an Attempt, yet the Contradictions of others, of no less Note, would have left me dubious, had I not some Time since seen large *Blood-Vessels* in the *Tendon* of a Horse's Leg; which at that Time convinced me, that *Tendons* as well as *Bones*, and other Parts, would *unite*, though they were quite divided, in case the neighbouring Parts remain intire, if their two Extrems could be artificially applied to each other, without compressing all, or the greatest Part of their *Blood-Vessels*. This Distribution of the *Blood-Vessels* is expressed in the annexed *Figure*, where one Trunk A, A, with its Branches a, a, *Fig. 79.* to the *Fibrilla* of the *Tendon* B, B, is expressed: Whether it was a *Vein* or an *Artery*, I could not discover in that Subject, but in all Probability, both those Vessels have the like Disposition in such large *Tendons*. I am inclined to think the like Distribution of *Blood-Vessels* is not to be found in the *Tendon* which was divided in this present Instance; but that its *Blood-Vessels* pass into it and back again at its internal Side, next the *Muscles* of the *Toes* and

Tarsus; which ought to be taken Notice of by the Operator in the like Case, and that he do not free it of its *Fat* and *Membranes* next those *Muscles*, lest its Communication with the *Blood-Vessels* be destroyed.

VI. *Accounts and Emendations of Books omitted.*

- n. 194. p. 544. 1. **O**steologia Nova; or some Observations of the *Bones*, &c. by Clopton Havers, M. D. Lond. 1691, in 8vo.
- Pb. Col. n. 2. p. 22. 2. De Ratione Motus Muscularum; by Dr. C. An. 1664. The Author here farther explains his Hypothesis, and obviates some Objections to it.
- n. 10. p. 176. 3. Nic. Stenonis de Musculis & Glandulis Observationum Specimen; cum duabus Epistolis Anatomicis.
- n. 27. p. 512. 4. Elementorum Myologiæ Specimen; seu Musculi Descriptio Geometrica. Auth. Nicolao Stenone. Florentiæ, 1667, in 4to.
- n. 32. p. 627. 5. Myotomia Reformata; or a new Administration of all the *Muscles* of human Bodies; wherein the true *Uses* of the *Muscles* are explained; the Error of former Anatomists concerning them confuted; and several *Muscles* not hitherto taken Notice of described. To which are subjoined a graphical Description of the *Bones* and other anatomical Observations illustrated with Figures after the Life. By Will. Cowper, Surgeon. Lond. 1694, in 8vo.
- n. 251. p. 130. 6. An Account of 5 Pair of *Muscles*, which serve for different *Motions* of the *Head*, on the first and second *Vertebræ* of the *Neck*; and of two *Ligaments*, one of which fastens the *Head* to the first *Vertebra*, the other fastens the first to the second. To which is annexed the History of an uncommon Appearance of a human *Skull*. By M. Dupré. But Mr. Will. Cowper here shews, that the Discovery of these *Muscles* is not new; most, if not all, of them being either described by him in his *Myotomia Reformata* and other Anatomists, or only the different Appearances of known *Muscles* in particular Subjects: To which he adds 2 exact Figures of the same *Bones* and *Muscles*, done after the Life.
- n. 42. p. 833. 7. Tractatus 5 Physico-Medici, de Sale-Nitro & Spiritu Nitro Aereo, &c. de Motu Musculari, & Spiritibus Animalibus; de Rachitide: Auth. Joh. Mayow, L. L. D. Oxon, 1674, in 8vo.
- n. 105. p. 101. 8. Wilhelmi ten Ryne, M. D. &c. Transsilano-Daventriensis, 1. Dissertatio de Arthritide. 2. Mantissa Schematica. 3. De Acupunctura. 4. Orationes tres sc. de Chymicæ & Botanicæ Antiquitate & Dignitate; De Physiognomia; De Monstris. Lond. 1683, in 8vo.
- n. 148. p. 222. 9. Two Treatises; the one medical, of the *Gout*; by Herman Buschof Senior, of *Utrecht*. The other partly surgical, partly medical, containing some Observations and Practices relating to some extraordinary Cases of Diseases in both Sexes; by Hen. van Roonbuysse. Englished out of Dutch. Lond. 1676, in 8vo.
- n. 125. p. 621.

C H A P. VII.

Monsters.

I. IN the House of M. Bourdelot was shewed a *Monster* in Form of an *Ape*, A monstrous Birth like a Monkey, at Paris; by M——n. 26. p. 479. having all over its Shoulders, almost to his Middle, a *Mass of Flesh* that came from the hinder Part of its Head, and hung down in Form of a little *Cloak*. The Report is, that the Woman which brought it forth had seen on the Stage an *Ape* so cloathed: The most remarkable Thing was, that the said *Mass of Flesh* was divided in four Parts, correspondent to the Coat the *Ape* did carry. The Woman, upon Enquiry, was found to have gone 5 Months with Child, before she had met with the Accident of that unhappy Sight.

II. I have lately lighted upon a *monstrous Birth*, viz. *Twin-Females*, Twins fastned together at the Breast; by S. Jac. Grandi. n. 58. p. 1188. very handsome, but so fastened together by the *Breast*, that there was discerned but one only Trunk of the Body; which having their Chin united together, seemed to kiss one another. I opened them at the *Navel*, which was common to them both, and found that there was but *one Heart*, though greater and rounder than ordinary; so that Nature seemed to have united the Matter of two into one. They had *two Lungs* and *one Stomach*, the *Pylorus* of which did strangely branch itself into two Ranks in the Bowels. There was but *one Liver*, but big; for the rest, there were *two Spleens*, *four Kidneys*, *two Wombs* full of a white Matter, like a concreted Semen, and *two Vulva's* with their distinct *Hymens*.

III. Octob. 22, 1679, One *Grace Batterd*, of *Plymouth*, of honest Repute, Twins fastned together at the Breast; by Dr. Will, Durston. n. 65. p. 2096. and Mother of 5 Children, about 12 o'Clock at Night began to have *Tra-vailling Pains*; and near 4 o'Clock in the Morning the Head of a Child came to the Birth: When the Midwife, putting her Hand to help off this, felt another, by its Heat and Motion alive. This Birth had *two Heads* and *two Necks*, as also the *Eyes*, *Mouths* and *Ears*, suitably double; *four Arms*, with *Hands*, and as many *Legs* and *Feet*. There was to both but *one Trunk*; but *two Back-bones*, from the *Clavicles* to the *Hypogastrium*, and from the Shoulders down to the Bottom of the Loins they were not distinct, but cemented and *concorporated*, after this Manner: The *Right Clavicle* or *Channel-Bone* of the Right-hand Child (being long) joined with the *Left Clavicle* of the Left-hand Child. The *Ribs* on the Face-side of both of them, by the *Cartilages* or *Gristles* were *united* without any intervening *Sternum* or *Breast-bone*; and so made a common *Chest* to them both: And the *Ribs* of both on the Back-part were *united* by the *Gristles*; and from the *Clavicle* down to the *Hypogastrium*, or Bottom of the Belly they were so *conjoined*, that they made but one common Belly with one *Navel-String* to them both; but from the *Hypogastrium* downwards they were *divided*,

divided, and became *two*, each having the perfect Parts of *Females*. They were exactly like one another; very well featured, having also pretty neat and handsome Limbs. They had their Hair more than ordinarily thick, and about half an Inch long, and the Nails full grown. The Weight of this Birth was $8\frac{1}{4}$ Pounds; the Circumference of the Left Head was about 11 Inches, that of the Right being half an Inch less. The Circumference of the Trunk was about 16 Inches and $\frac{1}{4}$; and the Length of both, from Head to Foot, was full 18 Inches and an half.

We found on Dissection *one Navel-Vein*, and *one Liver*, but that was very large, with the *Bladder of Gall* seated in its usual Place: But there were *two Urinary Bladders*, *two Wombs*, *four Kidneys*, and *one Stomach*, with the *Oesophagus* or Gullet perforate and open from the Mouth of the Left Head; but the *Oesophagus* from the Mouth of the Right Head descended no lower than a little above *half an Inch* of the *Midriff*, and there it ended. Whence it may be concluded, that the Right-hand Child must have received its Nourishment by and from the Left Child. There was but *one Colon* which terminated into two *Intestina Recta*. So there was but *one Midriff*, and above that, we could find little or no Appearance of *Lungs*; but only a very large *Heart* (with two *Auricles*) the Figure of which was not Conical, but like a Soldier's *Pera* or Snapfack, or the *Ventricle* or *Stomach*; and lying near under the *Clavicles* transverse, as the *Stomach* lieth under the *Midriff* and *Liver*. We did also observe *two Ventricles* with the *tricuspid* or *sigmoid Valves*; as also the *Vena Cava* and *Aorta* dependant, and also the *Aorta* ascending and bifurcate towards each Neck, and then bifurcate again.

The Mother is in as good a Condition of Health as Women in Child-bed used to be.

A Twin Female Infant united below the Diaphragm; by Dr. S. Morris. n. 138. p. 961.

IV. At *Petworth* in *Suffex*, *Decemb. 20, 1677*, one *Joan Peto*, a Butcher's Wife, after most acute Pains, was, by her Midwife, delivered of a *Monstrous Female-Birth*. It had *two Heads*: Both the Faces very well shaped. The Left Face looked Swarthy, and never breathed; and the Left Head was the bigger, and stayed longer in the Bearing. The Right Head was perceived to *breath*, but not heard to *cry*. Betwixt the Heads was a *Protuberance* like another *Shoulder*. The *Breast* (and *Clavicles*) very large; about 7 Inches broad: But *two Hands*, and but *two Feet*.

The *Brain* in each Head was very large. The *Spina Dorsi*, from the Neck to the Loins, was *double*. There were also *two Hearts*, one on each side the *Thorax*: The Left Heart the bigger: And *two Pair* of *Lungs*, one infolding each Heart. Those in the Left-side were blackish; the other looked well. The *Mediastinum* parted the *two Hearts* one from the other. The *Aorta* and *Vena Cava*, below the *Diaphragm*, *single*; the *Diaphragm* having only three Perforations, as is usual. But a little above it they were each *divided* into two Branches, distributed to the *two Hearts* in the Figure of a *Greek Y*. The *Oesophagus*, in like Manner, a little above the *Diaphragm*, *scil.* about the *Fifth Vertebra*, was *divided* into two Branches, one

one ascending up into each Throat. There were also *two Stomachs* or *Ventriculi*; one shaped as in natural Birth: The other, a kind of great Bag, bigger than the natural Ventricle. In which Respect it answered to the Paunch in a Cow or Sheep: But, in regard of its Place, rather to the *Reticulus*, or else to the *Abomasum*; being at the one Orifice continuous with the true *Pylorus*, and at the other with the *Duodenum*. Within it was contained a Substance like *Meconium*, as is usual in Children newly born. The *Liver* but one, but very great; and the *Cystis Fellea* proportionable. The *Spleen* also one, but large. So were the *Intestines*, and all the Parts of the *lower Ventricle*, especially the *Left Kidney*. The *Uterus* of an usual Bigness; but the *Clitoris* large.

The *Secundine* extraordinary great, weighing about 8 *Pounds*.

V. I have seen a *strange Birth* at *Hilbrewers* in *Somersetshire*. There are two Things which seem to me probable. 1. That Nature designed and made Preparation for *Twins*. For, the *Joining* of these two infant Bodies beginning at the Navel, each hath all its Parts below, to the very Toes, proper to itself, and not only *distinct* all along, but *separate*. Upwards, beneath the *Breasts*, these Bodies part again, and then all is, as below, *distinct* and *separate*. When laid *supine*, they seem to have but *one Body* where joined; but when *turned*, there is a deep Furrow between both, each hath a *distinct Spina Dorsi*, &c. each hath *Nipples* in their proper Place respecting the several Bodies, but one of each is seen before, the other behind, respecting the whole: They do not *wake* and *sleep* together certainly; they *suck* and *cry* heartily, *exonerate* apart freely, and are likely to *live*, if the Multitudes that come to see them (sometimes 500 in a Day) do not occasion the shortning of their Lives. They are *christened* by the Names of *Aquila* and *Priscilla*, though both *Females*. They were born by an easy Travail to the Mother (who had been 2 Years infirm) on the 19th of *May*, 1681. She had had 5 Children before. 2. The other Thing I observe as credible is, That this Accident might happen in some such Way as this; Near the Time of the first Formation of the *Fetus*, the *Navel-Strings* of each chanced to be so *joined*, that all along, from within the Bodies of the Children to the End terminating in the *Womb*, they might seem as *one*. The *Midwife* said, the *After-burthen*, though but *one*, was tripple in Bigness to what is usual; that the *Navel-String* was very great, so that it is easy to conceive, there might be distinct, though joined *umbilical Vessels*, which, in Likelihood, parted within that common *Navel*, whence each Body had a just Distribution of its proper Vessels. There was such a Crowd of People there, that I could not give myself that Satisfaction I desired, yet I thought it worth my Pains to see and understand thus much of this unusual Accident. One in an adjoining Parish told us, That an ancient Man living there remembered his Wife (now dead) had, about 40 Years since, seen such a Thing in *Wales*, and that the Children lived so long as to be able to talk to one another, and that in Tears, when the one thought what the other should do when either should happen to die; and that both died together.

A double Birth joined at the Breast, in Somersetshire; by Mr. A. P. Pb. Col. n. 2. p. 21.

VI. There

Two monstrous Births in Scotland; by Dr. Geo. Garden. n. 175. p. 115⁶.

VI. There have been two *monstrous Births* this Year at *Aberdeen*, both *Females*: The first was two perfectly formed Children above and below the Belly, having *two Heads*, *four Arms*, and *four Legs*, only the two Arms which stood next the other, were not perfectly formed into *Hands* and *Fingers*, the *Breasts* beginning to *join* thereabouts. There was but *one Belly*, though somewhat bigger than ordinary, *one Navel* and *Navel-string*, tied to *one After-birth*; yet there were *four Buttocks*, *two distinct Fundaments*, and the *two Privities* were confounded together. It is thought they might have been brought forth alive, but that they staid so long in the Birth; for that both Heads presenting together, the Midwife thought they had been *Twins*, and thrust one of them always back.

The other had all the due Proportions of one Child, the *Head* excepted; it having *two Heads*, the one standing behind the other, the foremost less than the due Proportion, and bowed down upon the Breast, having yellow Hair, and wanting nothing of the due Proportions of the Face save one Cheek beneath the Eye; the other bigger than ordinary, standing somewhat higher, having no Face, which they supposed to have been disfigured by the back part of the foremost.

A monstrous Boy; by S. Jac. Grandi. n. 58. p. 118⁹.

VII. I have lighted upon a *monstrous Boy*, terrible to behold, born with his *Breast* open, the *Bowels* out of the Belly, the *Legs* distorted, the *Bladder* in the Place of the *Fundament*: In the *Genitals*, besides that the *Testiculi* were close to the *Kidneys*, there was nothing but a *membranous Expansion* wherein the *spermatick Vessels* were lost.

A monstrous Child; by M. Chr. Krahe. n. 160. p. 599.

Fig. 80.

VIII. *Feb. 29, 1684*, at a Village called *Heisagger*, near *Hattersleben* in *South Jutland*, a Soldier's Wife was delivered of this *monstrous Child*: It is supposed she had seen some Body wounded or disfigured in the same Manner, as it doth appear at the Child's Leg or Foot. At the Left Leg, 1. There was to be seen an oblong round Piece of Flesh of a brown and blue Colour, at the Extremities somewhat sharpened, which was joined to the Calf of the Leg 2, and could be moved or put out in from 1 to 3, that other Piece of Flesh 4, was of the same Colour, but fastened to the Leg, so that it could not be displaced. At the right Foot it hath 6 Toes; 7, was like a Bullet of a Pistol, which did hang loosely to the Leg; 8, another Bullet somewhat bigger. The Face did look pretty old, as it had been of 35 or 40 Years of Age. 5 and 6, at the Fore-head there had been observed such *Excrescencies* as if it were *artificial Laces*: Which the Painter, who 3 Days after it was dead, did draw the Scheme, testifieth to have been almost spoiled or rotten by the touching of so many Hundreds of People that went to see this Creature. But before, when the Head of the Child was turned against the Light of the Sun, these physical *Laces* seemed to be very artificially done. With the *Left Eye* it did look fiercely, keeping the other close. Behind the *Head*, there was a Shape like a *Hood*, or other Ornament, which Women commonly do wear. His *Arm* was figured like as the Scheme sheweth, with several Knots or Joints. The *Tail*, which was strangely grown out

out of the back Part, 9, was a quarter of a *Zealandish Ell* long. The Mother of this Child being aged about 40 Years, hath had formerly two other Sons, now of 7 and 9 Years of Age, which are well shaped, and still alive: But this *Monster*, after it had *cried* out two or three times, died presently.

IX. The Name of this *Hermaphrodite*, is *Anne Wild*, born in the Month of *February*, at the *Feast* of the *Purification*, in the *Year* of our *Lord* 1647, in a considerable Village of *Hampshire*, commonly called *Ringwood*. When she was about six Years of Age, after jumping and wrestling with some Boys of her own Age (a great deal weaker than she) there began first to appear two Protuberances, like the *Herniæ* called *Bubonocèles*, to reduce which (for that was their Intention) the Surgeons attempted for a long while in vain. For they happened to be little *Testicles*, which being now become larger, and included in a *Scrotum*, wrinkled and set round with *Hair*, are not to be distinguished from the Male *Testicles* in a natural State, except that each of them has a proper *Scrotum* of its own, as it were, but at the same Time so long as from the Production of the two to form the *Labia Pudendorum*. Within these Lips the *Nymphæ* and *Carunculæ Myrtiformes* appear well enough formed; and the Middle Part of the *Vulva*, is covered with a thin Membrane reaching upwards from the *Perinæum*. The *Clitoris* does not appear. The *Womb* with its *Neck* differs in nothing from that in other Women. Till she was thirteen Years old, it was not doubted that she was a Female, she wore a Woman's Garb, and did the same Work as Women commonly do. But happening accidentally to work hard at Baking of Bread, immediately a *Penis*, which had lain hid till that Time, broke forcibly out, to her no small Surprise. The *Penis*, when it is erected, is four Inches long; it is situated the very same as the *Penis* in Men commonly is, and ends in a *Glans*, covered with a *Prepuce*, with a *Frænum* connecting them together, the same as in Men. But the *Glans* being imperforated (in such a Manner however, as you would think the thin Membrane that closes its Orifice might easily be pierced) denies a Passage for the *Semen* out of the *Uretbra*, whence (flowing back perhaps) it is ejected by the Orifice of the *Vagina*.

An Herma-
phrodite at
London; by
Dr. Thomas
Allen. n. 32.
p. 624.

When she was seventeen, the *Menstrua* began to flow periodically and in the usual Quantity, and so continued to do for the Space of two Years. After which, these disappearing, the *Beard* began to sprout out, and from that Time her whole Body has been hairy, and the *Voice* and *Make* of the Body are both become masculine. The *Hair* is like that of a *Man*; she has no *Breasts*; the *Nipples* are very small; the *Chest* broad; the *Haunches* narrow; the *Hips* more contracted than is common in *Women*.

She says she is provided for either Sex, but rather chuses to have to do with *Women*; whom when she sees and lusts after, the *Penis* is erected; which whenever she longs for a *Man*, remains *flaccid*. I shall only add one Thing more, which I think is well worth mentioning, *viz.* That one Night, happening to pass the Evening with some merry Companions, in Drinking, and Dancing, and Games that raise Concupiscence, happening to

to cast her Eyes upon a handsome young *Man*, she immediately conceived such a violent Passion for him, that the next Day she was seized with an *Hysterick Fit*, as appeared not only from the *Rising* of the *Matrix*, her *Singing*, *Laughing*, *Crying*, and other *Symptoms* of that Disorder, but likewise from the *Cure*; for by giving her *Hysterick Medicines* and applying a *Plaster of Galbanum* to the Parts about the Navel, the Symptoms went off, and she soon recovered.

An Herma-
phrodite at
Tholoufe: by
M. Vess
n. 168. p. 282.

X. Nov. 1686, there was brought into the Hospital of *S. Jacques* a Servant that was ill, an *Hermaphrodite*. She had been baptized as a *Woman*, by the Name of *Margaret*. Her Father was a poor Man of *Pourdiac*, seven Leagues from *Tholoufe*, his Name was *Malause*. Her Age is one and Twenty, and she has the external Appearance of a *Woman*, but the real Marks of a *Man* appearing very strong. Her *Face* is like that of a *Woman*, and agreeable enough, the *Neck* very fine, the *Breasts* as well formed as you can desire in a *Woman*, the Hips and Thighs large as in a *Woman*, the *Pudenda* every Way like those of a *Woman*, only the *Vagina* is no more than two Inches long; and from the Middle of the *Slit* there hangs down a *Penis*, of a considerable Thickness, and in an *Erection* it stands out about eight Inches. This *Penis* is well formed, except that it has no *Prepuce*, and has no *Testicles* accompanying it. The *Urine* and *Semen* are voided by it as in Men, and, which is very particular, the *Menstrua* are discharged by the same Passage.

I should scarce have believed this, if I had not seen it myself, and examined it very exactly during the Time that the *Menstrua* flowed, which happens very regularly for the most Part every Month, hardly ever passing two Months together without them; but almost always accompanied with great Pain, and a Tension of the Lower-Belly, which indicates a Kind of Inflammation in those Parts.

I have got several of our Physicians to see this *Hermaphrodite*, and after having consulted the *Vicars-General* about it, we have made her put on Mens Cloaths, and take the Name of *Arnaud Malause*, and they are designed very soon to put her to some Trade. There was no manner of Occasion for being scrupulous about this, because the *Hermaphrodite* can very well perform the Function of a *Man*, and not at all that of a *Woman*.

C H A P. VIII.

The Period of Human Life.

An anatomical Account of
Tho. Parre;
by Dr. Harvey. n. 44.
p. 886.

I. **T**homas Parre was a poor Countryman of *Sbropshire*, whence he was brought up to *London* by *Thomas Earl of Arundel and Surrey*, and died at the Age of 152 Years and 9 Months. Being opened after his Death (Nov. 16, 1635) his Body was found yet very fleshy; his Breast hairy; his

his

his Genitals unimpaired, serving not a little to confirm the Report of his having undergone publick Censures of his *Incontinency*, especially seeing that after that Time, *viz.* at the Age of 120 Years, he married a Widow who owned, *Eum cum ipsa rem habuisse, ut alii Mariti solent, & usque ad 12 Annos retroactos Solitum cum ea Congressum frequentasse.* Further, he had a large Breast, *Lungs* not fungous but sticking to his Ribs, and distended with much Blood; a Lividness in his Face, as he had a *Difficulty* of Breathing a little before his Death, and a long-lasting *Warmth* in his Arm-pits and Breast after it (which Sign, together with others, were so evident in his Body, as they use to be in those that die by *Suffocation.*) His *Heart* was great, thick, fibrous and fat. The *Blood* in the *Heart* blackish and dilute. The Cartilages of the *Sternum* not more *bony* than in others, but *flexile* and soft. His *Viscera* very found and strong, especially the *Stomach*; and it was observed of him that he used to eat often by Night and Day, though contented with old Cheefe, Milk, coarse Bread, Small Beer, and Whey, and, which is more remarkable, that he did eat at Midnight a little before he died. His *Kidneys* were covered with *Fat*, and pretty found; only in the anterior Surface of them there were found some aqueous or serous (as it were) *Abscesses*, whereof one was near the Bigness of a Hen-Egg, with a yellowish Water in it, having made a roundish Cavity, impressed in that *Kidney*: Whence some thought it came, that a little before his Death a *Suppression* of *Urine* had befallen him, though others were of Opinion, that his *Urine* was *suppressed* upon the Regurgitation of all the Serosity into the *Lungs*. Not the least Appearance there was of any *stony* Matter, either in the *Kidneys* or *Bladder*. His *Bowels* were also found, a little whitish without. His *Spleen* very little, hardly equalling the Bigness of one *Kidney*. His *Brain* was entire and firm; and though he had not the Use of his *Eyes*, nor much of his *Memory*, several Years before he died, yet he had his *Hearing* and *Apprehension* very well, and was able, even to the 130th Year of his *Age*, to do any Husband-man's Work, even Threshing of Corn.

In short, all his *inward Parts* appeared so healthy, that if he had not changed his Diet and Air, he might perhaps have lived a good while longer. But coming out of a clear, thin and free Air, into the thick Air of *London*, and after a constant, plain and homely Country Diet, being taken into a splendid Family, where he fed high, and drank plentifully of the best Wines; whereupon the natural Functions of the Parts of his Body were overcharged, his *Lungs* obstructed, and the Habit of the whole Body quite disordered; upon which there could not but soon ensue a *Dissolution*.

II. 1. When I came first to live at *Bolton*, I was told several Particulars of the great *Age* of *Henry Jenkins*, but I believed little of the Story for many Years, till one Day coming to beg an Alms, I desired him to tell me truly how old he was. He paused a little, and then said, that to the best of his Remembrance he was about 162 or 3; and I asked, What Kings he remembered, he said *Henry VIII.* I asked, what *publick Thing* he could longest remember? He said, *Plowden-field.* I asked, whether the King was there, he

The great Age of Henry Jenkins; by Mrs. Anne Savile. n. 221. p. 266.

he said no, he was in *France*, and the Earl of *Surrey* was General. I asked him how old he might be then? He said, I believe I might be between 10 and 12; for, says he, I was sent to *Northallerton* with a Horse-Load of Arrows, but they sent a bigger Boy from thence to the Army with them. All this agreed with the History of that Time; for Bows and Arrows were then used, the Earl he named was *General*, and King *Henry VIII.* was then at *Tournay*: And yet it is observable, that this *Jenkins* could neither write nor read. There were also 4 or 5 in the same Parish that were reputed all of them to be 100 Years old, or within 2 or 3 Years of it, and they all said he was an elderly Man ever since they knew him; for he was born in another Parish, and before any Registers were in Churches, as it is said: He told me then too, that he was Butler to the Lord *Conyers*, and remembered the Abbot of *Fountains-Abbey* very well, before the *Dissolution* of the *Monasteries*.

By Dr. Tancred Robin-
son. *ib.*
p. 267.

2. *Henry Jenkins* departed this Life Dec. 8, 1670, at *Ellerton* upon *Swale* in *Yorkshire*; the Battle of *Flowden-field* was fought Sept. 9, 1513, and he was about 12 Years old when *Flowden-field* was fought. So that this *Henry Jenkins* lived 169 Years, viz. 16 longer than *Old Parre*, and was the oldest Man born upon the Ruins of this Postdiluvian World.

In the last Century of his Life he was a *Fisherman*, and used to wade in the Streams; his Diet was coarse and soure; but towards the latter End of his Days he begged up and down. He hath sworn in *Chancery*, and other Courts, to above 140 Years Memory, and was often at the *Affizes* at *York*, whither he generally went on Foot: And I have heard some of the Country Gentlemen affirm, that he frequently swam in the Rivers after he was past the Age of 100 Years.

By Mr. Hill.
n. 228. p. 543.

3. In the *King's Remembrancer's Office* in the *Exchequer*, is a Record of a Deposition in a Cause by *English Bill*, between *Ant. Clark* and *Smirkson*, taken April 1665, at *Kettering* in *Yorkshire*, where *Henry Jenkins* of *Ellerton* upon *Swale*, Labourer, aged 157 Years, was produced, and deposed as a Witness. Divers very ancient Witnesses swore him to be a very old Man when they first knew him.

Several very
aged Persons
in the North
of England;
by Dr. Mart.
Lifter. n. 160.
p. 597.

III. 1. *Rob. Montgomery* now (in the Year 1670) living at *Skipton* in *Craven*, but born in *Scotland*, tells me that he is 126 Years of Age; the oldest in *Skipton* say, that they never knew him other than an old Man; he is exceedingly decayed of late, but yet he goes about a Begging.

2. *Mary Allison* of *Thorlby*, in the Parish of *Skipton*, died in 1668, aged about 108. She spun a Web of Linnen-Cloth a Year or two before she died.

3. *J. Sagar* of *Burnley* in *Lancashire*, about 10 Miles off *Skipton*, died about the Year 1668, and was of the Age (as is reported) of 112.

4. *Tho. Wiggin* of *Carlton* in *Craven* died in 1670, at the Age of 108, and odd Months: He went about till within few Weeks of his last, and was a very fair Corpse.

5, 6. *Frances Woodworth* of *Carlton* died in 1662, of the Age of 102, and some

some odd *Months*; the Mother of 7 Children, always a very lean Woman, yet to her very last went about as streight and upright as a young Girl, and of perfect Memory: Her *Sight* and *Hearing* decayed, though not wholly deprived of either. This by Information from her Son *Robert Woodworth*, now (in 1670) living in *Carlton*, of the Age of 69, as able a Man to ditch and plough as any in the Town.

7, 8. *Will. Garthorp* and *Will. Baxter* of *Carlton* inform me, that they two being upon the Jury at *York* in 1664, they saw and spake with, in the *Affize-Hall*, two Men, *Father* and *Son* summoned as *Witnesses* in some Cause or other out of *Dent*, a small Village in *Craven*, 8 Miles beyond *Settle*. The *Father* told them, that he and his *Son* made 12 Score between them, and that his *Son* was above 100, and that he wanted not half a Year of 140. He told them further, that he could and did make *Fish-books* as small as would take a Trout with a single Hair. They observed that the *Son* looked much older, and had the whiter Hair. N. B. It is to be observed that the *Food* of all this *mountainous Country* is exceeding coarse, as salted and dried Beef, and soure leavened Oat-bread. I am confident many Scores of Persons might be found of the Age of 100 Years among these *Northern Mountains*.

IV. 1. My Lord *Bacon* says, that the *Countess* of *Desmond* in *Ireland* was 140 Years of Age.

2. Mrs. *Eckleston*, who lived at *Philipstown* in the *King's County*, was born in the Year 1548, and died 1691; so she was 143 Years old.

V. After I had often reflected upon the general Causes of Diseases that lead to *Death*, I mean those of the *Debilitation* of *Nature's Strength* in the Course of Man's Life, until its utter Extinction, and of the Causes of a merely *natural Death*, by the Failure of that Strength in an extreme *decrepit Age*, without the Concurrence of any Excess or external Cause; I have entertained some Conjecture, that if we were more intelligent in this Matter than we are, we might procure for ourselves an *Age* of continual *Youth*; setting aside the several Accidents of *divine Providence*, and merely considering the *Forces* of *Nature*, not only not hindered, but also assisted as much as may be.

Searching therefore for the true Causes of *Old Age*, and of *natural Death*, I was not satisfied with that *Extinction* of *natural Heat* and *Desiccation* of the *radical Humour*, assigned to be the Cause thereof, nor with the Causes of this *Extinction* and *Desiccation* that are commonly alledged, it being supposed that this *hot* and *moist* Principle of Life, in its own Nature dissipable in the Course of Life, not being perfectly repaired by Food, is considerably diminished, which brings *Old Age*, and is at last quite consumed, which causeth *natural Death*; where Authors make a great Difference between the *seminal Heat* and the *Moisture*, and that which comes from *Aliments*; so that, say they, the former cannot be repaired by the latter, as being heterogeneous. Which to me seems not to be true; for doth not this *seminal Heat* and *Moisture* originally

The great Age of two Persons in Ireland; by Dr. Tho. Molineux. n. 261. p. 502. Longevity, and the Causes of natural Death; by M. de Martel. n. 58. p. 1179.

originally proceed from what is superfluous of the 3d *Concoction* of the *Aliments*? It is therefore of the same Nature; and nothing hinders, but what is dissipated thereof may be perfectly restored by good Nourishment, well prepared, and taken seasonably and in due Quantity. Whence it may be justly concluded, that the Defect of Repairing this *Principle of Life* comes not from its Nature, not reparable this Way, but from something else.

The illustrious *Bacon* conceived, that this Fault came from the unequal Reparation of the liquid or soft, and the dry or more solid Parts, which jointly serve to maintain and repair themselves: Whence it comes to pass, that the most easy to repair, and the most necessary for Life, as the *Blood*, cease at last to be sufficiently repaired by the Defect of the others, which are not repaired at all. *Sanctorius*, being almost of the same Sentiment, holds, that *natural Death* happens, because the *Fibres* do so dry up, that they can no more be renewed; he making the Maintenance of Life to depend from the Renovation of the Parts. Which doth not satisfy me neither, because even the *Bones* themselves, which are the hardest Parts, are capable of Renovation in *old Age*; in regard that *old Oxen*, which we often eat, have at certain Times (I say not of the *Moon*, according to the common Opinion) their *Bones* of the same Place altogether dry and *Marrowless*, and at other Times bedewed with a Substance of the Nature of *Marrow*, wherewith they are then filled, which enlargeth their Pores, as of a fine Sponge, and softens them; which then especially comes to pass, after they have fed upon good Pasture in the Spring.

We must therefore enquire into other more true Causes of *Old Age* and *Death*, which to me seem to be the following. I suppose, that the *Blood* is the *Principle of Life*, as far as it is *vital*, that is, in Motion by the hot Particles contained therein; so that those who expire by *Age*, do not die for being destitute of *Blood*, which is found abundant and laudable enough in their Vessels; and which hath been sufficiently repaired till then; but because it ceaseth to be *vital*, by reason of the too easy Dissipation of the *igneous* Particles, which make it such: Which, in my Opinion, comes to pass, as it doth in Wine, which evaporates and loseth its Strength by the Fault of the Vessel, which by some Opening or other gives Passage to what gives Virtue to the Wine. The *Tunicles* and *Membranes* of the *Veins* and *Arteries* which enclose the *Blood*, wear in Time away and wax thin, and their Texture gives and breaks in several Places; at which Apertures the *igneous* Particles abandon the *Blood*: As in Stuffs and Cloth (whose Wool is in a Manner like that of the *Tunicles*) the Threads by wearing do loosen and break, insomuch that many Holes are made in it as in a Sieve. So that if we had the Art to reinforce and to strengthen anew those *Coats* and *Membranes*, that they might not let slip what maketh the *Blood vital*, the *Life* would be preserved perpetually. For a Proof of which this may serve for the present, that the *Life* of many dying Persons is maintained for some Time, by making them swallow some hot and spirituous Liquor, as *Spirit of Wine* or some *Essence*, by which the *Blood* is fortified and quickned for some Moments: But as this Reinforcement of *Life*, conveyed to the

Heart,

Heart, and running into the *Veins*, soon slips out, so also this new Vigour passeth away quickly.

As there is no Reason to despair of finding out such Medicines, or Aliments, as are proper to strengthen the *Coats* and *Membranes* of the *Vessels*, so as that they may at all Times retain the *fiery* and *spirituous* Corpucles of the *Blood*, as well as in the Time of *Youth*; we may also hope to be enabled to maintain the *Blood* in a Condition always to furnish alike, as in our vigorous Age, for all the Functions of Life; the Engine of our Body being not unlike to a *Chymist's Furnace*, which at first well retaining the *Heat*, is very proper for the Operations of Art; but at last Chinks and Crevices being made therein, it ceases to be so, the *Heat* getting away through them, what Fire soever you kindle therein.

VI. Having some Months since entertained a Suspicion, that the Causes of *Tides* at *Sea* do also continually exert their Power in other Places, though the Effects thereof may not be so sensibly perceived on the solid as the fluid Parts of the terraqueous Globe, I took this Method to examine it. First, I divided the *Nox Hymægon* into four *Senaries* of Hours: The first consisted of 3 Hours before the *Southing* of the *Moon* and 3 after; the second of the 6 Hours following; and so the 3d and 4th, containing the two remaining Quarters of the natural Day. I next betook myself to observe *Births* and *Deaths*, in our own Kind, as also of other Species of Animals, whether they fell out indifferently in any of these 4 *Senaries*: And I found none that were *born* or *died* a natural Death in the *first* and *third* *Senaries*, which I take Liberty to call *first* and *second* *Tides*, but every one either in the *second* or *fourth* *Senaries*, which I call *first* and *second* *Ebbs*. I then proceeded to make Observation in the *Motions* of *Diseases*, which I could the better do, because I had some in my Family visited with *Agues*. Here I found that the Tumult of the *Fits* generally lasted all the *Tiding Time*, and then went off in gentle kindly Sweats in the *Ebbs*. I went on then to take Notice of the *Sex res non naturales*, and Alterations of the *Weather*, and such Accounts as I could meet with of Earthquakes and sundry other Things: And I have yet met nothing to hinder me from laying down this as a Maxim, that *Motion*, *Vigour*, *Action*, *Strength*, &c. appear most, and do best in the *Tiding Senaries*; and that *Rest*, *Relaxation*, *Decay*, *Dissolution*, belong to the *Ebbing Senaries*.

VII. It is observed on our *Sea-Coast*, with relation to Mr. *Paschall's* Observations, That People that are sick change at the *Turns* of the *Tide* at the Place; so as this Notion has obtained among all the *maritime* Towns: *Up-land*, with us, it does not constantly hold; which may thus be accounted for (if the *Moon's* Effect be *Fluidity*, as in *Frosts* is seen, a *New Moon* ever thawing, and is agreeable enough to a neighbouring Body of so quick a Motion) upon *dry* Land the *Moon* may not have the same Force; for I observe in Capt. *James's* Voyage, at *Charleton Island* the Fixedness of the Winter frozen Air occasioned the Difference of *Tides* at the *New* and *Full* to be scarce greater than the common *neap* ones, whereas *Spring-tides* advanced

The Motions of Diseases, and the Births and Deaths of Animals in different Times of the natural Day: by M. Paschal, n. 202. p. 815.

Deaths at certain Hours of the Tide; by Mr. Benj. Allen. n. 231. p. 665.

with

with the *Summer*. I have observed *Agues*, *Tertian* I mean, to come when the *Moon* has come to an Angle, as in one or two exactly when the *Moon* was *setting*, and the succeeding *Fits* when she *culminated*, the third *Fit* at a *rising Moon*, and so on. *Deaths* I have kept exact Account of, but can find no one Observation hold true, some at one *Time* of the *Tide*, some at another.

VIII. *An Account of a Book* omitted.

n. 14. p. 254. King *Solomon's* Pourtaiture of *Old Age*; by *Jo. Smith*, M. D.

C H A P. IX.

Pharmacy. Chymistry.

Three Queries relating to the *Entalia*, *Dentalia*, *Blatta Byzantina*, *Purpura* and *Buccina* of the *Shops*; by *Mr. Sam. Dale*. n. 197. p. 641. Answered; by *Dr. Lister*. *Ib.*

I. **W**HAT is the *Entalia* of the *Shops*? By what Authors described? Under what Names? And how they differ from the *Dentalia*?

2. Of what *Shell* is the *Blatta Byzantina* the *Operculum*?

3. There are divers Sorts of *Purpuræ* among Authors, which is that of the *Shops*? Likewise which Sort of *Buccina* and *Umbilici Marini* ought to be used in the *Shops*?

II. 1. As to the *Entalia*, I do not remember to have seen any thing in the *Shops* under that Name. The Descriptions of the *Dentalia* in *Schroder* are very faulty, and both those and the *Entalia* by him should seem to be the two Species of *Dentalia*, which are by me figured. The *Dentalium* being that which is commonly and in Plenty found about the Island of *Garnsey*, and elsewhere upon our Coast, and is the same with that found in the *Mediterranean*. It is a long, slender, round Pipe, a little bending and tapering, hollow and open at both Ends without any Crack or Flaw, naturally white at one End, and usually a little reddish; very smooth and polished on the Out-side, and from thence, and the Figure, called a *Dog-like Tooth*. The *Entalium*, or other Species of the *Dentalia*, is very much longer and thicker than the former, much like in other Respects, save that this is streaked with high Ridges, and mostly of a greenish Colour. This Species I guess to come from the *Indies*. Note, that any thing that is wrought into, or channelled, is in the modern *Italian* called an *Intaglia*; whence I believe, and the Nearness of the Word *Dentalia*, arose those Distinctions of Names.

2. To the second Query, I take the *Blatta Byzantina* to have succeeded the *Unguis Odoratus*, and to have been brought into the *Shops* in its Place. In *Dioscorides's* Time the best was brought from the *Red-Sea*, viz. the palest and fattest; the blacker, and less, from *Babylon*, or the *Persian-Gulf*; but it seems later Times took up with those found about *Constantinople*; whence the present *Shop Blatta* had its Name. The Name of *Blatta* is given to this *Operculum*, from the Colour I guess; as being of a dark Hair

Colour, as the common *Blatta Pistoraria*, so common in London, is; also this being a broad, thin, flat Beetle, like the Cover.

It is true, the same *Dioscorides* says, the *Unguis* was an *Operculum* (πῶμα κογχυλίου) like to that of the *Purple-Fish*: He means what was used in his Time; in which it seems the *Unguis Odoratus* was lost, or was not brought to Europe. But it will appear out of the same *Dioscorides*, that the *Unguis* was no *Operculum*. It will be worth the while to make out this Mistake, and consequently the Error the *Moderns* have been in to substitute an *Operculum* of a marine *Turben* for the true *Unguis Odoratus*.

Take the History of the *Unguis* out of *Dioscorides*. “ It is found, says he, “ in the Lakes of *India* where *Narde* grows; wherefore the *Conchylium* feeding on *Narde* are *Aromatick*. It is gathered after that the Lakes are dried “ up with Summer Heats. He concludes, the *Conchylium* itself burned or “ calcined, is of the same Efficacy with the *Purpura* and *Buccinum* burnt.” In the Chapter of *Narde*, he says farther, That the *Indian Narde* grew near the River *Ganges*, that is, in certain Lakes, which the Overflowing of that River caused. Hence it appears (1.) That the *Unguis Odoratus* was Part of a *Fresh-water Conchylium*. (2.) Now if it was gathered in the *Nardeferous* Lakes upon the River *Ganges*, how comes it to pass that the same was brought out of the *Red-Sea* and *Babylon*? And why should the Shell itself be brought, an usefess Luggage, so far, as from the River *Ganges* to *Greece*, the *Operculum* rarely being a tenth Part of the Shell itself? Now if it was not used to be brought and exposed to Sale, to what Purpose was it to declare its *Virtues*, or how could the Experiment be made? I conjecture therefore, that the true *Unguis Odoratus* was something like the half of a *Pestunculus Fluvialis*, so common in the River *Thames*, of the Bigness and Thickness of my Thumb Nail, and that for these Reasons;

1. That the *Unguis Odoratus* seems to have been a *Fresh-water Bivalve* or *Muscle*, for that they stayed till the Lakes on the River *Ganges* were dried up before they gathered them. Now *Bivalves* are ever buried in Sand and Mud, and never rise up and swim about and float as the *Turbinatè Snails* do, to which latter only the *Operculum* belongs, and which therefore were always, and easily to be caught.

2. He calls this Snail *Conchylium*, and by that general Name distinguishes it from all the other Sorts, concerning which he treats in several Chapters; which though in general it take in both Kinds, as well *Turbinatè* as *Bivalve*, yet it does more particularly denote a *Concha* or *Bivalve*.

3. The *Onyx* is expressly reckoned by *Pliny* amongst the *Bivalves*. For (l. 32. c. 11.) he makes all these Synonymous, *Solen*, five *Aulos*, five *Donax*, five *Onyx*, five *Dactylus*. And again more particularly (Lib. IX. c. 61.) He says, *Ex Concharum genere sunt Dactyli, ab Humanorum Unguium similitudine appellati*. So that in all Probability the *Onyx Odoratus* brought more antiently out of the *Fresh-water Lakes* about *Ganges* in *India*, was not unlike the common *Onyx* of the *Mediterranean*, which was of the *Solen* Kind.

Whatever the *Blatta Byzantia* of our *Shops* is, which has certainly nothing of the Characters of the antient *Aromatick Unguis*, and which in all Probability was lost upon Account of the difficult Passage from *Ganges* into *Europe*, I lament its Loss, which I have Reason to believe was a good Medicine, from its strong *Aromatick Smell*; which is much wanting in our *Testacious Powders*, of which this was one of the Number, so much used, and that not without good Reason now-a-days, which are all very flat and insipid.

To the *Third*, The *Purpura* of the *Antients* is well made out, and figured by *Fabius Columna*: And is one of the most common *Murices* of the *Mediterranean Sea*. In this he could not be much mistaken, because, as I remember, he somewhere mentions Heaps of those Shells where *Officina Purpuræ* antiently were; and also from the *purple Sanies* the *Fish* yields of itself. He mentions one or two more Species of *Turbinate Snails*, to be found in the *Mediterranean*, which yields a *purple Juice*. Upon the whole Matter, it is indifferent, what Sort of *Shell* we use in the *Shops*, if it be to be *calcined*, provided it be a *Sea-Shell*: Nor do I find either *Dioscorides* or *Ætius* to have distinguished betwixt the *Ostrea Purpura* or *Buccinum calcined*; but gives them all the same *Cautick Virtue*. Possibly some one Species may have it in a higher Degree, as we see the various Sorts of *Limestone*, if *calcined*, differ in Strength.

One Thing I shall not omit before I end this Paper, because it is now in my Mind, that tho' the Species of *Shell* or *Purpura* be scarce known to our *Shops* at this Day, yet the Use of the *purple Juice* has been, by Tradition at least, transmitted down to our Times, and kept as a Secret even in these Islands, till Mr. *Cole* got hold of it, and published it. Sir *Rob. Southwell* told me many Years ago, that his own Mother in *Ireland* was famous for marking Handkerchiefs with the Juice of *Fish*; which Mark would never wash out. And the very learned Mr. *Jo. Beaumont* informs me of a Passage in our *Beda's Ecclesiastical History* relating to the *Purple*, as a known Thing in his Time. The Passage is as follows;

Vid. Vol. I.
Cap. 6. Sect.

Bedæ Hist.
Eccles. l. 1. c. 1.

Variis Conchyliorum generibus exceptis: in quibus sunt & Musculæ, quibus inclusam sæpe Margaritam omnis quidem Coloris optimam inveniunt; id est, & Rubicundi & Purpurei, & Hyacinthini & Prasici sed maxime Candidi. Sunt & Cochleæ satis superque abundantes, quibus Tinctura Coccinei Coloris conficitur. Cujus Rubor Pulcherrimus nullo utiquam Solis ardore, nulla valet Pluviarum Injuria pallescere; sed quo vetustior, eo solet esse venustior.

You see from this Passage the *Purple Trade* of *Dying* was used in *England*, and very much valued.

Fig. 81.

Fig. 81 represents the true *Purpura* of the *Antients*, by the *Italians* called *Gerusolo*.

Stones in several Animals; by Mr. Will. Clerk. n. 250. p. 99.

II. *Stones* are not only found in *Human Bodies*, but also in several Parts of other Animals, as *Bezoar Stone* found in the Stomach of a kind of *Goat* in both *Indies*; as also in the Stomach of *Monkeys* (which is esteemed the best). There is also a kind of *Bezoar* called *Cow-Bezoar*, found in the Stomach

Stomach of a Cow. *Hippalithus* found in the Stomach of Horses; *Ægagropila*, in the *Capra Alpina*, &c.

The Writers of the *Materia Medica* ascribed great *Virtues* to these Stones, and particularly the *Bezoar*, and have wrote large Encomiums upon them. But if *Physicians* would consider seriously the true Worth of them, they would find, that their *Virtue* proceeds more from their being brought from a foreign Country, and a common Vogue and Esteem they have got in the World, than from any *intrinsic Virtue* they have in the Cures of Diseases; and that which seems most to recommend them is, their extravagant Price.

Much esteem- ed by many Writers, but in Truth of little Purpose in Physick.

III. That some *Distillations* may be made by *Frosts*, I have this Proof: At my request you were pleased to get me a *Thermometer* of a very small and slender Stem, especially the higher Parts for 10 Inches near the Head. The *Spirit of Wine* is very deeply tinged, which renders it in that Smallness clearly visible. I exposed it out of Doors in the *hardest Frosts* of the extrem Winter, An. 1665, when the Winds were also violently sharp. In those *Frosts* there ascended to the Top of the Glas small *Drops* like a *Dew*, which afterward in Time descended into the Stem, and filled up the Space of an Inch or thereabouts, and it was as clear, and bright, and more flickering, than any Crystal, or Glas. On the contrary, in the *Heat* of the *Summer*, I placed a stronger *Thermometer* of slow Motion on a Sunny Wall, till a Part of the Liquor ascended into the Top, and there continued some Hours: Then by sloping the Glas I divided it from the rest at a little Distance: And this took up two Inches in the Stem, being at first of a very pale Reddishness. I guess it contained much of the *Spirit of Urine*, which at first was intermingled with the *Spirit of Wine*; but in a short Time all the Reddishness was quite consumed: And since it remains of a transparent, but very dull Clearness, in no Degree so bright and flickering as the other.

Cold Distillations; by Dr. Jo. Beale. n. 56. p. 1140.

Whether this may prove a *Distillation* of the same Kind, and not differing from *Distillations* by *Heat*, I know not: But we are sure, that false Grounds and vain Hopes have done infinite Good to us, and to our Posterity, by *Pyrotechnie*; and why may not we accept of *specious Hopes* to attempt something in *Psychrotechnie*?

IV. After this learned and experienced *Physician* and *Chymist* had often with himself considered what the Reason might be, why the chief *chymical Operations* had been hitherto contemned, and by some reputed even for *Chimera's*, he affirms to have found at last, that the true Cause thereof is, that the *Artists* have not made Use, as they should, of those Means and Ways that would have made them successful. Now of those Means he as- sureth, by his own Experience, these three to be the most eminent and the most admirable for Use, viz. *Digestion*, *Fermentation*, and *Triture*; Operations sufficiently discoursed of, but in his Opinion, little understood as to their Efficacy and Usefulness, which he here undertaketh to make out by some considerable and uncommon Experiments.

The great Use of Digestion, Fermentation, and Triture; by Dr. Joel Lange- lot. n. 87. p. 5052.

First, Then he shews the excellent Usefulness of *Digestion* in the Preparation of the *Volatile Salt* of *Tartar*: Where having mentioned the Difficulties and Unsuccessfulness in other Proceffes, tried by him, he assures us, that as soon as he made use of a long *Digestion* he succeeded so well, that the very first Time he obtained what he feared he should not have gotten by many *Cobobations*, which was a pure white *Volatile Salt* of *Tartar*, leaving behind a few white insipid *Fæces* of an earthen Colour.

To this he adds another great Use of *Digestions*, in duly preparing the *Essences* of *mineral Sulphurs*; instancing an Experiment made upon *Corals*, as most clearly of all representing that great Power of *Digestions*. He poured then, some Years ago, upon Fragments of *Red Coral* an *Oil*, which among all distilled Vegetables is, as far as he knows, the mildest; desirous to try whether he could extract a *Tincture* therewith. But finding after a long Time no Change at all in the *Coral* nor *Oil*, he laid by all Thoughts of it. But having one Winter other Things to *digest* in a *digesting Furnace*, he thought good to resume that *coralline* Operation, and to give the *Bolt-head*, wherein that Matter was yet contained, a Place there, not without good Success: For within a Month's Time, when he stirred it, as he used to do, he perceived that the Bits of *Coral* had a higher Colour, and were grown softer, yet without any Change in the *Oil*. He therefore continued the same Degree of Heat, and after some Days saw, to his Wonder, that the *Corals* were altogether *dissolved* into a very red *Mucilage*, yet the *Oil* still swimming upon them in the pristine Form, without having received any *Tincture* at all. He did shake the Vessel vehemently and often, to see whether he could unite the *Oil* with the *Mucilage* of the *Corals*; but all was in vain, the *Oil* still ascending when the Vessel was at rest, and the *Mucilage* subsiding. Whereupon he tried whether he could combine them by *Digestion*; but that also not succeeding, he poured off the *Oil* (which he found to retain almost its former Scent and Taste,) and poured upon the remaining *Mucilage* some *tartarized Spirit* of *Wine*, of which by a short *Digestion* it was relolved into a highly *red Tincture*.

By these two Experiments, the Author thinks he hath made it evident of what Value the hitherto neglected Works of *Digestion* are; as also given a Hint of the great Efficacy there is in *volatile Salts*, if they be fettered, and kept from Avolation.

Secondly, To shew the Power and Use of *Fermentation* in *Chymistry*, he instances first in a true *Volatilization* of *Salt* of *Tartar* by means of the same; passing by what he hath performed thereby, upon *Antimony*, *Pearls*, *Coral*, &c. He saith then, that to obtain the *Spirit* of the *volatile Salt* of *Tartar*, he proceeded thus: He took of *crude Tartar*, 2, 3, or more *Pounds* (according to Pleasure) and first *calcined* it slightly, and only to some Blackness, to have what is most necessary, a *Ferment* to *ferment* the *Tartar* with. Having put this into a large Pot, he poured on it so much *Water*, that it stood an Inch high above it. 1. Then he gave it at first a *gentle Fire* to make it lukewarm; which done, he poured into it *half a Handful* of finely *pulverized Tartar*, and shortly after saw some Bubbles arise, that encreased more and more. Which perceiving he continued, as

he had begun, at several Times to pour in more *Powder of Tartar*, whereby the *Fermentation* was raised and quickened, the Bubbles thereupon rising in so regular an Order, as they had been natural Grapes, the Colour excepted. But here he was to keep a very exact *Regiment of the Fire*, such as all *Fermentation* requireth; and took Care also, lest by a too copious Affusion of the said Powder, the *Ebullition* should grow too vehement, and the Pot run over. The *Fermentation* ceasing, he put all that was in the Pot into an *Iron Bolt-head* (a *Glass* one being in Danger to be broken) to which he often applied a wet Linnen-Cloth, thereby to hinder a too great boiling up of the fermented *Tartar*, which else will suddenly run up and pass into the *Recipient* itself. Wherefore the *Fire* is also very carefully to be governed, and increased by little and little; though at last it must be strong, to force up all the *Salt*. Which being observed by him, he found the gross and feculent *Tartar* by the said *Fermentation* so volatilized, that there remained not any fixed *Salt* in the *Caput Mortuum*; which, he saith, he hath experienced more than once. He adds, that the Liquor obtained from thence, having much Water in it, added for the Sake of the *Fermentation*, is also to be much rectified, and that so far till it appear whitish; which shews that it holds a due Quantity of *volatile Salt*. Which *Salt*, of what Value it is, this Author would have us to estimate from the Testimony of *Van Helmont*, c. 15. de Feb. p. m. 780, and from the wonderful *Virtue* himself saith to have found in it, both in *internal* and *external Affections* of the Body, and even in *Gangrenes* themselves: Besides, that by means thereof he hath prepared some *Essences*, which in vain he had tried to make some *Menstruums*.

Another Instance he gives us of the great Use of *Fermentation* in separating *impure* and *noxious Sulphurs*; which he prescribeth to try in *Opium*, whereby, according to him, it becomes not only a very *safe Medicine*, but also a highly useful one for very many Cases, if rightly used.

Take then, saith he, of true *Theban Opium*, sliced, 1 Pound, and pour upon it in a low Cucurbite 10 Pounds of fresh Juice of *Quinces* very ripe, adding to it 1 Ounce of pure and very dry *Salt of Tartar*; expose it to a gentle Heat for a Day or two, until there appear some *Bubbles*, which is a Sign of the *Fermentation* at Hand. Then, to further the same, add 4 Ounces of *Sugar* very finely pulverized, and observe still such a Degree of Heat as the *Fermentation* requireth; which by so doing will duly proceed, and you shall see the *Opium* manifestly rise and dissolve *per minima*; taking Heed mean while of the strong-scented *stupifying Sulphur*, which then is wont to steam out. You will then also see a Part of the impure volatile Scum to emerge at the Top, and the more terrestrial to subside at the Bottom of the Vessel; the purer Part staying in the Middle, which is a red Liquor, like a *Ruby* Transparent; which you are with Care to separate, filtrate, and by a due *Distillation* to thicken to the Consistence of *Honey*. And this you must again dissolve by an highly rectified *Spirit of Wine*, filtering it, and digesting it for a Month, that whatsoever of Crude there may yet be in it, may be by that celestial Fire ripened and brought to Perfection. This *Spirit* being abstracted to a due Consistency, you will find this *Essence* to be

of that Virtue, that the 4th Part of a Grain, or at most *half* a Grain, taken in a proper Vehicle, moist or dry, will perform very wonderful Things.

3. Having dispatched *Digestion* and *Fermentation*, he comes now to *Trituration*; by which alone he esteems many great and admirable Things may be performed in *Chymistry*: To which he is perswaded he shall very easily obtain the Assent of all those that shall but observe and well consider the two following *Operations*, both experimented in the *Laboratory* of *Gottorp*, in the Presence of the late Duke *Frederick*, a Prince exceedingly well versed in all Kind of Knowledge, especially that of *Chymistry*.

The *first Operation* was made upon *Gold*; which, though the most *fixed* of all Bodies we know, was, though it will not yield to *Fire*, nor to any other known Dissolvent, mastered by *Grinding*; which he assureth himself to have been an Eye-witness of. But this he did by means of a singular Instrument, by him called a *Philosophical Mill*, whose Structure is thus described.

Fig. 82.

A, A *Leaden Head* pretty thick.

B, The *Axis*.

C, An *Indented Drum*.

D, A *Drum* consisting of *Coggs*.

E, A *Mortar*.

F, *Pestles*.

G, A *Handle*, by which the *Mill* is turned.

a, The superior Part of the *Axis*, which is round.

b, The inferior Part of the same, which is *square*.

c, d, Here both the *Pestles* are affixed to the *Axis*.

e, Here the *Pestles* are strengthened by a strong *Brass-ring*.

f, f, Here both *Pestles* are strengthened by two *Brass-cases*.

g, g, Both the thick *Pestles* of *Glass*.

The *Operation* itself follows.

Put *Leaf-Gold*, as much as you please, cut very small, into a very thick *Glass-Mortar*, or into one of *Gold* (such an one as the late *King* of *Denmark*, a little before his Death, caused to be made for this *Operation*.) In this *Mortar*, covered only with Paper, lest any Dust or other Thing should fall in, grind the said *Gold* Night and Day by an uninterrupted Agitation of the *Mill*, till you see it reduced into a duskyish Colour. For which *Grinding* there are commonly to be allowed 14 *Days* and *Nights*. But if you will only work by Day, there will need a whole *Month*. This done, put the *Powder* into a *Retort*, not very deep but shallow, such as the *English* ones use to be; and drive it by a *Fire* of *Sand* by Degrees, but at last by a very strong one; and there will come over a few, but very red *Drops*, which being digested either *per se*, or with tartarised *Spirit* of *Wine*, give you a true *Aurum Potabile*, which is sincere, and unimbrued with any Foreign Quality.

The Remainder, though they could also have easily resolved by grinding, yet they thought good to make an *Extract* of it by means of their philosophical *Acetum*, made of *Verdegrease*, *Sulphur*, and a highly rectified *Spirit* of *Wine*,

Wine, by a long *Digestion*: Whereby they got again a *Tincture* sufficiently *red*, and of very great *Vertue*. And that little that remained, which was but very little, they reduced into a *Body* by the means of *Borax*; but it wanted its due *Weight*.

'Tis true, saith our Author, that at the first *View* this *Operation* seems to be gross, requiring much *Time* and *Labour*, but little *Art*; but well considered, it is highly admirable, being assisted by the wonderful *Salt* of the *Air*, as the only *Catholick Dissolvent*. And that *Salt* is, by the continual *Grinding*, attracted and intermixed, many other *Experiments*, made by him about it, have taught him; which he reserves for the *Publication*, hereafter to be made, of the *Things* done in the *Gottorpien Laboratory*.

The second *Experiment* of the Use of this *Grinding*, was in a true and genuine Preparation of the *Mercury of Antimony*: A *Process* affirmed not only made by himself before his *Prince*, but also by the Hands of that very experienced *Chymist* of the *Electoer of Saxony*, *Jobannes Kunchelius*.

The *Operation* consists in this; *Grind* first the *Regulus* of *Antimony* into an impalpable *Powder*; and to 1 *Pound* of it add 2 *Pounds* of very pure and dry *Salt* of *Tartar*, and 8 *Ounces* of *Sal Armoniack*, and mix it well together. Then moisten it with some *Urine* of an healthy *Man*, especially of one that drinks *Wine*, if such may be had; and take Care to have this *Mixture ground* for a whole *Day* together, without any *Intermission*, by two very strong young *Men*; always, if there want *Moisture*, sprinkling *Urine* upon it, that it may stand 3 *Inches* high over it, and closing it well, keep it in *Digestion* for a whole *Month*, daily shaking it. And if, during that *Time*, the *Mass* appear to be dry, pour on more *Urine*. The *Digestion* being ended, form the *Matter* into *Globules* with equal *Parts* of *beaten Glass* and *Calx viva*, and dry it in the *Shade*. Of these, extract the *Mercury* in *Manner* following:

Let there be ready an oblong *Iron-Vessel*, like a *Bolt-head*, into which pour cold *Water*, and dig it into the *Ground*: Upon it put an *Iron Plate* with many *Holes* in it, and lay thereon the said *Globules* well dried; then fit also an *Iron Head*, somewhat flatted, to it, that you may conveniently lay *Coals* thereon, and thus keep a moderate *Fire* for 4 *Hours*, then encrease the *Fire* for as many *Hours*, unto the last. After that, let it cool, and beware not to stir the *Vessel* digged in the *Ground*, nor to pour out the *Water*, before that be altogether cooled, or else you will lose a great deal of the *Mercury*; as happened, it seems, to our Author, when his *Prince* being impatient of *Delay*, commanded the *Water* to be poured out before it was *Time*: For the *Mercury*, being by so strong a *Fire* resolved into *Atoms*, is to be *coagulated* again by *Cold*.

This *Mercury* of *Antimony* our Author glorieth in, as having prepared and handled it with his own *Hands*, and seen it with his own *Eyes*, after the finished *Distillation*, running in the *Bottom* of the *Vessel*. Neither doth he care if any do call it a *Non-Entity*, or if any unwary *Laborants* be unsuccessful in the *Operation*: It is sufficient to him, that he hath alledged nothing but what he hath tried himself, and candidly described. He wisheth
such

such *Operators* to consider, how many Things there are to be observed before and in the *Operation*, and even after it, if you will be certain thereof. Which, he saith, may plainly appear even by the *Operation* of the *Tartar* alone; for as much as all *Tartar* is not equally good, and himself hath met with great Diversity of the same: Besides which, great Care is to be had of the *Fermentation* itself of the *Tartar*; for if it be not duly made, the *Tartar* will not be resolved *per minima*; nor will the Grapes be represented in that natural Shape they ought to be; nor will all the *Salt* (which is the main thing) be *volatilized*. Further, if perhaps the *Fire* be excessive, during the *Distillation*, much of the *volatile Salt* will be burnt up, and it will yield a strong smelling *Spirit*.

Having dispatched this, the Author subjoins an Account he met with among his Papers, of another Way of *Operation* of *grinding* of *Gold*; which, though he hath not yet tried, yet it seeming to him very likely to succeed, he scruples not to communicate also. The Instruments to be used therein, he describes thus:

Fig. 83.

a, A *Mortar* of very fine *Steel*.

b, A *Body* serving for a *Pestle*, of the same *Metal*, which is to fit the *Mortar*; as it is delineated in the *Figure*.

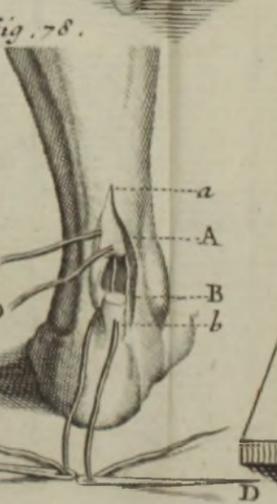
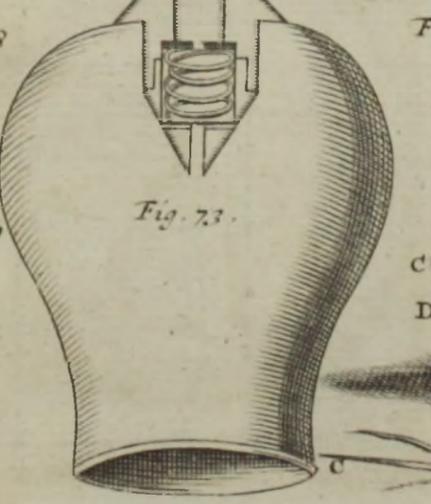
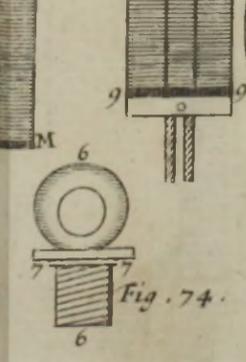
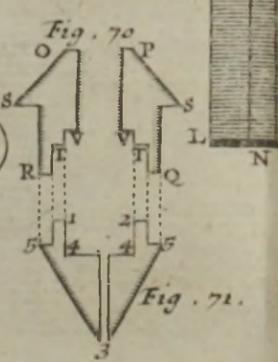
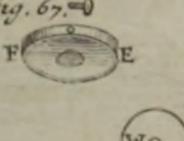
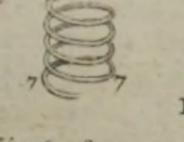
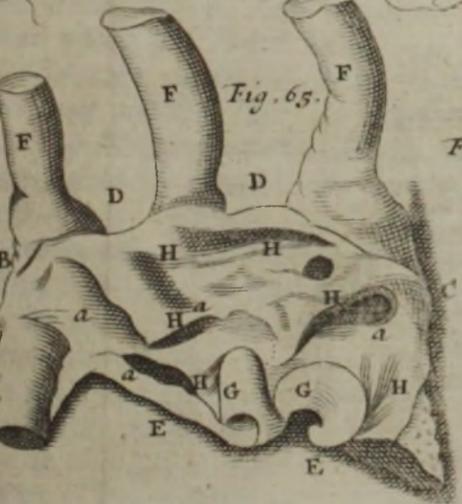
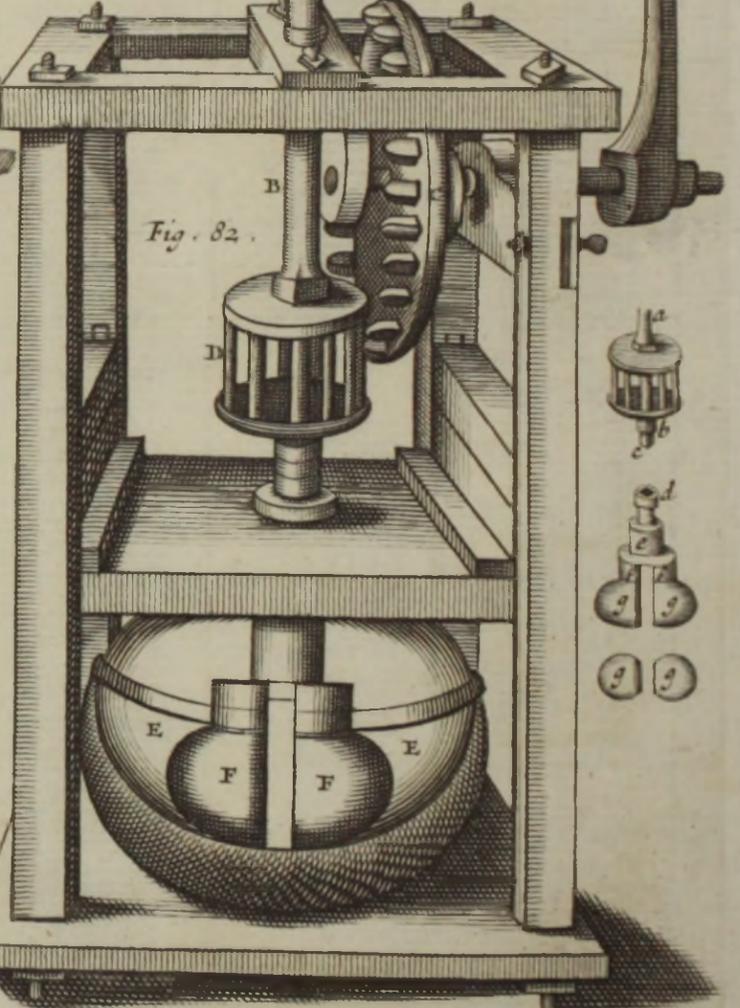
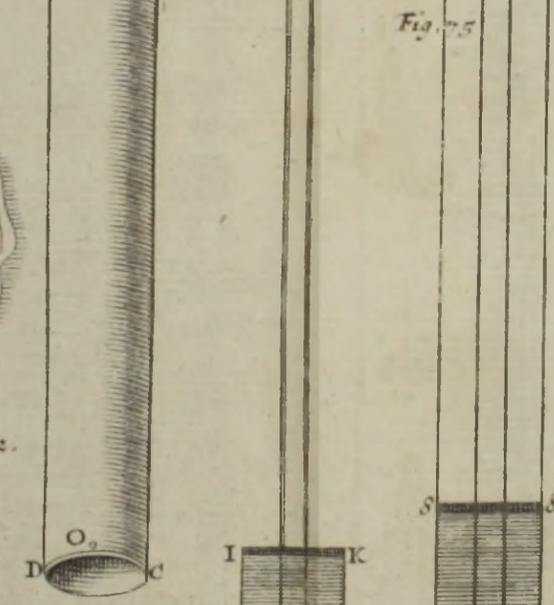
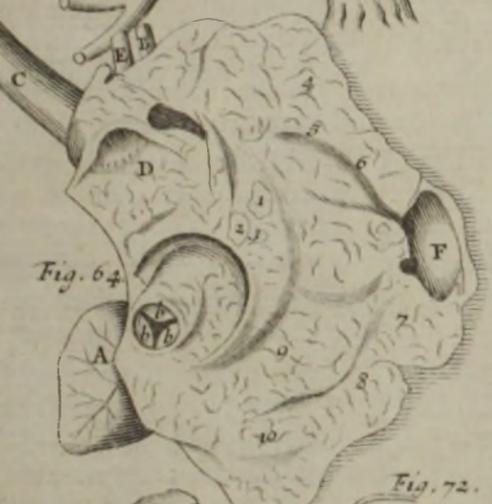
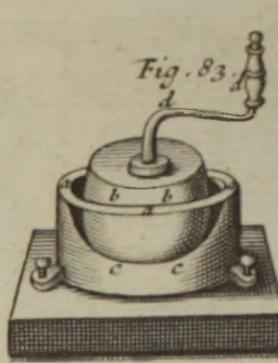
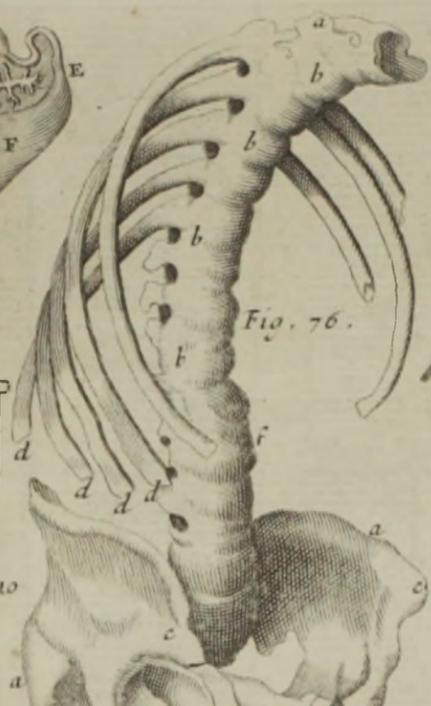
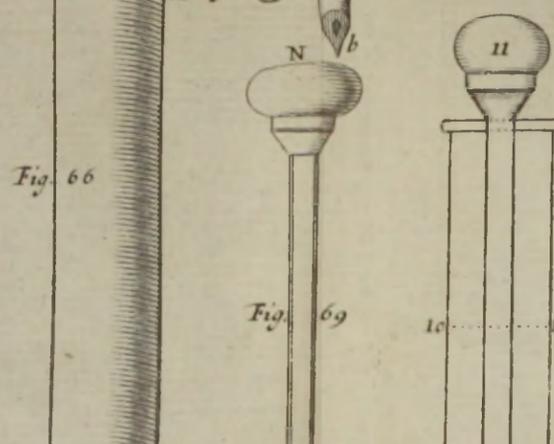
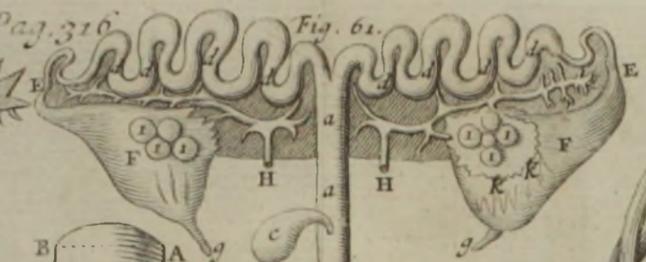
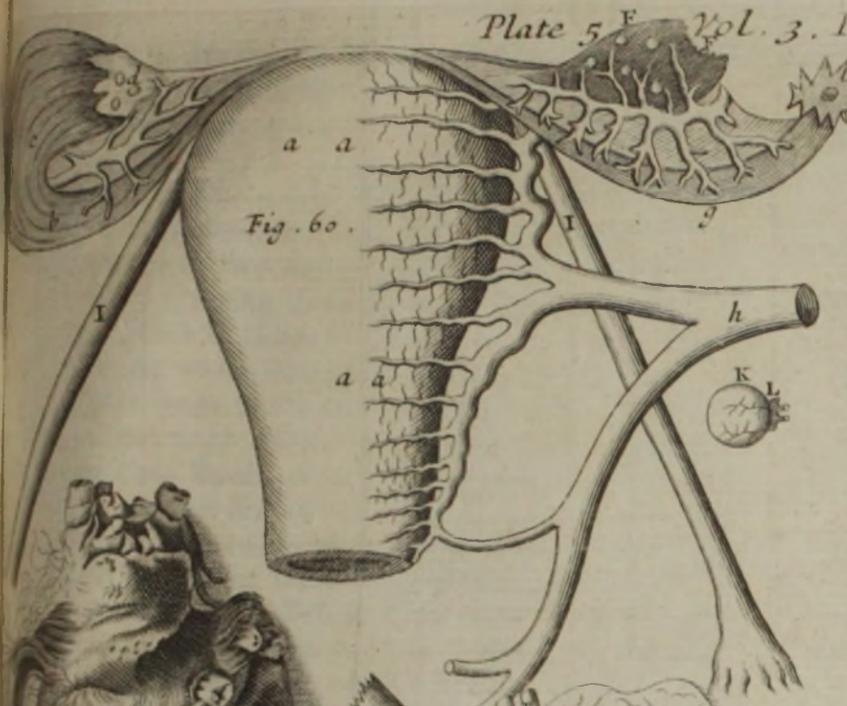
c, Is a small Space, where is interposed a *golden Plate* half a *Ducat* thick.

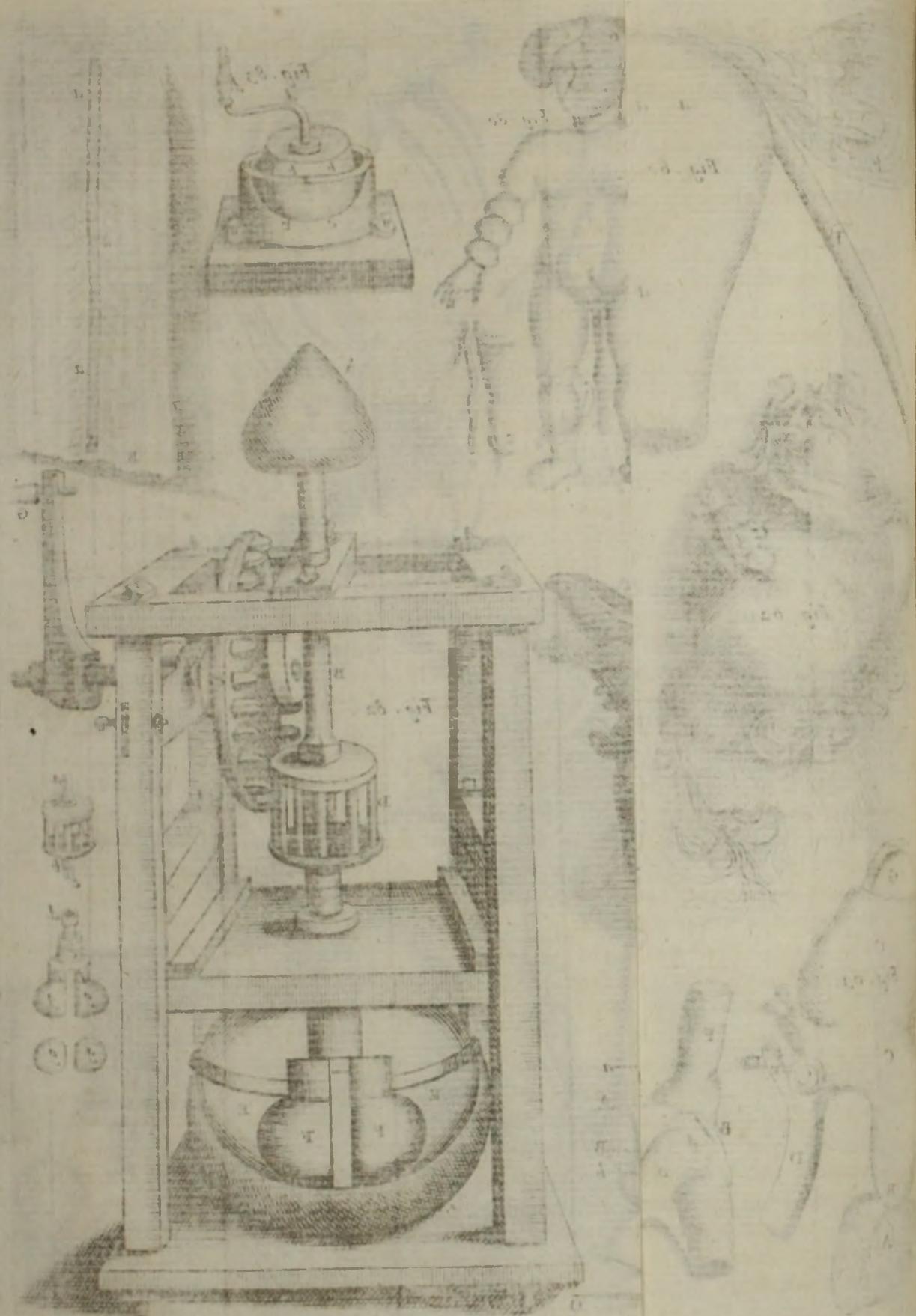
d, The *Handle*, by which the *Pestle* is to be managed in the Work of *Grinding*, which is to be continued for 3 *Weeks*; at the End of which the *Gold* will be resolved into a *potable Liquor*.

This Way, as it is much simpler, so it is by the Author esteemed much more expedient than the former, by reason of the *sulphury saline* Quality of *Iron*, which by *grinding* being opened and highly subtilized, acts the more powerfully upon the most solid Body of *Gold*, and attracts withal the *Salt* that is in the *Air* in greater Plenty than can be done in a *Glass* or *Golden Mortar*. And if it be objected, that by that long continued *Grinding* the steely Particles are worn off, and commixed with those of the *Gold*, the Author would have it considered, how great a *Cognition* there is between those *Sulphurs*, and also how great is the Use of *Digestion*, separating the Pure from the Impure, and withal exciting that occult *Fire* of *Mars*, well known to the true Searchers of Nature; which being assisted by the *Alcohol* of *Wine*, is able to *concoct* the little *immature* Portion to a due *Maturity*.

The Volatili-
zation of Salt
of Tartar elu-
cidated; by
Dr. Dav. von
der Becke.
p. 92. p. 5185.

V. This Author having (as he affirms, and as will appear by the Sequel) formerly taken Pains in the *Fermentation* of *Tartar* for the *volatilizing* the *fixed Salt* thereof, he endeavours here to declare his Thoughts about the Causes of his undertaking that Labour, and of the Manner how that *Volatilization* is performed. In the doing of which he labours to shew, *First*, The Causes of the *Fixation* of the *Salt* of *Tartar*; *Secondly*, The Reasons of the *Volatilization*; and *lastly*, what Degree of *Volatility* the *Salt* of *Tartar* hath acquired in that *Fermentation* made with its own *Ferment*.





As to the *first*, he begins with blaming those that divide *Salts* into *Fixed* and *Volatile*, forasmuch as, in his Opinion, that Division is unknown to Nature, there being not to be formally found in any Body before *Calcination* any *fixed Salt*, such as the *alcalizate Salt* of *Tartar* and other *fixed Salts* are produced by *Calcination*. He therefore informs us, that *Salts* that are *volatile* before *Incineration*, are by the Action of the *Fire*, as the Efficient, so colligated among themselves and with the Earthy Particles, as to be *fixed* thereby. For the clearing of which he presupposeth, with some others, that there are two Kinds of *Salts*, an *Alcali* and an *Acid*, as the genuine Instruments of Nature, by which the several Kinds and Seeds of things are put forth, and which every where are employed in the *Germination* of *Plants*, and the first *Conceptions* of *Animals*, and in all the *Beginnings* of *Fermentations*. These two *Salts* he affirms to be both *volatile*, and therefore easily resolvable by the supervening *Salt* of the *Air*: Since it appears, that all *Vegetables*, especially *Aromaticks*, if they be any considerable Time exposed to the *Air*, lose their *Salts*; and that Wood in particular, by the Action of the *Air*, consuming the *volatile Salt*, doth in Time quite moulder away. Whilst therefore these *Salts* are loosened and set at Liberty by the *Fire* (for else they would not act) they began to operate on one another; the *volatile Acid*, whilst it works upon the *volatile Alcali*, fixeth it, and they are colligated together. Which Operation of Nature being well observed, it will be manifest that that received Axiom, *Things volatile are fixed by those that are fixed, and Things fixed rendered volatile by those that are volatile*, is false. Now that *volatile Salts* are consumed by the *Air*, and *colligated* by *Fire*, is so notorious, that common People are wont to sink in Water such Timber as they would preserve from *Putrefaction*, thereby to keep it from *Air*, and to harden it to a great Degree for strong Supports of Buildings. Hence also they slightly burn the Ends of Timber to be set in the Ground, that so by the *Fusion* made by *Fire* the *volatile Salts*, which by the Accession of the Moisture of the Earth would easily be consumed to the Corruption of the Timber, may catch and *fix* one another. For which Reason also, namely, the *Fusion* of the same *volatile Salts*, Ship-wrights are wont to burn the lowermost Part of Ships that lies under Water. And to use a very common Instance, *Soot*; it is known, that whilst the Wood is burning, the *Smoak* ascends, wherein the two *volatile Salts* are contained, that *coagulate* one another into *Soot*, which two *Salts* may thence easily be separated and made visible, and these *volatile Salts* constituting the *Smoak* and the *Soot*, rise so long until the Wood be quite reduced to *Ashes*, in which the remaining *volatile Salts* are *colligated* to a *fixed Salt*, easily to be washed out by Water. These two *volatile Salts* therefore afford the Matter, of which the *fixed Salt* is made by Means of the *Fire*: Whence it is evident, that we must (as really we do) obtain so much the more *fixed Salt*, the more *volatile Salt* there was before *Incineration* in the mixed Body; as also why out of *Herbs* freshly burnt to *Ashes*, we get a greater Quantity of *fixed Salt*, than when they have been dried up; because the *Air* by its Operation (which is somewhat advanced by the Moisture in the Plant itself) dissolving the *Salts*, hath robbed them of the greatest Part of their *volatile Salts*. Upon which same Account, Wood, decayed

decayed and mouldered away, contains almost no *fixed Salt*, as it hath also lost almost all its Weight.

Having thus shewed, that before *Incineration* there is found in mixed Bodies no *fixed alcalizate Salt* at all, and how the *volatile Salts*, by *Calcination*, are brought to *Fusion* and so *fixed*; the Author, further to make out the *Fixation* of such *volatile Salts*, takes Notice of the Mixture of *earthy Parts* in such Bodies, some of which, when those two *volatile Salts*, thus opened by the *Fire*, act on one another, are *coagulated* with them. Which he conceives to be the Cause, when the said two *Salts* being concreted in the *Kidneys*, they by their *Asperity* wound the sanguineous Vessels (whence the *nephritick Pain*) and so *coagulate* together with them the extravasated Blood, which makes the *Stone* of the *Kidneys reddish*; as the *Stone* of the *Bladder* is *whitish* from the mucous Substance of the *Bladder*, therefore given it by Nature, lest the sharp *Urine*, by working upon its Membranes, should cause Pain, being *coagulated* together. And so he observes that the *Stones* concreted in the *Bladder* of *Gall*, taste bitter by reason of the *Gall* that is *coagulated*.

This *Earth* then, when by the *Fire* it is intimately united with the *Salts*, and has been in a manner *vitriified* with them, keeps them so close together, that they can no more rise and fly away than Birds fastened to a Rock; those *Salts* being rendered so *fixed*, that by a gentle *Fire* they are not so much as at all moved; by a strong one brought to *Fusion*, and united with a considerable Quantity of *Earthy Particles*, by an extream Degree of Heat *vitriified*. So if you mix *fixed Salt* of *Tartar* with *Cinnabar* of *Antimony*, or with *Quick-silver*, all the *Quick-silver*, though a very ponderous Body, will pass into the *Retort*, but the *Salt* of *Tartar*, by reason of its *Earth*, remain at the Bottom of the Vessel. Whence he esteems it evident, that the *fixed Alcalies*, especially that of *Tartar*, cannot by reason of the *Colliquation* of the *earthy Parts*, penetrate into Bodies to be dissolved, nor consequently remove the inmost Seeds of Diseases.

Vid. sup. Sect.
4.

Now, in the *second Place*, though the *Volatilizing* such *fixed Salts*, and particularly that of *Tartar*, hath hitherto been found a very difficult Work, yet doth our Author conceive it would be very easy, if we took but Nature for our Guide, and but separated from *Salt* of *Tartar* the *fixing Earth*, that has been proved to be mixed with it; for the doing of which he refers to the Prescript of Dr. *Langelot*, requiring that the *fixed Salt* of *Tartar* be mixed with its genuine *Ferment*, viz. *Crude Tartar*, or (if in the *Fermentation* you have a Mind to see the *Grape* like *Bubbles*) *Cream* of *Tartar*, and so exposed to *Fermentation*. In which Commixture of *Ferment* he would have this especially observed, that it be mixed to the very Degree of *Saturation*, and until the *fermenting* Agitation and the Motion of the *saline Particles* do cease, as a Sign that there is not any Particle of the *fixed Salt* of *Tartar* left unconjoined with the *acid Particles* of the *crude Tartar* or its *Cream*, nor any *acid Part* of the *crude Tartar* not saturated by the *fixed Salt*. Which being observed, the *Distillation* will, the Action of the *saline Particles* being thus stopped, the more securely be done. Mean time, that only the *acid Particles*

ticles of the *crude Tartar* are laid hold on by the *fixed Salt*, and not the *alcalizate*, he promises a Proof of hereafter.

But since the main Question is about the *new Volatilization* of the *fixed Salts*, the Author is altogether perswaded, that in his *Fermentation* of *Tartar*, it is not chiefly the very *fixed Alkali* of *Tartar* that is again *volatilized*, but rather the added *Ferment*, which is the *crude Tartar*. For in his *crude Tartar*, though there be no *fixed Salt* in it (which he hath asserted generally of all Mixtures) yet the *volatile alcalizate* Particles of the *Tartar* are detained by the *volatile Acids* of the same, commixed with it to the very Degree of Saturation: Whence they are *fixed*, forasmuch as these two when conjoined do fix one another, when separated, become again *volatile*. Which Manner of *Fixation* he calls *natural*, being shewed us by Nature; as that which is made by the *Colliquation* of the *Earth* by *Fire*, *artificial*, because only performed by Art; upon the Account of which, *volatile Salts* are detained no otherwise, than Birds tied to a Rock are restrained from flying away.

Now, though indeed the *fixed Alkali* of *Tartar* is in this *Fermentation* freed from that *Earth*, to which, by the *Fusion* of the *Fire*, it was intimately united; yet, notwithstanding this, it is *fixed* again, saith he, by the *Acid* of the *tartareous Ferment*. For the clearer Proof of which, he makes use of the *urinous Spirit* of *Sal Armoniac*, in which there are two *volatile Salts*, an *Urinous* and *Acid*. These two *Salts*, saith he, though they be *volatile* when separate, yet when united they detain one another, emulating, as it were, the Nature of *fixed* ones, since they are neither dissolved in the Air, nor emit any Odour, as true *Volatiles* are wont to do. Now to obtain out of this *Salt* the *urinous, volatile Spirit*, there is requisite a Separation of these 2 *Salts*; for this Bond being dissolved, the *Urinous* immediately riseth. To obtain which, Water is poured upon the *Sal Armoniac* (because *Salts* act not but when dissolved) and then there is added a *fixed Sal Alkali*, which whilst it is joined with the *acid* Portion of the *Sal Armoniac* (for the more *fixed Acid* is sooner united with the *fixed Alkali*, than with the *volatile*) the *volatile urinous* Part quickly deserts its fellow *Acid*, and being conjoined with the Water, yields a most *volatile* and piercing *Spirit*, which, though the *Sal Armoniac* before the Commixture of the *fixed Sal* was quite inodorous, yet now after the Addition thereof, strikes the Nose most violently, and that even when put from the *Fire*; insomuch that if you do not, after the mixing of the *fixed Salt*, very accurately close your Vessel, you will afterwards find no *Spirit* at all. Wherefore, as in this Example of *Sal Armoniac*, the *fixed Salt* added, freeth the *alcalizate* Portion of the *Salts*; so in this *Fermentation* of *Tartar*, the *Tartar calcined to Blackness*, or the *fixed Salt* of *Tartar*, freeth the *alcalizate* Part of the *crude Tartar* from the *acid* Parts. For, saith he, in the *Crude Tartar*, or its putrified *Cream*, there are, as in *Sal Armoniac*, two *volatile Salts*, an *Alkali*, and an *Acid*, from the *Colliquation* of which (as hath been said) the *fixed Salt* results; since it is notorious, that in the *Fermentation* of *Wine* the *acid* Particles do *coagulate* the superabound-

ing *alcalizate* with the *terrestrial* ones, to the very Degree of Saturation and so by their increased Weight take Place in the lower Part of the Vessels.

If therefore to this *Tartar* pregnant with *Salts*, *crude* or *depurated* by a Solution in Water, you add a *calcined Tartar*, or, which is the same, *Salt* of *Tartar* itself, immediately this *fixed Salt* will lay hold on the *acid* Portion of the *crude Tartar*, and, as in the *Sal Armoniac*, so here, free the *volatile Alcalizate*; from which Conflict and Action of the *Salts* on one another, *Grape-like Bubbles* will arise. And this Injection of *calcined Tartar* must be continued, until all *Fermentation* do cease; that is, to the very Degree of Saturation: Which, unless it be well observed, many Inconveniencies will obstruct the Operator. But this *volatile Alkali* being, by means of the *calcined Tartar*, freed from its *Acid* (like the *Urinous* of the *Sal Armoniac*) will presently fly away. Wherefore, if this *volatile Spirit* could forthwith be received, it would afford a real *volatile Salt* of *Tartar*, especially if by Art it were freed from its *Phlegm* (which makes it a *fluid Spirit*) and without the Addition of any extraneous Thing, *coagulated* into *Salt*. But this cannot be, saith he, seeing that, before all the *Fermentation* and Motion of the *saline* Particles shall have ceased, this *Mixture* cannot be put into the *Cucurbite*, because it would break the Vessel; nor can the *fixed Salt* be added to the dissolved *crude Tartar* all at once, but at several times, because else all the *fermented* Part would quickly get out at the Edges of the *Cucurbite*. Now then, since every time there is, by the Addition of *fixed Salt*, so much of the *volatile Acid* freed out of the *crude Tartar* as much as there is added of *fixed Salt*, and that presently flies away, it certainly follows, that, if by Injections several times repeated you come at last to the Point of Saturation, there will remain no *volatile alcalizate Salt* at all of the *crude Tartar*.

Since therefore there is no Hopes of obtaining the *volatile Salt* from *crude Tartar* this Way, we must endeavour to get it by an Addition of *Tartar calcined*, or *fixed Salt*; and how this is to be done, hath been already intimated, *viz.* by the Separation of the *earthy* Parts. For as the *volatile alcalizate* Particles, upon a very vehement *Colliquation* of the *Fire*, are, by an intimate Union with the *earthy* Parts, kept from ascending; so also, when freed from these *terrestrial* Fetters, they are restored to their former Freedom and *Volatility*. And this Separation of the *Earth* we obtain by this *Fermentation* of the *Tartar*; for, in the same Moment that the *acid* Portion of the *crude Tartar* is conjoined with the *Tartar's fixed Salt*, to set the *volatile Alkali* of the *crude Tartar* at Liberty, there is also made a *Precipitation* of that insipid *Earth*, which by the extream Degree of *Fire* was united with the *Salt* of *Tartar*, and had *fixed* it before.

But to expose this *fixing Earth* to the View of all, I shall alledge the Example of *vitriolate Tartar*, known to the very Apprentices of *Apothecaries*. In this Operation, whilst the *Spirit* of *Vitriol* is affused to the dissolved *Salt* of *Tartar*, or its *Oil* made *per deliquium*, you may observe a very great *Effervescence*,

vescence, during which and the Action of the *Acid* of the *Vitriol* upon the *Alkali* of the *Tartar*, there is *precipitated* an *Earth* (for the Separation of which, Care is to be had of the Degree of *Saturation* between the *Spirit* of *Vitriol* and the *Salt* of *Tartar*) which afterwards may be severed by *Filtration*. Now that this *Earth* is *precipitated*, not out of the *Spirit* of *Vitriol*, but rather the *Salt* of *Tartar*, none versed in these things can be ignorant of. This *precipitated Earth* some call the *Magistry* of *vitriolate Tartar*, and very imper-
tinently prefer it often in their Prescriptions to the true *vitriolate Tartar* it-
self. This *Earth* indeed hath a *saline Taste*; but these *Salts*, as is usual in all
Precipitations, did not only adhere to the Matter *precipitated*, and may, by
a repeated Ablution, be easily separated; which done, there remains nothing
but an utterly *insipid Earth*, which can have no other Virtue but that of
Exsiccation. Wherefore after the self-same manner, whilst the *acid Part* of
the *crude Tartar* is united with the *alcalizate* of the *Salt* of *Tartar*, the
Earth also of the *fixed Salt* of *Tartar* in the said *Fermentation* will be *preci-
pitated*.

The greatest Difficulty being thus dispatched, our Author proceeds, in
the Third Place, to a lesser yet remaining, which is; That the *acid Part*, by
means of which, the *Earth* was *precipitated*, detains the *volatile alcalizate Part*,
and *fixeth* it anew; so that his *volatile Salt* of *Tartar* hath hitherto acquired
no greater Degree of *Volatility*, than *crude Sal Armoniac*, or the *Flowers*
thereof are known to have. For these, though they are made up of *vola-
tile Parts*, yet they diffuse no *Odour* before the Separation of the *volatile*
Parts: They also endure the *Air*, which no *volatile Salt*, truly such, will
do: Wherefore they cannot yet be reckoned among *Volatiles*, strictly so
called.

Now then, to give this *volatile Alkali* of *Tartar* the last and highest De-
gree of *Volatilization*, the Author esteems it necessary that there should be
made a new Addition of *fixed Salt* of *Tartar*, which in the same manner as
before it had freed the *alcalizate Part* of *crude Tartar* from its *acid*, must
here also take from the manifest *Acid* of *crude Tartar* the *alcalizate Part* of
the *fixed Salt* of *Tartar*, already freed from *Earth*; whereby this *alcalizate*
Part of the *Salt* of *Tartar*, truly *volatilized*, being joined to the *Water*
(which was before added for the free Action of the *Salts*) will constitute a
most *volatile Spirit*, which, he saith, is *coagulable*, without Addition, into
volatile Crystals, having the perfect Taste of *Tartar*.

VI. P. Fr. Lana, having extracted out of a *metallick Substance* a very white *Salt*, the same was, upon the Application of the gentlest Heat, resolved into a *golden coloured Liquor*; which being removed from that Warmth, as soon as it felt the cool Air, and even by opening the Glass wherein it was inclosed, did in a Moment shoot afresh into the same *Salt*; and that (which seemed oddest) whilst he was pouring it out of one Glass into another, during its Fluidity, it was dispersed all over the Glass it was poured into, suddenly *congealing* into most fine Threads, many of which were extended from one Side

An odd Salt
extracted out
of a metallick
Substance;
by P. Fr. Lana.
n. 79. p. 3060.

Side of the Glas to the other, and hanging as it were in the Air, formed just like the subtilest Cob-webs, not at all rigid, but by reason of their exquisite Subtilty pliable, and scarce perceivable by the Eye.

Volatile Salt
and Spirit ex-
tracted out of
all Sorts of
Plants; by Dr.
Dan. Cox.
n. 100. p. 7002.
n. 101. p. 4.

VII. Take in warm Weather a considerable Quantity of the *Leaves* of any *Vegetable*, stripped or pulled from the greater *Stalks*, lay it on a *Heap*, pressing it pretty close together; they will soon become very hot, especially in the *Middle*, and after a few *Days* resolve into a pappy Substance (excepting the outward *Leaves*) which being made into *Pellets*, and put into a *Glass Retort*, and *distilled*, will yield, besides a great Quantity of *Liquor*, much thick black *Oil*, of a balsamick Consistence. The *Liquor* being separated from the *Oil*, and *distilled* in a tall *Glass-body*, a *volatile Spirit sublimes*, which, after one, two, or three *Rectifications*, becomes perfectly *urinous*, not to be distinguished, by *Smell* or *Taste*, from *well-rectified Spirit of Harts-horn*, *Blood*, *Urine*, or *Sal Armoniac*.

I never made *Trial* of any *Herb*, which thus ordered, did not yield the mentioned *Substances*; although I have examined many by this *Method* of *Procedure*, which seemed very different from each other, as well in sensible *Qualities* as those vulgarly called *occult*; such as *Rue*, *Sage*, both *Celandines*, *Carduus benedictus*, *Tobacco*, *stinking Orach*, *Garden Scurvy-grass*, the *lesser Spurge*, *Baum*, *Mint*, *Tansy*, *Camomil*, *Monk's Rhubarb*, several *Docks*, and even common *Grass*, with many others, which it were altogether unnecessary to enumerate; besides *Flowers* of *Elder*, *Pæony*, *Cowslips*, *Clove-gilliflowers*, &c. with several *Sorts* of *Mosses* and *Rudiments* of *Vegetation*; which last is a green Substance on the *Surface* of the *Earth*, in *Rivers*, *Cisterns*, where *Rain* often falls, and on *Ships* between *Wind* and *Water*, very apt to run into *Moss* and *Fibres*.

Note, 1. The *Vessels* wherein these *Distillations* were performed, though exceedingly well washed with *Water*, scoured with common *Salt*, *Sand*, *Ashes*, *Soap*, *fixed Salts*, &c. and afterwards exposed many *Years* unto the *Air*, *Wind*, *Rain*, *Dews* and *Frosts*, yet nevertheless retained a very strong *Smell*, not unlike that of *Musk*.

2. The *Water* left at the *Bottom* of the *Glass*, after the first *Rectification*, was somewhat *acetous*; especially when the *Herbs* were not sufficiently *fermented*.

3. If the *Herbs* are duly *fermented*, they leave little *Caput Mortuum*; sometimes not a 20th, and never, by my *Trials*, above a 10th *Part*; whereas *distilled* before *Fermentation*, they leave much more: And this remaining *Coal*, burnt to *Ashes*, yields scarce any *Alkali* or *fixed Salt*.

4. The *volatile Salt* is much more than the *fixed Salt* would have been, afforded by the *Herb* *incinerated* the ordinary *Way*.

5. All those *Herbs* which yield *Store* of *fixed Salt*, such as *Wormwood*, *Carduus*, *Mugwort*, *Sage*, &c. do likewise, being thus managed, afford plentifully a *volatile Salt*.

6. These *volatile Salts* being highly *rectified*, did not, that I could perceive, differ from each other; as neither do *vinous Spirits* of *fermented Vegetables*, or their *fixed Salts*, highly purified and rectified.

7. During

7. During the *Fermentation*, the Room would be strongly perfumed at the Beginning with the *natural Scent* of the *Herb*, if it had any eminently peculiar *Smell*; in the Middle, with the *Scent* of a *mixed*, between that and the *urinous*: But being well putrified, became sensibly *urinous*.

8. The *distilled Liquor* of some *Herbs*, at the first *Rectification*, yieldeth a *Spirit* very hot; but the last inclined rather to that of pungent *vinous Spirits* of *Scurvy-grass*, *Horse-radish*, &c. being, if I may so speak, *piperaceous*, and biting, rather than like *volatile Salts*; but after *repeated Rectifications*, one, two, or more, according to the Nature of the Plant, or Time it had *fermented*, became perfectly *urinous*. This was usually, when the *Herbs* had not duly *fermented*; which proceeded, in my Apprehension, from some Commixture of *essential Oil*, which by reiterated *Rectifications* is either separated or transmuted. The same happens in the *vinous Spirits* of *fermented Vegetables*, and in their *fixed Salts*.

9. In the *Distillation* of the *putrified Herbs*, the *urinous Spirits* and *Salt* came chiefly at the latter End with the *Oil*, in the Form of a thick white Cloud or Fumes, and condensing in the *Recipient*, formed an innumerable Company of very irregular crooked Rivulets, exactly after the manner of *Hair-born*, *Blood*, &c. and at the Beginning came the *Pblegm*, with most of the *Acetum* in great Drops, with little Fume, and the Rivulets straight, and without *Striae* and Wandrings.

10. Some *Herbs*, as *Winter-Savory*, *Sage*, &c. in the *first Distillation* yielded copiously a *volatile Salt* in a dry Form, which did coat the *Receiver*, and *sublimed* into the Neck of the *Retort*: So doth *Tobacco*; and once *Saffron* did so, in *Digestion* with *Spirit of Wine*.

11. All *Plants*, thus *fermented*, yielded plentifully (especially toward the latter End of the *Distillation*) a *fætid* gross *Oil*, which, if the *Herb* was well *putrified*, did not in the least resemble the Plant which produced it: I could hardly perceive, that they *differed* from each other in either *Taste* or *Smell*; only, if the Plant was not thoroughly *fermented*, an *Oil* would come over at the Beginning of the *Distillation*, which, as also the *Water*, would retain exactly the *Taste* and *Smell* of the *Vegetable* which afforded it; and it would be fluid and transparent, like other *essential Oils*. The *Oil* of *Herbs* very well *putrified* came over chiefly at last, and did require a very strong *Fire* to extricate it out of the *Herb*; was mostly, especially that which comes last of all, of the Colour and Consistence of *Tar*, very tenacious, and did far and wide emit a very odd, faint, *fætid*, offensive, *Odour*: If any thing became infected by this *Oil*, it was not to be freed from it in a long Time.

12. *Herbs*, which *distilled* in an *Alembic* with *Water* yield little *essential Oil*, as *Baum*, *Mint*, *Camomile*, &c. afford much of it thus *fermented*: And those that give much *essential Oil*, as *Wormwood*, with many others, being *putrified*, yield abundantly more.

13. During

13. During *Putrifaction*, the *Herbs* became exceedingly *hot*, especially those that were closely compressed and had Store of Moisture in them; so that I could as well detain my Hand in the Flame of an ordinary Fire, as in the Midst of them.

14. Fatty, moist, and insipid *Herbs* ferment much sooner, and with greater Heat, as *Grass*, *Docks*, *Garden Scurvy-grass*, *Celandine*, &c. Drier and much more sapid Plants more leisurely, and with less Heat, as *Winter-Javory*, *Rosemary*, *Sage*, *Rue*, *Mint*. The *Stalks* of no *Herbs* ferment so soon as the *Leaves* freed from them. This is most evident in *Docks*, whose tender Parts are pappy and mucilaginous, when the *Stalks* are entire.

15. *Herbs* seem, by this *Putrifaction*, to be deprived of their *specific* or peculiar Properties: *Celandine* loses its *tinging* Quality, *Spurge*, its *Milk*, *vesicating* and *poisonous* Nature, &c.

16. *Herbs*, which before *Putrifaction* were extremely *fœtid*, as *Atriplex Olida*, &c. became afterwards either *inodorous* or not ill-scented: And, on the contrary, *Monk's Rhubarb*, *Garden Scurvy-grass*, with many other *inodorous* Vegetables, during *Putrifaction* became abominably, and almost insupportably *fœtid*, like the worst of Excrements; all which yet they lost immediately upon *Distillation*.

17. None of these *Flowers* I have hitherto used, do *stink* in *Fermentation*.

18. Many of the *Herbs*, thus *putrified* or *fermented*, swarm with *Maggots* (an Argument of the close and stedfast Contexture of the seminal Principles in *Insects*) especially at the Bottom, and in the Middle, whither *Flies* and other *Insects* can have no Access to deposite their *Eggs*, and where the Heat is so violent, that they could not possibly subsist.

19. Yet the *volatile Spirit* and *Salt* is not afforded by these *Insects*: For, having *distilled* separately a great Quantity of them, they yielded no *volatile Salt* or *Spirit*, but a *Liquor* of a very different Nature.

20. *Herbs* fermented in a great *Glass* with a narrow *Neck*, the Mouth left open, in a few Weeks became, for the greater Part, a *Mucilage*, and *distilled* a Year after they had stood so open, yielded a little *urinous Spirit*, but not a Drop of *Oil*.

21. *Vegetables*, if the external Air be excluded from them, will not *putrify* or *ferment*.

22. Some *Herbs*, *Mosses*, and *Rudiments* of *Vegetation*, yield a *volatile Salt*, *distilled* without previous *Fermentation*; as do also many *Seeds*, and several of them sufficiently *insipid*.

23. These *volatile Spirits* and *Salts* have not only the same sensible Properties, but also agree in all known Effects and Operations with common *urinous Spirits* and *Salts*; as, in the changing of *Syrup* of *Violets*, and many other *vegetable Tinctures* green; in being *diaphoretick*, *diuretick*, and *deobstruent*: Contrary to *Acids*, which they do *mortify*, *precipitate* all *Metals* and *Minerals* dissolved in *acid Menstruums*; being highly *rectified*, and mixed

mixed with perfectly *deplegmed Spirit of Wine*, strike the *Offa alba*, as Chymists speak: They unite with *Acids*, and thereby become *Armoniac*, or *neutral Salts*; and indeed perform whatsoever can be expected or desired from the common *urinous Spirits of Salts*.

VIII. 1. The *alcalizate* or *fixed Salts of Plants*, extracted out of their Ashes after *Incineration*, or out of *Tartar calcined*, do, in my Apprehension, neither *præ-exist* in the *Vegetables* that afforded them, before they were exposed to the *Action of the Fire*; nor do they differ considerably (I am certain, not *sensibly*) from each other.

The former Part of this Position may be thus made out.

1. I never yet found that any *vegetable* (or indeed *animal* or *mineral*) Substance did in the least measure manifest to the Taste, or by its Effects, that it contained any such *Salt*. Many *Plants* and *Roots*, lightly bruised, affect the Eyes and Nose after the manner of *volatile Salts*, and several do bite the Tongue, and strike upon the Palate. Some *Herbs* yield a copious *volatile Salt* immediately after they are pressed, by a considerable Degree of *Heat*, and many Sorts of *Earths* do abound therewith; so that it is highly probable they do often actually exist in *Vegetables*, in the very same Form wherein they appear to us upon *Distillation* from the *Herbs* themselves, or from *Soot*: And that *acid Salts* do really exist in many *Plants*, is displayed by their Tastes and Effects. They may be also obtained without *Fire*, or any artificial *Analysis*, as is evident in *Tartar*, and the reputed *essential Salts* of many *Plants*, in *Verjuice*, *Vinegar*, and *Verdegrease*, whose *Acidities* may be concentrated and made to appear in a dry Form. Now did *Alcalies* exist in the *Plants* before the *Analysis*, especially so copiously as they sometimes appear afterwards, certainly they would betray themselves by some visible sensible Property, or other Symptom of their Presence.

2. Did *Alcalies* pre-exist in *Plants*, probably *Animals*, whose sole Food they are, would also abound therewith; whereas, on the contrary, we do not find the least Foot-steps thereof, either in *Blood*, *Urine*, *Bones*, *Horns*, &c. which do all abound with *volatile Salts*; nor in some other Parts, Excrements and Juices, that afford Store of *Acidity*, which may frequently, by *Coagulation* be brought to a *saline* Form or Consistence. Nor can it reasonably be pretended, that the *Ferment* of the Stomach and other Parts, several Digestions and repeated Circulations, have altered its Property, and at length rendered it *volatile*; for, first, *Alcalies* seem to be of a very *fixed* Nature, and are not easily *volatilized*: And daily Experience will evince, that the Chyle doth not in the least participate, either in Taste or any other Property, with *alcalizate Salts*. Besides, *Herbs* taken out of the *Omasus* of *ruminating* Animals, without any further Digestion or Preparation, yield a *volatile Salt*, as when *fermented* or putrified in the open Air, without Additament.

3. Most *Vegetables*, whether Woods or Herbs, if burnt whilst they are green, and with a smothering Fire, yield *Salts* which are far enough from

No alcalizate Salt in any Subject before the Action of Fire upon it; by Dr. Dan. Cox. n. 107.

p. 150.

alcalizate,

alcalizate, being either *neutral* or *acid*, or, to speak more properly, *tartareous*; for they do almost exactly resemble putrified *Tartar*, and *distilled*, yield the very same Substances. Indeed, some few Herbs, such as *Satureja*, *Rosemary*, &c. which abound with sprightly *volatile Oil*, if they are well dried, upon simple *Incineration* yield an *alcalizate Salt*; so do some dry Woods. But that they are produced by the *Fire*, and not separated, I shall anon prove from Experiments, I think unquestionable and unanswerable.

4. In the most natural Method of *analysing Plants*, which is by *Fermentation* or *Putrefaction*, without Additaments, or the intervening of a suspicious *Analyser*, we receive *Oil*, *acid Spirit*, and *volatile Salt* copiously; all which did evidently pre-exist. But if the Herbs are perfectly or intirely *putrified*, little or no *Alkali* can be extracted from them; as neither from rotten or *putrified Wood*; the active *Salts*, by whose *Combination* the *Alkali* is produced, being either expired or evaporated.

Next, I am to enquire, how the *Fire* produces this *Alkali*; whether by the *changing* of one single pre-existing Principle; or by enabling any among them to make so notable an Alteration upon, or in the other? Or, lastly, whether it is effected by the Union of two, or more active Principles, which thereby become different from what they were before the said *Combination*?

I shall not at present trouble you with the Reasons, Experiments, and Observations, which have induced me to reject the former, but briefly suggest those which encourage and dispose me to believe and assent to the latter: So that this is my Position; That *Alkali Salts* do result from the *Combination* or *Union* of the *saline* and *sulphurous Principle*. But whether it is the *volatile* or *acid Salt* which *combines* with the *Oil* or *Sulphur*, is now the Subject of our Enquiry. The ensuing Considerations seem to determine in Favour of the *Acids*.

First, *Tartar*, which is sensibly *acid*, and from which a *volatile Salt* cannot be separated by any commonly known Method, by bare *Calcination* becomes a strong and perfect *Alkali*. *Secondly*, *Nitre*, an undoubted *Acid*, with a small Proportion of *mineral* or *vegetable Sulphur*, is converted into a genuine fiery *Alkali*. *Thirdly*, *Nitre*, which is made by the Affusion of an *acid Spirit* upon an *Alkali*, may be almost totally distilled into an *acid Spirit*, there appearing not the least Footsteps of a *volatile Salt*, and scarce any of the *Alkali*, out of which it was chiefly produced.

But these are very weak and inconsiderable, compared with Arguments which necessitate me to believe, that it emerges from the *Union* of the *volatile Salt*, with the *oleaginous* or *sulphureous Principle*. For,

1. There seems to be a great Contrariety between *Acids* and *Alcalies*: Being mixed, they heat, fight, and mortify each other; whatsoever one dissolves, the other precipitates: Whereas, were the *Salt* of *Alcalies* of a Nature approaching to *Acids*, they would more plainly *unite* without the violent Contention, which usually ensues.

2. *Alcalies*

2. *Alcalies* and *volatile Salts* agree in most Properties, excepting their different Degrees of *Gravitation*. They are both *diuretical* and *de-obstruent*; they both dissolve *sulphureous* Bodies; agree in their Contrariety to *Acids*, but mix together quietly without Noise, Heat, Ebullition, or impairing each others Virtues, and are easily separable; the same in Quantity and Quality they were before Mixture.

3. *Tartareous* or *essential Salts* of *Vegetables* cannot become *Alcalies*, until their *Acidity* be driven away; during which Operation the *volatile Salts* and *Oil*, uniting, become more ponderous than the *acid*, which before did gravitate more than either of them in their separate State: So that such a Degree of *Fire* as will wholly dissipate the *acid Spirit*, cannot elevate the more ponderous *Alcali*. Not but that, contrary to that, which is commonly asserted, the most *fixed Alcali* may be sublimed to a great Height without Additaments, by an intense Degree of Heat: For, I have frequently reduced a *Pound* thereof unto 3 or 4 *Ounces*, and recovered a considerable Proportion which was caught in well contrived Vessels, some Yards above the Crucible, little, if at all, altered from what it was immediately before it suffered this *Violence*. Upon this Account chiefly it is that *Soot* yields some small Quantity of an *Alcali*, especially that nearest the *Focus*.

4. *Alcalies* may be divided into *Oil* and *volatile Salt*, by facile and natural Methods of Procedure. I myself have many Times effected this in Part: And a very worthy Person, in whom I can perfectly confide, assured me, he hath frequently resolved the whole Body of *Alcalies* into the two distinct Substances of *volatile Salt* and *Oil*, receiving of the latter a small Proportion: Which is also confirmed by those Trials I have made on the same subject.

I could suggest many more Arguments and Experiments; but these being sufficient, and, I think, indissoluble, I proceed to confute the Pretensions of *acid Salts* to an Interest in this new Production. *First*, What concerns *Tartar*, its *Acidity* is driven away in great Quantity before it can become *alcalizate*; and a *volatile Salt* may, to my Knowledge, be by divers Methods separated from it. *Secondly*, As to *Nitre*, though that in *Distillation* yields an *acid Spirit*, yet it abounds also in *volatile Salt*; as I could demonstrate from the manner of its Generation, and from irrefragable Experiments. And besides, perhaps in the Operation of the *Sulphur* on the *acid Salt*, supposing it such, there is a Comminution of its Parts, and thereby that made a *volatile Salt* which was before *acid*, only Magnitude discriminating between them.

2. I have asserted above, That *alcalizate* or *fixed Salts* extracted out of the *Ashes* of *Vegetables* do not differ from each other; as neither their *vinous Spirits*; yet with this Restriction, if they were *highly rectified* or *purified*: And I may add, nor *volatile Salts*, not only of *Vegetables*, but even those yielded by *Animals* or *Minerals*, with the before-mentioned Limitation of due Purification.

No sensible
Difference among the fixed and volatile Salts and vinous Spirits; by Dr. Dan. Cox. *ibid.* p. 154. Vid. *Sup. Sect.* VII. 6.

First, then, I say, That *Salts* perfectly *alcalized* differ not from each other in sensible, nor (so far as I have had Opportunity to enquire) in hidden Properties. It hath been a constant and general Perswasion, that many *fixed Salts* do retain, some at least, the *specifical Properties* of those *Vegetables* out of whose *Ashes* they were extracted. The *Salt* of *Wormwood* and *Mint* are said to be stomachical; that of the greater *Celandine* proper for *Istericks*; those of *Broom*, *Ash-keys*, *Elder*, *Beans-stalks*, &c. Diuretical; of *Rosemary*, *Sage*, &c. Cephalick; and others (too many now to enumerate) which are thought to be endowed with very different medicinal Properties. I am not very forward to question and quarrel with Opinions and Maxims established by universal Consent, and confirmed by the Experience of many Ages, unless I have sufficient Reason to distrust their Veracity and Validity. In the present Case, the Perswasion of the Antients, and the Position which I shall endeavour to illustrate, though at the first Appearance they seem diametrically opposite, may be easily reconciled. I formerly declared, that most *Vegetables*, burnt whilst green or moist, and with a smothering Fire, yield a kind of *neutral Salt*, which may be called *tartareous*, and sometimes not improperly *essential*, many of them retaining the *vomitiv*e, *purging*, *sweating*, *diuretical* *Opiate*, or other general, and perhaps some *specifical*, Properties, wherewith the *Plants* were ennobled which produced them. Now, whether it is some small Quantity of *essential Oil*, which mixed with the *saline* Principle, renders it so variously medicinal, the *essential Oils* of *Plants* being manifestly as it were a Compendium of the Plant, which they do equally exactly resemble in Smell, Taste, and other Qualities; or, whether those Vertues are the Result of the *Crasis*, and Mixture of the several Principles; certain I am, that after the *Oil* is evaporated by an intense Heat, or the *Crasis* disturbed by Avolation of some Parts, and new Combinations of what remains, farewell all *specifical* Qualities, and consequently all other *Differences* than what Purity and Impurity, and several Degrees of Heat may occasion, some being more white and fiery than others. Now some *Salts* are much more easily deprived of their *acid* and *oily* Parts than others; and in some, on the contrary, the *Oil* is of so *fixed* a Nature, or rather so closely combined with the other Principle, that it must be a very intense Heat which can disjoin them, and thereby reduce the *Salt* to the common Standard or Aggregate of Qualities wherein all *Alcalies* agree.

The industrious *Tachenius* does somewhere pretend to demonstrate, that there is a real *Difference* between the *Alcalies* of different *Plants*; which he would prove by the various Effects they have upon a Sublimate dissolved in common Water. But this is easily resolved by what I before suggested; as also by an easy obvious Experiment, which may at any Season in any *Plant* be readily proved. Take what *Wood* or *Plant* you please, *burn* it *green*; the *Salt* being extracted out of the *Ashes*, will, according to the different Degrees of Fire whereunto it shall successively be exposed, variously influence the *Mercurial* Solution, the several *Precipitates* differing no less from each other than when made with the *Salts* of *different Plants*. This

This is also most evident in *Tartar*, which the less and more gently it is calcined, the more *Salt* it yields; and, on the contrary, a much smaller Proportion, if suddenly, and with the highest Degrees of Heat. That which is prepared by the former Method, is mild and gentle; its Taste approaching somewhat towards that of *Acids*; whereas the other, which hath passed through the Violence of Fire, hath not the least Affinity therewith, and can almost as little be endured by the Tongue as a live Coal of actual Fire. And there being very many Degrees of Heat, whereunto the *Tartar* may be successively exposed; according to the said Degrees, the Manner of applying it, Space of Time, and Substances employed in the *Calcination*, the Result will be different, and produce different Effects: And the very same Sort of *Tartar* will oftentimes become sensibly *different* upon these Methods of Procedure, and produce most of the Appearances mentioned by *Tachenius*. And sometimes several Parcels of *Tartar*, which seem to our Taste and Eye *calcined* to the same Degree, yet the Operations in nice Experiments are frequently various. And to me it doth not seem so very wonderful, that many Concretes do really *differ*, which to the Senses appear simple and uniform; of which many Causes may be assigned. A great Number and Variety of Instances might be here introduced to clear this Truth, if it were not already sufficiently known and believed.

But to proceed, where I digressed: What I have *asserted* is confirmed by the great *Variety* which is most visible in *Pot-ashes*: Some being highly *alcalizate* are very *hot*; others *cold*, *watry*, *nitrous* to the *Palate*, and no less weak in Effects than Taste; whereof *Soap-boilers*, *Dyers*, and other *Mechanicks* are very sensible. All which proceeds from the Woods being, when they are *burnt*, *green* or *dry*, from their abounding with *oily*, *aqueous* or *acetous* Parts, as also from the several Degrees of *Heat* employed in their Production. Those who make *Glass*, and especially the finer Sorts thereof, complain, that they cannot with the same Quantities and Proportions of Ingredients always produce the same Sort of *Glass*: Which they, not without Reason, ascribe to the *Differences* in their *Ashes*. This must necessarily often happen according to the lately mentioned *Hypothesis*.

That which hath been said of *alcalizate Salts*, may likewise be affirmed concerning *volatile Salts*, and *vinous Spirits*: The former are afforded not only by *Vegetables* and *Animals*, but also by some *Minerals*: And although immediately upon their Production or *Extraction* out of the several Substances which did yield them, they appear sensibly *different* from each other, and are without dispute endowed with very *different* Properties, chiefly medicinal; yet they may all by slight Artifices be reduced into such a *Simplicity* and *Identity*, as that neither the most acute and faithful Senses, nor the most rational and nice Experiments, can find or make, without Additaments, the least Disagreement or *Discrimination*.

n. 108. p. 169.

Vid. Sup. Sect.
VII.

Volatile Salts abound in most *Vegetables*, from which they sometimes may be extricated by simple *Distillation*; but usually previous *Fermentation* is required: Of which *Operation* I have formerly rendered a particular Account. This *Salt* may be obtained from *Soot*, *Urine*, the *Blood* of *Men* and other *Animals*; from *Bones*, and especially *Craniums* or *Skulls* of *Men*; from many *Sorts* of *Horns* (and indeed no *Subject* yields them so copiously as those which are annually cast by *Stags* or other *Deer*) from *Vipers* in great *Plenty*, as also from divers other *Animals*. I need not here mention *faëtitious Salt Armoniack*, that being a *Commixture* of several of the mentioned *Substances* with *Sea-Salt*. Also many *Minerals* and *Fossils* contain *volatile Salt*, vast *Quantities* of *Salt Armoniack* being found in many *Parts* of the *East*, which was probably *sublimed* into those *Caverns*, whence it is extracted, by the *Force* of *subterranean Fires*: Which *Conjecture* is sufficiently authorized by the same *Substances* being gathered near the *Crateres* or *Mouths* of our *European Vulcano's* of *Ætna*, *Hecla*, *Vesuvius*, in *Campis Phlagreis*; in *England* also near the *Mouth* of several *Coal Mines*, which have been accidentally fired: And of recent Memory, that *Torrent* of *melted Minerals* which boiled over the *Crucible* (if I may so speak) upon the late *Conflagration* in *Sicily*, and poured itself into the adjacent *Plains*. This *liquid Fire*, as it cooled, *condensing*, became crusty at *Top*, and almost every where *Stores* of *Salts* were *sublimed* or thrust forth by the *Violence* and *Fury* of the *Heat*. Some of these *Salts* resembled the vulgar *Sea-salt*; others *Nitre*; some were of an *aluminous* and *vitriolick* Nature; but that which was most copious and universal, was *Armoniac*; which although much discoloured, and rendered very impure in most *Places* by its *Union* with various *metallick* and *mineral* *Particles*, yet did chiefly, as the *faëtitious Salt Armoniack*, consist of *marine* and *volatile*, commonly called *urinous Salts*, as did also the fore-mentioned; as many *Experiments* have informed me, too numerous and tedious to be here inserted. Besides those *mineral Substances* already mentioned, several *Sorts* of *Earth*, *Clays*, and *Marle*, which are fetched from the superficial or cortical *Part* of the *Earth*, do contain *Store* of *volatile Salts*, which appear upon *Distillation*: And from some of them I myself have frequently separated greater *Quantities* than will be easily credited. It would require more *Patience* in the *Reader* than the *Subject* deserves, should I relate or particularly enumerate the peculiar sensible and medicinal *Properties*, whereby the *Salts* are *discriminated*, which the several forementioned *Substances* do afford. I shall therefore at present only suggest, what in my *Apprehension* renders them so *multifariously different* from each other, and then discover, how they may be reduced unto the *same common Nature*, and if you please, being *united*, become an *uniform* and *homogeneous* *Substance*; wherein I may challenge the most severe *Criticks* and experienced *Chymists*, to find a greater *Variety* of *Parts* and *Qualities*, than what is absolutely necessary to constitute the *Essence* and *Definition* of a *volatile Salt* in the *Abstract*.

It was long since by the famous *Van Helmont* judiciously observed, and by many *Experiments* confirmed, that *Variety* of *Sulphurs* did chiefly *discriminate*

criminate the Species of *mixed* Bodies, and that most of the considerable *Changes* which were made in or upon them, were occasioned by separating their own, or superinducing an extraneous *Sulphur*. If this be affirmed of *Sulphur*, a pretended simple homogeneous Body, and the 2^d *Principle* of the *Chymists*, it is denied: But if he intended, as is most probable, by *Sulphur* a Substance, which, when separated, is usually inflammable, and doth ordinarily appear in an *oleaginous* Form, I esteem his Assertion very probable and specious.

Let us make a short Reflection on the *Oils* extracted out of *Vegetables* by the Assistance of common Water, which are as it were a Compendium of the *Vegetables* that afforded them, being eminently and manifestly ennobled with most of those sensible and those more hidden Qualities that did discriminate the *Vegetables* whilst flourishing: Whereas their *Salts*, whether *fixed* or *volatile*, their *Waters* and *Earths*, can boast of little, which discovers whence they proceed, unless they retain some small Portion of their respective *Oils*, whose Presence occasions those slight *Differences*, which *discriminate* them from each other; and being therefore deprived, they relapse into their elementary Simplicity. The same happens, as with *fixed*, so in *volatile Salts*, which are *different* so long as they retain any Mixture of those *Oils* and *Sulphurs*, wherewith the Concrete that afforded them was imbued; from which being freed, they all *agree* in one common *Essence*.

Although I could confirm this Position by a great Number and Variety of Experiments, I shall for the present acquiesce in some easy and obvious Operations, which will sufficiently manifest, that all *volatile Salts*, being freed from adhering *Oils* and *Sulphurs*, become forthwith *homogeneous* and *uniform*.

Take any *volatile Salt*, whether *Vegetable*, *Animal* or *Mineral*, put it into a very tall *Glass-body*, or *Bolt-head*, sublime the *Salt* in *Ashes*, *B. M.* in a *Lamp-furnace*, or with other equal temperate Heat, and the more remiss the better. Repeat this Operation twice or thrice: Most of the *Oil* remains at the Bottom, or adheres to the Sides of the Vessels employed; and the *Salts* will not easily be *distinguished* from each other, agreeing in most, if not all, manifest Qualities.

But because this Operation will not so well succeed, unless the Vessels be very conveniently shaped, and the Fire exactly regulated by a judicious experienced Artist; for, either Skill or due Care being wanting, some small Portion of the more subtile fugitive *oleaginous* or *sulphureous* Particles will ascend with, and infect the *Salts*, which are thereby still in some measure (if I may so speak) *specificated*; I shall briefly represent a more certain and facile Method of reducing them into one common Nature and Denomination. Pour upon the *volatile Salt* you would *purify*, a convenient Quantity of well *rectified Spirits* of common *Sea-salt*. When the *Salt* is fatiated (which is discerned by the ceasing of the Heat, Ebullition or Commotion) then with a gentle equal Heat abstract the *Phlegm*, and with it some small Quantity of *volatile Salt*, which not being closely united, is upon the first Accession of Heat presently dismissed. *Sublime* the remaining,

maining dry Substance, which will become good *Armoniac Salt*. This being *pulverised*, and mixed with equal Parts of a pure and well calcined *alcalizate Salt*, or if you pour thereon a strong *Lixivium* or *Solution* of any perfect *Alcali*, the *alcalizate Salt* combining more closely with the *acid* than the *volatile*, this latter will be elevated by a small Degree of Heat, and appears, either immediately, or upon *Redification*, in the Form of a dry, subtile, fugitive *Salt*, perfectly free from the Contagion of *Oils* or *Sulphurs*. And by this common Method of Procedure, all *volatile Salts*, although the Tribes and Concretes that afford them were exceeding different and distant, and they also disagree in *sensible* and (as they are commonly stiled) *occult* Qualities, are brought unto a perfect *Agreement* in some few common Properties.

I might add, that whatsoever can be effected by artificial Operations, in order to the *unspecificating* of *volatile Salts* is more naturally and speedily performed by the *Air*, which is, as I could fully demonstrate, impregnated with a *volatile Salt*, partly *sublimed* by *subterraneous*, and *extracted* by *celestial Fires*; partly expired from *Animals* during their Life; and both from *them* and *Vegetables*, upon the Dissolution or Dissociation of their constituent Parts in *Arefactions* and *Fermentations*. These *Salts*, being received into the vast subtile fluid *Expanse*, are immediately divested of their *discriminating* Properties, and become the Instruments of sundry remarkable Effects and Operations, not only in natural, but also artificial Productions: Which *Salt* may be obtained by sundry Methods, and out of several Substances, in its pure *Simplicity*; but being once dissolved in Rain, and Dews, and thereby insinuated into the Earth, or otherwise caught and conveyed into *Vegetables*, they are soon *specificated*, and by Union with the other Principles or Corpuscles of a different Nature, do degenerate, or are exalted, which you please, and of *simple* (at least comparatively) become *compound* Substances; yet easily again reducible, by Nature or Art, into their Primitive *Simplicity*.

It remains that I should detect the same *Identity* or Uniformity of Nature and Properties to reside in all *highly rectified vinous Spirits*, which we have discovered in *Salts* both *fixed* and *volatile*.

That *vinous Spirits* are only (or at least chiefly) the more subtile fine *Oils* of *Vegetables*, by *Fermentation* broken into lesser Particles, and less branched than those which constitute the *Oils* themselves, will appear highly probable to him that shall duly consider the Manner of their Production, and seems demonstrable by divers obvious Experiments. For the same Quantity of *Vegetables*, which being *distilled* with Water, no *Fermentation* preceding yields *Oil* plentifully, and little, if any, *vinous Spirits*; being *distilled* after a convenient Time of Digestion, and the Addition of some proper *Ferment*, they afford Store of *vinous Spirits*, and if fully *fermented*, there is little Appearance of *Oil*. Also the same *Herb fermented*, after its *Oil* is extricated by the usual Method, yields a far less Proportion of *vinous Spirits*, than when *fermented* before it was deprived of its *Oil*. That Por-
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tion of the *Oil*, which is by *Fermentation* divided into lesser Particles, although, notwithstanding this Comminution they are (according to the *Cartesian Hypothesis*) branched enough to continue inflammable, yet being minute, do not affect the Palate after such different Manners, or make upon it such a Variety of Impressions, as those that are occasioned by Impulses from the more gross *oleaginous* Particles.

Now, if the smaller and more subtile Matter, which we shall henceforth call *vinous Spirits*, being pressed by Heat, carry up and convey along with them some entire unbroken *oily* Parts, or receive them that are capable of being elevated with the same Degree of Heat by which they were raised, these Mixtures will retain somewhat of the most remarkable *Differences* in *Taste*, and sometimes *Odour*, whereby the *Vegetables* themselves or their *Oils* were *discriminated*: But upon long frequent *Digestions*, or reiterated *Distillations*, these gross *oleaginous* Particles are either subdivided, and thereby become *vinous Spirits*, or that gentle equal Degree of *Heat*, which is sufficient to elevate the more active *volatile vinous Spirits*, cannot raise the more sluggish *Oils*: So that the Results are pure single *homogeneous vinous Spirits*, which, whatsoever the *Concretes* were from whence they were derived, though vastly *differing* from each other; as also their *Oils*, out of which the *vinous Spirits* were more immediately produced; yet the *Spirits* themselves thus *purified* are, in outward Appearance, *similar*, and perhaps as perfectly simple and *homogeneous* as most Substances in the Universe.

What I have delivered is further confirmed by a more visible palpable Conversion of *vegetable Oils* into *vinous Spirits* which I have effected in many, and, by analogous Operations, I presume the same *Change* may be superinduced upon all. Pour upon an Ounce of some common *vegetable essential Oil* 2 or 3 Pounds of *vinous Spirits* perfectly *dephlegmed* (the greater Quantity the more speedy is the *Transmutation* or Change performed) the Spirit will immediately, upon simple Agitation, absorb, devour, or dissolve the *Oil*, which by long *Digestion*, or reiterated *Cobobations*, may be totally divested of all those peculiar Properties it enjoyed whilst an *Oil*, and become perfectly *vinous*, never to be *separated* in a distinct Form, or by any known diacritical Sign or Artifice, to be *discriminated* from what hath, in all Appearance, *converted* or *transmuted* it into its own Nature, or at least into a Substance so like itself, as to deserve the same Denomination.

I shall here, instead of a Conclusion, impart unto you *two* very odd surprising *Experiments*, which have some, though remote, Relation unto the preceding Discoveries concerning *alcalizate* and *volatile Salts*.

Having procured a great Quantity of *Fern-Asbes*, I *extracted* their Salt after the common Method with *Water*: Most of the *Water* being evaporated, I obtained several Pounds of *Salt*, the greatest Part whereof being dried, I exposed the Remainder unto the *Air*, that it might arrest some of the Vapours fleeting in the same, and thereby become fluid; which is commonly, though improperly, stiled the *Oil per Deliquium*. The rest of the *Lixivium* which continued fluid, being *filtered* whilst warm, was of a very *red Colour*,
deeper

deeper than that of florid Blood, or of most Clarets, and exceeding *ponderous*. The *Colour* argued it abounding with *sulphureous* or *oily* Parts, and the *Weight*, that it was highly fatiated with the *saline*. Having put this strong Solution into a capacious Glass, I either forgot, or neglected it five or six Weeks; and then looking after it, my Eyes were unexpectedly saluted with a most pleasant Spectacle, which having arrested, did immediately fix, detain and employ them in the Contemplation of an Object which did at once most charmingly invite, and fully requite their greatest Attention: The *Lixivium* had deposited a large Portion of the Salt it formerly contained, Part of which subsided, I suppose, immediately upon its Cooling: And, several Weeks of very cold Weather ensuing, did occasion the Precipitation of more. So that, according to my Estimation, it was at least 2 Inches thick over the Bottom of the Vessel. The lowest Part of the Salt was of a *dark Colour*, as if some Earth, Dirt or Dregs were admixed therewith. The upper Part or Surface contiguous to the Liquor was exceeding *white*, and there did arise or spring out of the whole Mass of Salt, at small Distance from each other, several, I believe 40 Branches, which (abating the Colour) did most exactly resemble that Sort of *Fern* which is single, like *Poly-pody*, and not branched, sending out several Leaves on each Side from one Stem. Their *Magnitudes* were divers, but the *Figures* of all were the same, without the least Variation; only some emitted more Leaves from the Stem than others; which is also usual in the *natural Fern*. I preserved these *artificial*, regenerated, or resuscitated *Vegetables*, many Weeks in the same Position, not moving them, they being of so tender a Fabrick, that the least Motion of the Glass did hazard their Disappearance.

Obs. 1. The *Fern* was of a middle Constitution, between *green* and *dry*, when burnt.

2. It was employed to dry Malt, burnt in a Kiln with a close smothering Heat.

3. Therefore the *Ashes* yielded a far greater Proportion of *Salt* than when the *Herb* is very *dry*, and *incinerated* by a free open Fire.

4. From the same Causes the *Salt* was not perfectly *alkalizate*, but plainly *tartareous*, and abounded with *Oil* and *acid* Particles; and therefore might properly enough be called an *Essential Salt*: And, upon *Fusion* with a strong Fire, was much changed from a *dark Brown* becoming *white*, and was by the Action of the Fire much lessened in Bulk, the Consequence of the Avolation of *Oil*, *Acidities*, and perhaps other Substances, during the Operation of so strong a Fire.

5. That Part of the *impure Salt*, which, as I before intimated, was set to *deliquate*, did not, as is usual, become *liquid*, but a perfect Gelly, which could not by any Method be afterwards reduced unto its *saline* Form; which recalls unto my Mind what is delivered by *Kircher* of his own personal Experience in the *Resuscitation* of *Plants*, who affirms, that at some certain Time of the Operation the prepared *Vegetable* Substances appear in such a Form.

The *other Experiment* concerning *volatile Salts*, succeeded after this Manner :

Having Occasion for *volatile urinous Spirits* for some ordinary Uses, I mixed equal Parts of *Sal Armoniac* and *Pot-Ashes*, which latter had a very strong *sulphureous* Smell, yet did seem to abound with *Salt*, and that considerably *alkalized*. The Mixture being put into a tall *glass Body*, immediately upon its feeling the Heat, Plenty of *volatile Salt* sublimed ; from which I expected no unusual Appearance, having often repeated this Operation without observing any Circumstance which deserved peculiar Attention. Being called from my *Laboratory* just as the *Salt* began to appear, at my Return I was amazed to see in the *Glass Head*, which was, as the *Cucurbit*, very spacious, or capacious, a *Forest in Perspective*, so admirably delineated as not to be excelled, if imitated, by the Pencils of the greatest Masters in *Painting*. They were all, not only to my Apprehension, but also in the Opinion of several Spectators, ready to attest it, *Shadows*, *Rudiments*, *Adumbrations*, or *Representations* of *Firs*, *Pines*, and another Sort of *Tree* which I cannot easily describe, nor have I ever seen it growing wild, or in Gardens, or in any Herbal exactly represented. All these *Images*, although very numerous, were reducible to one of these *three Species*. I do not remember that I have ever seen any more transportingly agreeable Appearance in any Chymical Operation ; although it is well known that *Chymistry* doth daily present those who are very conversant with her, a great Number and Variety of Objects, highly diverting for their Prettiness and Curiosity in *Colour*, *Figure*, and other Accidents.

But to return to the forementioned Operation, I am not ignorant, that *volatile Salts* do constantly shoot into variously and beautifully shaped *Cry-stals*, but I could never observe them regular, or reducible unto a certain Number of Figures ; whereas in the Operation we have described, the Figures were, *first*, very different from any that ever appeared before or since upon *Distillation* of the Commixture, and *Distillation* of *Pot-ashes* and *Salt Armoniac*, although by me frequently repeated ; as neither upon the *Distillation* or *Rectification* of *Harts-Horn*, *Blood*, *Urine*, *Cranium Humanum*, *Salt Armoniac* with *Lime*, *Salt of Tartar*, and other *Alcalies*. *Secondly*, The Figures were all reducible, in the Apprehension of every Spectator, unto *three* Kinds ; two of them commonly known. But of this so delicious a Spectacle, to my great Grief, I was soon deprived by the *Sublimation* of more *Salt*, which filling up the Interstices, did, together with the former, case the *Glass*, and retained no other Figure than the Concavity thereof allowed of.

The next Day that great Virtuoso Sir *Rob. Murray* (whose Memory can never be too much cherished, nor his Loss sufficiently bewailed) honouring me with a Visit, I acquainted him with the lately recited Accident ; who scrupled not, though a rigid Philosopher, to credit my Relation, and to confirm me in the Belief, that some certain govern-

ing Principle might contribute towards the Production of this Phænomenon.

He affirmed, that one *Davison*, a famous and experienced *Chymist* at *Paris*, had frequently shewed him in a Glafs a great Company of *Firs* and *Pines*, which seemed no less lively and accurate, than those produced by Painters are; but such Suspicions were soon stifled by their speedy Disappearance and Reproduction. He also referred me unto his Book of *Chymical Operations*, where I find he makes mention of it as a great Artifice, as really it was, and makes it no less a Mystery by concealing the Process or Materials, whereby it may be effected; only that nothing was employed besides Substances afforded by the *Trees* which were represented; and that the chief Ingredient was *Turpentine*. Herein his Operation differed from that which I lately recited; in that the Substance, out of which *be* raised those Shapes, was of a more fixed Nature; that which afforded *mine*, *volatile* to the highest Degree: *He* could constantly and regularly produce these Figures; but *mine* did unexpectedly and fortuitously represent themselves unto my View; neither do I ever again expect the like Appearance; nor will I contend with him that shall affirm it was a meer Phantasm, or a fortuitous Coalition of Salts into such pretty Figures.

Vegetable
Salts extract-
ed; by S. Fr.
Redi. n. 243.
p. 281.

IX. 1. Burn any Sort of *Herb*, *Flower*, *Fruit*, *Wood*, or whatever it be, and make *Ashes* thereof; with the *Ashes*, and with pure *Water*, in its natural Temper, make the *Lye*, which after strain through moist Paper, or a Filter, so that it becomes as clear as possible. Afterwards put the *Lye* into a Glafs Vessel, and let it remain in *Balneo Mariæ* until such Time as a great Part of it *evaporates*, according to the Proportion observed by those that are used to such Operations, and according as the *Congelation* of the *Salt* is desired to be more or less expedited or retarded.

2. If you keep the *Lye* to *evaporate* by the *Fire* in Vessels of *Earth* glazed, you will lose a great Quantity of the *Salts*, for that as the *Lye* grows thicker, the *Salt* penetrates the Bottom and Sides of the Vessels of *Earth*, and is lost.

3. The Quantity of *Water* to make the *Lye* of is not determined; for the most Part 5 lb of *Water* will extract all the *Salt* from 2 lb of *Ashes*.

4. The *Ashes*, whereof we have already made the *Lye*, and by Consequence drawn out the *Salt*, may, if you *burn* the same again in a Brick Furnace, make you afterwards another new *Lye*, which usually yields some small Portion of *Salt*.

5. The *Salts* drawn in the Manner aforesaid, when the *Air* is moist, use to *melt*: To obviate this Inconvenience, when you burn the Materials to reduce them to *Ashes*, it is requisite to use with them a due Quantity of *Sulphur*; and if it happen the *Ashes* should be made to your Hand, you may mingle them with *Sulphur*, and keep the same to the Fire till such Time as it be *burnt*. By this Means the *Salt* will never come to *run*, but become more *white* and *chrySTALLINE*.

6. There

6. There is no general Rule concerning the Quantity of *Sulphur* to be put into the Materials you thus *burn*: You may nevertheless at a Guess say, to 100 lb of Materials 4 or 5 $\frac{3}{4}$ of *Sulphur* are usually sufficient.

7. All the *Salts* have a peculiar and *determined Figure*, the which they always keep, although they are often resolved into Water, and afterward congealed.

8. If in one only Liquid you dissolve together 2 or 3 Sorts of *Salts* of *different Figure*, when they congeal they all assume their antient and *proper Figure*, and this not only happens in *faëitious*, but also in *mineral Salts*. If in a Vessel full of Water you *dissolve* equal or unequal Quantities of *Vitriol* of *Cyprus*, *Roch Allum*, and of purified *Nitre*, this Water will be all of an *Azure Colour*: But when the Water is *evaporated*, you will see in the Vessel, that the *Vitriol*, the *Allum* and the *Nitre* have re-assumed distinctly their first *natural Figures*, and that the *Vitriol* hath recovered its most compleat *Azure Colour*, leaving the *Nitre* and the *Allum* with their usual transparent *Whiteness*.

9. Although it be said before (N. 7.) that all *Salts* have a *proper and particular Figure*, yet notwithstanding all this, I have observed, that some Manner of *Salts* have 2, 3 and 4 Sorts of *Figures*. *Two Sorts* have been seen in *Lettice*, in the *Scorzoneræ's*, in the *Musk Melon*, the *Scopa*, in the *Roots* of *Esula*, in the *Black Hellebore*, in *Endive*, in *Eye-bright*, in *Wormwood*, in *Sorrel*, and in *Shoots* of *Vines*; *Three Sorts* in *Black Pepper*, and in *incarnate Roses*; *Four Sorts* in the *Roots* of *White Hellebore*.

10. Besides the before-mentioned *Diversity* of *Figures* which are found in *Salts*, I have observed, that among all *Salts*, of whatsoever *Figure*, there are found some *cubical*; which, though they be never so often dissolved and congealed, appear still of a *cubical Figure*, or enclining to it.

11. *S. Redi* knows not that it is a general Rule, That the different Parts of *Herbs*, *Fruits*, &c. make *Diversity* in the *Figure* of their *Salts*; but he says particularly, That the *Salts* of the *Leaves* of *Lawrel* differ from that of the *Wood*, and that the *Figure* of the *Salt* of the *Pulp* of a *Gourd* differs from that of the *Rind*.

12. Many *Salts* of different Matter have the *same Figure*, or at least very like. The *Salt* of *Cucumber* hath a *Figure* like the *Salt* of *Eye-bright*, *Mecboacan*, *Scopa* and *Lettice*; also all the *Salt* of *Orange-Flowers*, *Roses*, *Ginger*, *Endive*, *Colloquintida*, *Scorzoneræ-Root*, *White Hellebore Roots* and *Liquorish*, are all like one another: *Coleworts* and *Rosemary-Flowers* give a *Salt* of one and the *same Figure*, as likewise do among themselves *Vine-Branche*s, *Sorrel*, *Black-Pepper*, the *Rind* of *Pomegranates* and the *Roots* of *Black Hellebore*.

13. To make the Bodies of the *Salts*, when they congeal, rest *distinct* one from another (so as their *Figures* may be observed) and not to be entangled and heaped together, 'tis necessary, he says, that very great Diligence be used in evaporating the *Lye*: For if that be wholly evaporated, or if too great a Part thereof, the *Salts* make a confused *Crust* at the Bot-

tom of the Vessel ; if the *Lyes* are left too weak, the *Salts* require a very long Time to congeal in; it is requisite therefore to use such a Diligence which is not to be gained without long Practice. The Instruments for measuring the *Weights* of *Liquids* may give a Rule, which if it be not general, will at least come very near it. The *Lyes* being reduced to a convenient Thickness, are put into little small Glasses closed with a Stopple and kept in a very dry Place, and you must expect by the Benefit of Time, that the *Salts* will congeal themselves into *Chrystalline Stones*, either in the Bottom, or on the Sides of the Vessel.

14. Not all *Herbs*, nor *Flowers*, nor *Fruits*, nor *Woods*, when they are *burnt*, render equally the same Quantity of *Salt*, but, according to the Diversity of their Species, the Quantity of *Salt* which is drawn from their *Ashes* is found different. The Seasons wherein the *Plants* are gathered make a great Diversity ; as also does the Country, whether Mountainous, or Champaine, or Sea-Coast, or Marshy, or Moist.

15. All Matters *burnt* give not the same Quantity of *Ashes*. But there is a great Diversity, which you may see by the following *Proofs* ; the greatest Part in the Year 1660.

Vegetables

Vegetables.	lb	Ashes.		Salts.		Ashes from 100 lb of Vegetables.				Salts from 1 lb of Ashes.						
		lb	ʒ	ʒ	ʒ	ʒ	lb	ʒ	ʒ	ʒ	gr.	ʒ	ʒ	ʒ	gr.	
Dried Flowers of Oranges	100	4	6	0	0	5	4	6	0	0	0	0	0	1	0	8
Gourds new gathered (which dried in the Oven were 36 lb)	800	4	0	0	10	0	0	6	0	0	0	0	2	4	0	0
Red Onions (being 720) roasted, the Coals burned to 16 lb; to the Coals were added 4 ʒ of Sulphur	400	1	6	0	2	2	0	4	4	0	0	0	0	7	1	0
Eye-bright fresh, and afterwards distilled and burnt	150	5	0	0	4	0	3	4	0	0	0	0	1	1	1	9
Distilled Roses	120	4	0	1	0	4	3	4	0	0	0	0	3	0	0	0
Maidenhair	100	9	0	0			9	0	0	0	0	0	0	0	1	8
Roots of Black Hellebore, which dried came to 50 lb	150	6	0	0	1	0	4	0	0	0	0	0	0	0	4	0
Roots of White Hellebore fresh, which dried came to 50 lb	150	2	0	0	4	0	1	4	0	0	0	0	1	0	0	0
Roots dried and burnt of fresh Esula	96	3	0	0	2	0	3	1	4	0	0					
Roots of Liquorish	30	2	0	0	1	4	6	8	0	0	0	0	0	6	0	0
Pellitory	20	1	0	0	0	6	5	0	0	0	0	0	0	6	0	0
Green Endive	100	2	0	0	2	0	2	0	0	0	0	0	1	0	0	0
Green Bindweed	90	1	0	0	2	0	1	1	2	2	0	0	2	0	0	0
Leaves of Lawrel	2000	33	0	4	0	0	1	2	0	0	0	0	0	3	1	22
Leaves of Lawrel	500	6	0	0	10	0	1	7	4	2	10	0	1	5	1	6
Water Melons well ripe, the Seeds being taken	1000	25	0	1	0	9	2	6	0	0	0	0	0	6	1	11
Cucumbers	2400	18	0	0	0	0	0	9	0	0	0					
Wood of Ivy	300	9	0	0	0	0	3	0	0	0	0					
Scorzonera dried	50	8	0	0	0	0	16	0	0	0	0					
Pine Apples, the Nuts taken out	300	3	0	0	0	0	1	0	0	0	0					
Mugwort dried	150	8	0	0	0	0	5	4	0	0	0					
Leaves of Cypress	130	6	0	0	0	0	4	7	3	5	0					
Peel of Pomegranates dried	10	1	8	0	0	0	6	8	0	0	0					
Sassafras	2	1	0	0	0	0	3	1	4	0	0					
Lignum Sanctum	12	2	6	0	0	0	20	10	0	0	0					
Yellow Sanders	4	1	1	4	0	0	1	0	4	0	0					
Black Pepper	4	1	2	4	0	0	5	2	4	0	0					
Ginger	30	1	7	0	0	0	5	3	2	2	0					
Turbitb	12	1	0	0	0	0	8	4	0	0	0					
Wood of Fir		3	0	0	3	0							1	0	0	0
Scopæ		16	0	1	4	0							1	0	0	0
Scopæ		16	0	1	6	0							1	1	0	0
Wheat-Flour							2	2	5	1	0					

Heads

Heads of old Garlick 32 lb were dried in a Furnace and burnt; from the *Asbes* there was hardly any *Salt* to be gathered.

Thirty Pounds of Wheat-flour burnt in a Furnace with a little *Sulphur*, and burnt a-new in a Potter's Oven, gave 8 $\frac{3}{4}$ of very black *Asbes*, the which being baked again for 8 Days continually in a Brick Furnace, after the *Lye* was made, there could not be a *Grain of Salt* drawn. The like happened in 10 $\frac{3}{4}$ of *Asbes* drawn from a *Stare* and a half of Bran, burnt first in the Furnace with *Sulphur*, and afterwards baked in a Potter's Oven, and in one of Bricks.

16. All the *Salts* whatever drawn from the *Asbes of Vegetables*, taken by the Mouth, says he, have a *purging Faculty*, and in a great Measure more than what by some is believed in *common Salt*, which taken by the Mouth has little or none at all; or if it have any, betwixt that of *common Salt* and *Vegetables*, the Proportion is but as *two to eight*.

17. This *solutive Faculty* is of equal Energy in all the *Salts*, in such manner that the *Salt of Sumach*, *Peels of Pomegranates*, *Myrtle Berries*, or *Mastick*, purges as much as the *Salt of Rhubarb*, *Sena*, *Turbitb*, *Mechoacan*, and all other like *purgative Drugs*.

18. The *Dose* to be used is the same in all the *Salts*, to wit, from 2 *Drachms* and a half to half an *Ounce* dissolved in 6 *Ounces* of common Water and Broth: He has observed by infinite Experiments, that half an *Ounce* uses to purge 3 lb and a half, or 4, or thereabouts of Matter, more or less, according to the Complexions, and according to the Fulness of the Bodies.

19. In the *Purging* he has found no *Difference* betwixt these *Salts* that have sharp Points, and those that are obtuse and blunt, or *cubical*: He has made Proof very often in divers Persons, causing the like *cubical Stones of Cucumbers*, *Ginger*, *Colewort*, and of *Liquorish*, to be picked out, and he has seen that they have worked with the same Energy as the most acute *Hexagon-Stones* of the *Salt of Pepper*, of *Carnation-Roses*, of *Mechoacan*, of *Coleworts*, of *Cucumbers*, &c.

20. From the aforesaid Observations, though you cannot establish a certain Rule, you may nevertheless conjecture, not without some Reason, *First*, that the *Salts* drawn from the *Asbes of Herbs*, *Flowers* and of *Fruits*, &c. do not conserve the Virtue, and that Faculty which Physicians believe the *Herbs*, *Flowers*, *Fruits*, &c. endowed with. *Secondly*, You may very near be certain of the Proportion of *Asbes* rising from each Species of *Vegetables*, and of the Quantity of *Salt* which is afterwards to be drawn from them.

21. You may also observe that some *Vegetables* insipid and cold, as *Endive*, *Pompion* and *Roses*, have given much more *Salt* than others of a stronger Savour, aperitive and incisive, as the *Onions*, *Hellebore*, *Lawrel*, *Maiden-Hair* and *Garlick*; which is so strong, gives none at all: But it may perchance be said, that in these there is a greater Quantity of *volatile Salt*.

X. M. Homberg, in a Discourse at a Meeting of the *Royal Academy* concerning the *Quantity of volatile acid Salts* contained in *acid Liquors*, told us, That the *acid Spirits* were no other thing but a *Salt* dissolved by a little Water, which the Taste shews well enough for an *Acid*, as also its Effects. He calls it *Volatile*, because it is raised by the Fire with the *Pblegm*, and it cannot be but hardly separated from that, and reduced into a dry Form: That nevertheless M. Homberg has made in the Operation inserted in the *Memoirs of the R. Academy*, published the 15th of Dec. 1692, by what Operation it appears that the *acid Spirits* are nothing but *volatile Salt* and *Pblegm*. The *Quantity of Salt* contained in a determined *Quantity of acid Spirit* was not yet known, but he has given a Way to know it, and also he may say the *Quantity of Salt* contained in whatever *acid Spirit*, only by the *Weight of Volume* compared with the *Weight* of another *Spirit*, of which the *Quantity of Salt* contained in it was known. First, for knowing the *Quantity of volatile acid Salt* contained in some *acid Spirits*, he has poured upon an Ounce of *Salt of Tartar* well dried, the *Quantity of an acid Spirit*, as much as the *Salt of Tartar* has been able to take of it; then he evaporated all the insipid Humidity or *Pblegma* out of this *Salt*, and he weighed the Matter: The *Quantity of his Weight* above the *Weight of the Salt of Tartar* before *Saturation* is the *Quantity of acid volatile Salt* contained in the *Quantity of acid Spirit* which has been taken by one Ounce of *Salt of Tartar*. Here is the Table of the *Quantity of Acid* that has been necessary to the perfect Impregnation and Fulness of the *Salt of Tartar*, and by the same Means the Table of the *Quantity of acid volatile Salt* contained in one Ounce of several *acid Spirits*.

For the perfect Impregnation of one Ounce of *Salt of Tartar* was poured upon it *Spirit of Nitre* ℥j, ℥ij, Gr. xxxj, the *Weight* of that *Salt* after the Evaporation of the insipid Humidity has been encreased to ℥iij, Gr. x, above one Ounce; that Encrease coming from the *Acid* retained in the *Salt of Tartar*, shews to us that one Ounce of *Spirit of Nitre* contains ℥ij, Gr. xvij of *acid Salts*.

So for the Impregnation of ℥j of *Salt of Tartar*, has been poured upon it *Spirit of Salt* ℥ij, ℥v; the Encrease after the Evaporation has been found ℥iij, Gr. xiv; and therefore one Ounce of *Spirit of Salt* contains ℥j, Gr. xv of *acid Salt*.

Upon ℥j of *Salt of Tartar* has been poured *Oil of Vitriol* ℥v, the Encrease has been found ℥iij, Gr. v; therefore ℥j of *Oil of Vitriol* contains ℥iij, Gr. lxv of *acid Salt*.

Upon ℥j of *Salt of Tartar* has been poured *Aquafortis* ℥j, ℥ij, Gr. xxx; the Encrease has been found ℥iij, Gr. vj; therefore ℥j of *Aquafortis* contains ℥ij, Gr. xxvj of *acid Salt*.

Upon ℥j of *Salt of Tartar* has been poured *distilled Vinegar* ℥xiiij; the Encrease has been found of ℥iij, Gr. xxxvj; therefore ℥j of *distilled Vinegar* contains Gr. xvij of *acid Salt*.

To find the exact Quantity of volatile acid Salts contained in acid Spirits; by M. Homberg. n. 262. p. 532.

Vid. Vol. I. Cap. VI. Sect. VI. 2. & S. VI.

It appears by this *Table*, that the *Quantity* of *acid Salt* for saturating the *Salt* of *Tartar*, is near the same, though the *Quantity* of *acid Liquors* should be very different: 'Tis only the *Acid* of *Vinegar* of which the *Salt* of *Tartar* retains more than it does of the others, that *M. Homberg* attributes to the Subtility of the Particles of the *vegetable Acid*, which have been very much divided by the Alterations in the *Fermentation* of the *Liquors* in the *Plants*, &c. of the *Wine*, and also in the *Distillation*; which Alterations the *Mineral Acid* has not received. The *vegetable Acid*, by that Subtility of Particle, is able to impregnate a greater *Quantity* of *Liquor* than the same *Quantity* of *mineral Acid*, and by that it is more easily raised up by the *Fire* than the others.

By these Observations, *M. Homberg* makes evident the Reason of some Cases difficult to be explain'd without them: As 'tis well known *one Ounce* of *Aqua Regia*, compounded with the *Spirit* of *Nitre*, and the *Armoniac Salt* dissolves *twice* more *Gold* than *one Ounce* of the *Spirit* of *Salt* can do. The *Chymists* attribute that Effect to the Softness of the Points of one *Acid*, and to the Hardness of the other: When these Observations make evident, that the *Spirit* of *Nitre* contains *twice* more of *acid Salt* than the like *Volume* of *Spirit* of *Salt*, and open in the same time the true Cause of this Effect.

M. Homberg discoursed also how we may know the *Quantity* of *acid Salt* contained in an *acid Spirit*; which he doth in the following manner: He takes an *acid Spirit* (as *Spirit* of *Nitre*) he weighs it by his *Areometer*, and at the same time he weighs also *distilled Water* (for the *Weight* of the *Pblegm* contained in the *acid Spirits* is like as the *Weight* of the *distilled Water*) then he looks for the *Bulk* of *Spirit* of *Nitre*, compared with a like *Bulk* of *distilled Water*, which has given a certain *Quantity* of *acid Salt* for each *Ounce*; and from thence he concludes, that the *Bulk* of the other *Spirit* of *Nitre*, of which the *Weight* is known, compared with the like *Bulk* of *Water*, shall give a determined *Quantity* of *acid Salt*, which will be raised by the Computations of the Relations of the *Weights* of those *Spirits* with the *Weights* of the like *Bulks* of *distilled Water*, by concluding from them, and from the *known Product* of *acid Salt*, for the *unknown Product* of the same.

Four Sorts of
factitious
shining Sub-
stances; by
Mr. Olden-
burg. n. 135.
p. 867.

XI. I have received Accounts of four sorts of *factitious shining Substances*,
1st. A *factitious Paste* of *Dr. Baldwin*, shining in the Dark like a glowing
Coal, after it hath been a while exposed to the *Day* or *Candle-Light*. Ano-
ther is the *Bonian Stone* calcined, which imbibes *Light* from the *Sun-*
Beams, and so renders it again in the Dark, whereas the former needs no
shining Sun, but doth the Effect in quite over-cast Weather, and even in a
misty Day. The 3^d, is by the *Germans* called *Phosphorus Smaragdinus*, said
to be of this Nature, that it collects its *Light* not so much from the *Sun-*
Beams, or the illuminated Air, as from the *Fire* itself; seeing that, if some
of it be laid on a *Silver* or *Copper-plate*, under which are put some live
Coals, or a lighted Taper, it will presently shine; and if the same Mat-
ter be shaped into Letters, one is able to read it. The 4th is called *Phospho-*
rus

rus Fulgurans, which is a Matter made both in a liquid and dry Form; and not only shineth in the Dark, and communicates a sudden Light to such Bodies as it is rubbed upon, but being included in a Glass Vessel well closed, doth now and then *fulgurate*, and sometimes also raise it self as it were into Waves of Light; differing very much from the *Baldwinian Stone*, which is to be exposed to some shining Body, as the *Day*, the *Sun*, the *Fire*, or some *lighted Candle* to receive Light from thence; whereas this *fulgurating* Substance carries its Light always with it, and when put in a dark Place, presently shews the same; of which we have this further Assurance given us, that a little Portion of it having been kept two whole Years, hath not yet lost its Power of *Shining*: So that it is believed, if a considerably big Piece were prepared for it, it would serve for a *perpetual*, or at least a very *long-lasting Light*.

XII. 1. Though several Persons have pretended to know the Art of Preparing and Calcining the *Bononian Stone*, for keeping a while the Light once imbibed; yet there hath been indeed but one who had the true Secret of performing it: This was an *Ecclesiastick*, who is now dead, without having left that Skill of his to any one.

The Bononian Phosphore lost; by ——— n. 21. p. 375.

2. S. *Malpighi* takes notice, that one S. *Zagonius* had a way of making out of the *Bononian Stone* calcin'd, *Statues* and *Pictures*, variously *shining* in the *Dark*. But he adds (to our Sorrow) that that Person lately died, without discovering to any body his Method of Preparing it.

Statues of the Bononian Stone; n. 134. p. 842.

XIII. *Septemb. 30, 1680*, there was taken a considerable Quantity of *Man's Urine* (because the Liquor yields but a small Proportion of the desired Quintessence) and of this a good part at least had been for a pretty while digested before it was used. Then this Liquor was *distilled* with a moderate Heat, till the *spirituous* and *saline* Parts were drawn off; after which the superfluous Moisture also was abstracted (or evaporated away) till the remaining Substance was brought to the Consistence of a somewhat thick Syrup, or a thin Extract. This done, it was well incorporated with thrice its Weight of fine *white Sand*; and the Mixture being put into a strong *Stone Retort*, to which a large *Receiver* (in good part filled with *Water*) was so joined, that the Nose of the *Retort* did almost touch the *Water*. Then the two Vessels being carefully luted together, a naked Fire was gradually administered for 5 or 6 Hours, that all that was either *Pblegmatick* or *Volatile* might come over first. When this was done, the Fire was increased, and at length for 5 or 6 Hours made as strong and intense as the *Furnace* (which was not bad) was capable of giving (which *Violence* of *Fire* is a Circumstance not to be omitted in this Operation.) By this means there came over good Store of *white Fumes*, almost like those which appear in the *Distillation* of the *Oil of Vitriol*; and when those *Fumes* were pass'd, and the *Receiver* grew clear, they were after a while succeeded by another sort, that seemed in the *Receiver* to give a faint bluish *Light*, almost like that

A Phosphorus; by Mr. Robert Boyle. n. 196. p. 583.

that of little burning Matches dipp'd in *Sulphur*. And last of all, the *Fire* being very *vehement*, there pass'd over another Substance that was judg'd more *ponderous* than the former, because it fell through the *Water* to the Bottom of the *Receiver*; whence being taken out (and partly even while it stay'd there) it appear'd by several Effects, and other *Phænomena*, to be such a Kind of Substance as we desired and expected.

An Account of
Dr. Kunkelius's Phosphores; by
Joh. Chr. Sturm. Ph.
Col. n. 2. p. 9.

XIV. Dr. *Kunkelius* prepares out of the *condensed Light* (which by his Skill in *Chymistry* he knows how to extract out of any Kind of Terrestrial Body whatsoever, as if it were there naturally placed) certain *Pills* about the Bigness of Peas (to which he ascribes very strange comforting and medicinal Virtues) these being moisten'd a little, and in the *Dark* scrap'd with one's Nail, Knife or the like, do yield a very considerable *Light*, not without a conspicuous *Smoak* also; which afford a *Light* yet much more pleasant and strange, if about 8 or 10 of them be put into a Glass of *Water*, and therewith shook in the *Dark*; for thereby all the *Water* and the Cavity of the Glass will seem perfectly fill'd with *Light*, flashing by turns very briskly; as I myself, not without the Admiration of the Spectators, have several times experimented. The same Dr. *Kunkelius* hath also reduced the same *lucid Matter* into the Form of larger *Stones* (which I have not yet had the good Fortune to see myself) which being warmed by the *Hand*, but especially if there be a little scrap'd, or rubb'd upon a Paper or Table, describes Letters very legible in the *Dark*.

Experiments
with the li-
quid and so-
lid Phospho-
rus; by Dr.
Fred. Slare.
Ph. Col. n. 3.
p. 48.

XV. 1. The *liquid* and *solid Phosphorus* do not materially differ, being made both out of Substances taken from a human Body. The *Liquid* is a Substance mix'd with a Liquor that (though it would burn a Body when in a *solid Mass*) will not offend a Lady's Hand with Scalding, or even Heat, when wash'd in it. An Experiment of this Kind I made this last Week, in the Presence of several Persons of very great Quality, where a very learned and ingenious Person, wash'd both his Hands and Face with it, made not only his own Face to shine, but the Lustre of his Face discover'd 3 or 4 other Faces not far distant: Yet so soon as the Candles were brought into the Room, the *Shining* disappear'd, and no Sign or Change was perceivable on the Skin of either.

This *Phosphorus* continues not its *Light* very long, if close stopp'd: Yet in one Sort I have observ'd a Kind of *Flashing* 6 or 7 times successively, though the Glass were closely stopp'd; which makes me conclude it to be the same with the *Phosphorus Fulgurans* of Dr. *Elsholtz*, the *Flashings* of it having some Resemblance to *Lightning*.

The other *Phosphorus* which is *solid*, differs not, as I said, materially from the *Fluid*, being made for the most Part out of *Urine*: But I am sufficiently satisfi'd that it may be as well made out of *Blood*, if it could as easily be obtain'd as *Urine* in great Quantities, since *Urine* is but the *Serum* of *Blood* strain'd through the *Kidneys*.

In this Preparation we have not only the common *Analysis* into *Waters*, *Spirits*, *volatile Salts*, *Sulphurs*, or *Oils*, but divers other extraordinary Appearances before this grand Product comes.

The Substance of this *Phosphorus* may be made as *transparent* as any resinous Body, and will *melt* like Wax in warm Water: And when cold, it is exceeding tough, and cuts like *Luna Cornea*, or rather somewhat harder. When it is all under, or covered with *Water*, it *ceases to shine*; but whenever any Part of it chances to emerge or get into the *Air*, though the Glass be hermetically sealed or perfectly shut, yet it will *shine*.

In a large Glass I have kept it without Water for several Days, and yet continually *shining* with little or no Diminution of its *Light* or *Weight*.

Of this *Solid* I have had some Parcels much more vigorous and inflammable than others. When I made some Experiments last Summer with this *solid Phosphorus*, every one handled it without any Danger: But I have since had some Parcels that would scarce endure the Touch of a warm Hand without taking *fire* and *burning*. Such Mischances have happened to several, that extorted this Curiosity out of my Hand, who would not believe such a cold Body would of itself turn into so fierce a *Fire*. Thus making some Experiments in the Company of a very worthy and ingenious Gentleman, I laid down a Piece of this *luminous* Substance (about 2 *Drachms* in Weight) and it took *Fire* when no Candle was in the Room, and we were all at a good Distance, and it blazed like a Faggot, and burnt the Carpet and Board it lay upon. This Sort is only for the Experienced and Careful to meddle with.

The less vigorous, as I was speaking of, did afford us this Experiment: We writ with a pointed End, what Words we pleased in the *Light*, and then we removed into the *Dark*, and had very radiant and *legible* Characters, which looked like Words written with a Beam of *Light*: I have made this continue so for a considerable Time, by laying it on with Advantage.

If we carry these glorious Letters to the *Fire-side*, and suffer them there to grow warm, they will presently turn into *dark Lines*, and remain as long as good Ink may be thought to do.

This *Light* is very diffusive of itself, for I have marked down above 100 Characters with this illustrious Pencil, and found not a 20th Part consumed.

In like manner I weighed out half a *Grain*, and spread it over my Hand at Night, which it gilded all over, and continued *light* all the Night, for so I found it next Morning.

As a further Proof of its diffusive Quality, having weighed out one *Grain*, and counterpoised it in good Scales, it continued to *flame* in the open Air for 7 or 8 Days, in so much, as shutting my Study Windows by Day, I could always see a Bead of *Fire*, and when I looked intent upon it, it sent up a *white Flame* into the ambient Air; which a large Piece does very remarkably.

After all was burnt out, we had no *Asbes* or *Recrements*, save only a little Moisture, which tasted *subacid*. Having suffered a larger Piece to burn out, I had more Moisture, which tasted like a weaker *Oleum Sulphuris per Campanam*. This puts me in Mind, that most of my Friends, when they have seen this Experiment, are apt to call its Fume *sulphureous*, and truly in all its Properties it seems rather referable to *Sulphur* than *saline* Concretes, upon the Score of its *Inflammability*, as well as for this Reason, that it neither loses nor is dissolved in *Water*.

What *medicinal* Use may be made of this noble Concrete, Time may discover. This I am sure, that the learned *Willis* (were he alive) would rejoice to see such a Product out of our Bodies, who was very confident of something igneous, or flammeous, or very analogous to *Fire*, that did kindle and impregnate our *Blood*. Nor does the ingenious Dr. *Lower* disallow such an *Hypothesis*, though he supposes an *Accension* of the *Blood* rather in the *Lungs* than in the *Heart*.

What Service this may do, in helping us to explain other *Phenomena* of Nature, I should be glad to know, particularly, as to that Observation of the learned Dr. *Croon*, who, upon rubbing of his Body with a fresh and well-warmed Shift, has made both to *shine*; and also that of a worthy *Bristol* Gentleman, who together with his Son told me, that after much walking, both their Stockings will frequently *shine*.

Ph. Col. n. 4.
p. 84.

2. 1. In order to try the *Elasticity* of this *shining* Substance when brought to a *Flame*, I made the following Experiment. I conveyed a Quantity of it into a small *Bubble* of *Glass*, as big as a Nutmeg (but blown very thin in the Flame of a Lamp, that so it might be the more sensible of the *Elasticity* of the Substance expanding into *Flame*) then I hermetically sealed up the End of the Stem of this *Glass Bubble*, so that no *Air*, nor any thing else, could pass out of the same without breaking thereof. Then I approached the *Sealed Glass* to the Warmth of the *Fire*, and, as I expected, soon found it kindle into a Kind of *Flame*, and to continue so to do by emitting *Flames*, and as it were filling up the whole Capacity of the *Glass* for some short Time; after which it seemed to be extinguished, without breaking the *Glass*, or so much as cracking it.

2. That I might be the better satisfied what this Matter so *flaming* did resolve into, I made this following Experiment: I made another small *Bubble* with a pretty large Tube for the Neck, and left it open at the Top, to be as a Chimney to the *Fire* below it in the *Ball*; then I made the Matter to flame as before, by approaching it to the Heat, and found my Chimney as well as the upper Part of the *Bubble* lined with a yellowish *Sulphur*, which, though thus *sublimed*, was not yet wholly divested of its *shining* Property; but when a little warmed, the whole *Bubble* would *shine*.

3. To try at what rate it would *burn* in the open Air, I made a Piece of it *flame* merely by approaching it to the Warmth of the *Fire*, and found it to *burn* like a Piece of *Nitre*, but without any *Explosion*, for it only *flamed* away pretty nimbly.

4. I have further observed that it leaves a red tenacious Matter upon its going out, that looks not unlike to red Wax, and is so *soure*, that it sets the Teeth on Edge, and dissolves Iron.

5. Exposing a large Piece of it, that was carefully weighed, it continued a great while *shining* before the *Light* was quite extinct; and examining the Quantity of the Liquor that it resolved into, I was not a little surprized when I found it *thrice* its first *Weight* at least. Some that tasted of it, called it *Spirit of Sulphur*, others *Spirit of Salt*.

6. I attempted to make Mr. *President's* Experiment, by the Application of some *Wick*, to see if its *Light* and *Flame* could be more concentrated and directed into one Body by some such Application, either to the *solid* or *fluid* Matter; but I cannot as yet find any Expedient of doing it: For so soon as the *solid* Matter kindles into an actual *Fire*, it presently consumes itself and the *Wick*; and the *Fluid* will not take *Fire* at all, though actually heated, and so I could not drive it up the *Wick*; nor is the *Light* vivid enough to do any great service. However, I conceive the *liquid* Form may be much more useful than the *solid* for giving *Light*; because, filling Part of a large spherical Glass, of about 5 or 6 Inches Diameter, with the *Fluid*, I found the whole Cavity of the Glass above the Liquor so filled with *shining* Steams, that I was able pretty well to read a large Character thereby.

7. It being generally now agreed, that the *Fire* and *Flame* have their *Pabulum* out of the *Air*, I was willing to try this Matter *in Vacuo*.

To effect this, I placed a considerable Lump of this Matter under a Glass, which I fixed to an *Engine* for *exhausting* the *Air*; then removing the *Candles* for some Time, I carefully observed at what rate it *shined*: When I was well satisfied what Degree of *Light* there was, I presently drew the Sucker of the *Engine* (it was one of Dr. *Papin's* make) and found it grow *lighter*, though a Charcoal that was well kindled would be quite extinguished at the first Draught; and upon the 3d and 4th Draught, which very well *exhausted* the Glass, it much increased its *Light*, and continued so to *shine* with its increased Light, till I was weary with observing it, when I re-admitted the *Air*, and saw it again return to its former Dullness.

8. Endeavouring to blow it up to a *Flame* with a Pair of Bellows, I thought I had quite blown it out, for it lay a good while dead before any *Light* appeared.

9. All Liquors are apt to extinguish this *Light* when the Matter is plunged into them; nor will it *shine* or *burn* though you boil it in the most *inflammable* Liquors, though it be *Oil of Olives*, *Spirit of Turpentine*, or even *Spirit of Wine*.

3. 1. In order to the keeping my *solid Phosphorus* from consuming, I usually placed it at the Bottom of a Glass of *Water*: Having several of these Glasses disposed upon a Table in View, whilst I lay upon my Bed, I could observe several *Flashes* of *Light* that successively pass'd through the *Water*, and made such bright and vigorous *Corruscations* in the *Air*, as would surprize and affrighten one not used to the *Phænomenon*. This *fiery Meteor* passes

A Parallel betwixt Lightning and a Phosphorus;
by Dr. Fred.
Slare. n. 150.

p. 289.

passes something contracted through the incumbent Water, but expands itself much as soon as it gets above it. If you would make these Experiments to Advantage, the Glass ought to be deep and cylindrical, and not above 3 quarters filled with Water.

If we compare these Appearances with *Lightning*, we may observe that *Lightning*, which comes at Intervals, passes uninterrupted thro' the most condensed Clouds, and is not extinguished or obstructed by the greatest *Storms* or *Cataracts* of Water, but, like the *Beams* of the *Sun*, or any other *Fire*, freely passes through Glass and Water.

2. This *Phosphorus* in the mentioned State only emits these *Flashes* of *Light* in warm Weather, a certain Temper of the *Air* being necessary to produce the Effect; for in the *Winter*, or cold Weather, I never observed it.

The warm Season of the *Summer* is most productive of *Lightning*.

3. The mentioned *Flash* of *Light* is not apt to kindle or burn any combustible Matter, as I found by holding my Finger in it unmolested; but not trusting to that, I held in the *Flame*, *Paper*, *Flax*, and such materials as are apt to take *Fire*, which it did no more than when we projected the *Light* of the *Moon* by a *Concave* Glass upon the like Bodies.

Such an inoffensive *Flame* that of *Lightning* is generally observed to be. But,

4. The matter of the *Phosphorus*, whilst in a more condensed Body, will easily be accended by the Warmth of the *Air*, or by the immediate Beams of the *Sun*, and then will burn very furiously, with such a penetrating *Fire* as will not easily be extinguished.

Thus *Lightning*, when condensed or contracted, and wrapt up in a Vehicle of *Air*, so that it does not so easily diffuse itself through the yielding *Aether*, will then set *Fire* to *Houses*, *Trees*, &c. and do great Mischiefs.

5. Our Matter, whilst burning, acts the Part of a *Corrosive*; and when it goes out, it resolves into a *Menstruum*, that dissolves *Gold*, *Iron* and other *Metals*.

Thus *Lightning* melts down *Gold*, *Iron*, *Lead* and other *Metals*.

These Experiments were concluded most naturally to illustrate and resemble the *Phenomena* of *Lightning*, far exceeding either those made with *Nitre*, *Gun-powder*, or *Aurum Fulminans*.

Some Chymical Observations; by the Heer Mich. Behm.
n. 34. p. 650.

XVI. I wish the celebrated Mr. Boyle had favoured us with publishing a greater Number of Experiments upon the Nature of *Salts*, how the *Alkaline* or *Lixivious* ones, as being *Fixed*, differ from the *Acid* and *Austere*, which are hardly less *fixed*, and both of them from the *Volatile*, and other Kinds of *Salt* which are hitherto not sufficiently explained, and different both in their Texture and Name. For amongst the *Volatiles*, you see the *Urinous Salt* differ from that which is in *Spirit of Wine* and other inflammable *Spirits*; because when they are mixed together they coagulate, and acquire a new Quality or Disposition.

I am in great Hopes of being able to find out a *Liquor*, which being injected into the *Bladder*, will gently dissolve the *Stone*.

I lately examined the *Serum* of the *Blood* of Brutes, and observed it coagulate like the *White of an Egg*, with a very gentle Heat; by adding

ding an *Acid* to it, it hardned most of all; but by mixing *Spirit of Wine* with it, it remained long *fluid*, and still more by *Alkalies*.

I have observed the *Gout* to appear when the *urinous Acrimony* is not separated by the *Kidnies* from the Mass of *Blood*, or does not pass off by the *Skin* in Form of *Sweat*, but is distributed with the *Blood*, and sticks about the *Joints* in the colder *Ligaments*, where, upon Account of the *Acrimony* of the *Salt*, it produces *sharp Pains*, (but such as can be got the better of) or by its *Glutinous Quality* produces *Tophi*, or *Stiffness* of the *Joints*. I wish some of the penetrating *Genius's* amongst the *English* would search farther into this, and communicate their *Observations* to the *World*, that this *Disease* might be no longer thought incurable amongst *Physicians*. The *Thoughts* of its being so obstinate made me extremely anxious, especially after I had carefully observed that neither *Purging*, nor *Bleeding* was of any *Service*, *Sweating* and *Cauteries* of very little *Use*, and that *oily Plaisters* and all *Astringents* were hurtful, and besides, that the *Spirit of Wine* and of *Sal Armoniack* did not sufficiently evacuate or discuss the whole *morbifick Matter*. Every *Body* knows that the *Hot Baths* are very good in this *Case*, and I have experienced the *Truth* of this, especially in the *Diuretick Kind*. But as the *Hot Baths* are not every where to be met with, I have found out a *Liquor*, which in *Smell*, *Taste*, and *Virtues* exactly resembles them; and by bathing the *gouty Limbs* with this, and the rest of the *Body* with simple warm *Water*, I find great *Relief*. Besides, I have found great *Service* from some *Pills* which I took by my own *Prescription*, which promote *Urine*, depurate the *Blood*, and render it more *fluid*, resolve the *Matter* of the *Stone*, and *Scorbutick Viscidities* of the *Mesentery*, without any *Purging*. But (though *Physicians* dissuade *People* from them) I have found for some *Years* by past, the *Application* of *Blisters* to the *Part* affected to be the best and readiest *Remedy* both to myself and *Friends*; though to such as are subject to *fistulous Ulcers*, I would not advise them.

Concerning those *Diseases* which the *Noble Sylvius* derives from the *Effervescence* of the *acid Juice* of the *Pancreas* with the *Bile* in the *Duodenum*, I am still much in *Doubt*. For I never felt that *Juice* to be *Acid*; nor have I ever seen the *Bile effervesce* with *Acids*, whether they were strong or not, but rather coagulate in the *Bottom*, in the same manner as the *Lac Sulphuris* and other *oily Bodies* are precipitated by *Acids*. I therefore believe with *Helmont*, that by the *Mixture* of the *Bile* with the *acid Ferment* of the *Aliment* (which appears plainer than that *Juice*) the *Chyle* is properly tempered. But that so many *Diseases* should arise from such a *Mixture*, although it did raise an *Effervescence*, *Experience* contradicts.

XVII. 1. We took betwixt 10 and 20 *Gr.* of the *solid Phosphorus*, and caused it to melt in as much *Water* as would just cover it, which was about a *Drachm*: After it was actually cold, we poured it into two *Ounces* of *Oil of Vitriol*, which being well shaken together, did first heat, and then throw up such *fiery Balls*, which, like so many *Stars*, will adhere to the *Sides* of the

Chymical
Experiments;
by Dr. Fred.
Stare. n. 159.
p. 291.

the Glass, and continue to *burn* for some Time, and *shine* not only in the Dark, but at Noon-Day in the enlightened Air.

2. If you pour a small Quantity of Oil of *Turpentine* upon the foregoing Mixture, it will take *Fire*, and burn very furiously. This Experiment ought to be made in an open Vessel, where the Air has a free Access. This succeeded with Oil of *Petroleum* and *de Lateribus*; but *Sallet-Oil* and *Spirit of Wine* could not be made to *flame*.

The Ingredients that compose this *burning Mixture* are apart cold to the Touch, and some of them in the Operations: Thus *Water* and Oil of *Vitriol* are cooling in their Nature, but these in Conjunction cause a great *Heat*, which soon excites the Particles of our *Phosphorus* to an actual *Fire*, and this meeting with an *inflammable* Ingredient, such as Oil of *Turpentine* or the like, does produce as considerable a *Flame* as boiling Oils are wont to do.

Act. Hafn.

3. According to the Directions of *Borrichius*, to make two Liquors *kindle* one another, though apart they are actually cold, we took 4 Ounces of fresh drawn *Spirit of Venice Turpentine* to 6 Ounces of *Aquafortis* newly drawn and very strong. We mixed them together in a *Glass-body*, and accordingly placed the Vessel in the Sun-beams (which I foretold some of the By-standers would deceive us) after half an Hour's Patience the Liquors began to *ferment* very furiously, insomuch that a very great *Smoak* was raised by this Means, which was ordered to be kept down by a Cork that stopped the Vessel. This condensed *red Fume* represented *Flame* by reason of the Beams of the Sun that were permitted to *shine* upon it: But I was assured that this was a great Fallacy, and that the Experiment contradicted the Proverb, *There is no Smoak without some Fire*. I was willing to give the Experiment any Advantage, which made me comply with that Circumstance of doing it where the Beams of the Sun were admitted: But this very Circumstance giving ground to the Mistake, I desired Leave to make the Experiment in a dark Room, where we should better discern any real Productions of *Light*; being assured that the *Action* of the *Liquors* would as certainly succeed in the darkened Room as in a light one. The Experiment was repeated, and the *Action* of the *Liquors* was no less vigorous than in the former Experiment. Moreover, *Flax* being looked upon as a very combustible Matter, was suspended in the *Fume*. But in short, the Observers of this Experiment, which were many, and very inquisitive, could not discover the least Spark of *Fire* or Glimpse of *Light*; so that the *Flax* remained untouched, and the *fermenting Liquors* gave no *Light*, *Fire*, or *Flame*; only take this Caution, keep your Candles at a Distance, or the *Fume* will soon take *fire* at any actual *Flame*, and set the Liquors a *burning*, and so it may impose upon the Careless.

4. Amongst those various Mixtures, wherein great *Heats* and *Effervescencies* with much *Ebullition* were produced, none were so considerable as this: Upon an Ounce of *Spirit of Nitre*, if you pour 2 or 3 *Drachms* gradually of the *highest rectified Spirit of Wine*, the *Heat* and *Ebullition* will be incredibly great. And whereas, in the former Experiment, you must wait a good Time for

for your *Effervescence*, here it is performed in an Instant ; so that I had more Reason to expect, from the mighty *Action* of these *Liquors* upon each other, a Production of *actual Fire* or *Flame*, than from *Borrichius's* Experiment.

Possibly some may be ready to imitate this Experiment, which may fail them, unless they observe some little Directions. Errors of this Kind have made some People believe they are imposed upon, when there is no such thing. *Common Spirit* of *Nitre*, such as was first distilled into Water, and afterwards *deplegmed* (or distilled so as to have all the Water separated) this will fail your Expectations ; it must be the *red Spirit* of *Nitre*, and a very *high rectified Spirit* of *Wine*. In the next place, you must first pour into your Glass the *Spirit* of *Nitre*, which is the heavier Liquor, and then the *Spirit* of *Wine* after ; for if you invert the Order, you will have no *Ebullition*, which will not a little puzzle the Reason of Philosophers.

In this Experiment (especially if the Ingredients are made very *high*) the *Spirit* of *Nitre* does as it were act the Part of a *Coal* of *Fire* ; as *Fire* exhales and drives up Water that is thrown upon it, so does this *Spirit* of *Nitre* very furiously throw up a great Quantity of the *vinous Spirit*, insomuch that it presently perfumes a Room with the Smell. But to be more exact in this Observation, we mixed equal Parts together in a *Retort*, and then cemented a *Receiver* of good Dimensions, and so we condensed that Vapour which rises from this Mixture, and obtained much of our *Spirit* of *Wine* again.

Both these Experiments may serve as Arguments against the Notion of *Acidum* and *Alkali*, since mighty Conflicts may be excited by Bodies of differing Textures, where these two Principles are not conspicuous. We have here indeed very strong *Acids*, but in the other never were any *Alkali's* suspected whether *volatile* or *fixed*: Nor can I think that the latent *Alkali*, imagined to be in the *Spirit* of *Nitre*, does produce this great Conflict ; for I question whether there be any such Thing: If it be an *Alkali*, it has quite lost its Property, that it is not wrought upon by so strong an *Acid* in whose Bosom it lies. Wood may as well remain incombustible in a great Fire, as such an *Alkali* under the Power of so great an *Acid*. But this is only a Hint.

5. There are various *Liquors* whose Mixtures are apt to produce greater or lesser *Effervescencies*, *Heats* and *Inflammations* ; so that particularly the great *Incalescence* and *Burnings* in *Fevers* are easily accounted for, and made obvious by occurring Experiments. There seems more Difficulty to account for some *cold* Disaffections of the *Blood* and other Juices of the Body. For *hysterical* Persons will complain of a great *Chilness* or *Frost* in the *Blood*, during that *Paroxysm*, such as a good Fire and warm Cordials will not easily conquer. In these Persons the *Pulse* is always very tardy (differing from what I have observed in *Agues*, where in the *cold Fit* it has been very quick.) This may be better explicated by a Solution of *Sal Armoniac* than of *Nitre* in *Water*.

In about a *Pint* of *Water* we dissolved about a *Quarter* of a *Pound* of *Sal Armoniac*, which was found to be so very *cold* to the Touch, that we needed no *Weather-Glass* to convince us of the Effect.

In this Experiment we have no *Ebullition* or *Swelling* of the *Liquors*, but rather a *Condensation*, which may also happen in the *hysterical frigid Paroxysm*; for in case the *Humours* swelled, they would require more *Space*, which perhaps is not to be allowed, but must then be compensated by the *Acceleration* of the *Pulse*, which would then be obliged to transmit the extended *Humours* in a shorter *Time*; but this is not our *Case* here, but refers to the next. I here chose to explain the *Affections* of the *Blood* by the *Solution* of *Sal Armoniac*, that (as we said in our Experiment) affected the *Blood* of those Persons that long touched it, with a sensible and troublesome *Degree of Cold*. For the *Mass* of *Blood* may be very apt to degenerate into such *Concretions* as do much resemble *Sal Armoniac*; and this will seem more probable, if we consider that *human* and other *Blood* naturally abounds with *urinous Salts*, and do preternaturally degenerate into *acrimonious* and *pungent Juices*, which may be much promoted by a too liberal *Use* of high-seasoned or salted *Meat*, and sour *Liquors*. For this we find by *Experience*, that such an *Acid* as *Spirit of Salt* mixing with an *Urinous*, will be converted into *Sal Armoniac* (which has now lost much of its *volatile Nature*.) This we may plainly discern by its shooting into a *Figure* that resembles *Feathers*, which is proper to *Sal Armoniac*. That the *Blood* does abound with various *Sorts of Salts* is not to be doubted; and that it has such a *Salt* as some call *Salsum*, which is *Sea-salt*, I lately exhibited at the *Royal Society*: And lastly, that *Sal Armoniac* has its principal *Dependance* on great *Quantities of volatile Salt* (such as the *Blood* is stored with) and on this mentioned *Salt*, is very well known. So that having presupposed such *Concretions* as these to have their *Existence* in the *Blood*, we must consider how they come to act. That there may be some antecedent and other concomitant *Causes of hysterical Passions*, I do not deny; I only, or principally consider the *Cause* of the *cold Affections*.

It is very probable that the *Glands* do suffer great *Obstructions*, which are antecedent to this *Paroxysm*: I am the rather inclined to this *Opinion*, by reason of so great a *Thirst* as our *Patients* are apt to complain of before, and in the *Fit*; by which *Obstructions* the usual *Secretions* of the *Lympha* are hindered as well from watering the *Mouth* as the *Oesophagus* and *Stomach*, which causes *Thirst*. Moreover, the less *Quantity* of *Lympha* is evacuated the usual *Way*, the more is absorbed by the *Veins*, which does so dilute those *Salts* in the *Mass* of *Blood* as brings them to a *Fluor*, or such *Solution* as is necessary to give the *cold Effect*. Thus *Sal Armoniac* will mix with some *Liquors* and not with others; scarce at all with *Spirit of Wine*, and not so well with *Wine* as *Water*; and the more limpid the *Water* is, the better and sooner it dissolves, and to this *Menstruum* does especially impart this *cold Operation*. Which not unreasonable *Conjecture* of an extraordinary *Effusion* of *Lympha* into the *Mass* of *Blood* at such a *Time*, is further confirmed by that great *Quantity of Urine* those Persons are apt to make; which has made some fear a *Diabetes* that have not been well versed in such *Cases*: For the *Urine* here will look very pale and limpid. And this may be further
proved,

proved, that when the *cuticular Glands* are hindered from doing their *transpiring* Office, particularly by any cold ambient Fluid which happens to them that go into Water, that then they are obliged to throw off greater Quantities of *Urine*, which has been observed by me to be very pale and insipid after a 2d or 3d Evacuation.

6. If we take any *Acid*, whether of *Vinegar*, *Verjuice*, *Wood-Sorrel*, *Oranges*, *Lemons*, or perhaps yet milder ones, by casting into these Juices a *volatile Salt* of *human Blood*, I always observed a notable *Ebullition* would ensue, which I never could find would *beat*, as such boiling Liquors are apt to do (and one would expect they should) But on the contrary, affected a good *Weather-Glass* so as to make the Liquor descend, which was a manifest Token of *Cold*. There I found that the higher the *Acid* was, the greater the *Ebullition* and the *Cold* would be; which is very remarkable. For this Reason I made use of very strong *Vinegar*, dephlegmed by *freezing* (which Way is taught by the honourable Mr. *Boyle*, to whose great Favour and Manuduction I must ascribe whatever Service I shall be able to do *Experimental Philosophy*) and by this Mixture we came much nearer the *freezing Point*. But since it proves troublesome to prepare this *Vinegar*, and because it can be done only at certain Times, I have most commonly made the Experiment with *Spirit of Venus* or *Verdigrease*, which is the highest *Vinegar* in the World: With this the *Cold* will be most sensible to the Touch, and most conspicuous on the *Weather-Glass*. For by this Mixture I have in the *Summer* made a *Weather-Glass* to descend below the Temperament of cold Fountain-water, 6 *Inches* at least, which brought it so near the *freezing* Mark, that it scarce wanted *half* an *Inch*. But at the same Time the Liquor *swells* and takes up more Room than before, and will not be contained in shallow Vessels. In this Experiment we have some Things very rare, that a great and violent Motion of two dissenting Liquors, should be so far from producing *Heat*, as to produce a notable Degree of *Cold*, and that too with a considerable *Expansion* of their Parts. Here we might instance in an apposite and as unexpected an Experiment, where an Effect contrary to our common Observation happens, and that is thus: If you mix with *Oil of Vitriol* a Quantity of *Water*, a great *Heat* will follow without an *Expansion* of these Liquors; whereas *Heat* does constantly produce it in *Wine*, *Water*, and most *fluid* and *solid* Bodies: For here it rather *shrinks* and *condenses*, as you may see by making the Experiment in a Glass with a long Neck, and setting your Mark as soon as you make your Mixture. Both these Instances may a little puzzle the *Cartesian Hypothesis* to account for, though I am far from thinking they are able to destroy it. But to proceed with our Experiments: After I had sufficiently satisfied the worthy Spectators, that the produced Degree of *Cold* was very considerable, I then poured in some few Drops of another Liquor, that soon altered the Temper of our *cold* Mixture, and in two or three Minutes brought it to a Warmth beyond that of the ambient Air, though it was a very warm Sun-shining Day, in *July*.

To apply the Experiment. In the *cold Fit* of an *Ague* we have often a strong and quick *Pulse*, which argues an *Ebullition* (though I dare not call it an *Effervescence*) and quick Motion of the *Blood*, and the *Pains* of the *Head* and other Parts may be due to too great Distress or Extension of the Vessels, which depends on the *Expansion* of the boiling Humours. In this artificial, though *cold* Mixture, we observe a mighty *Commotion* and high *Ebullition* and *Expansion* of the *Liquor*. In the *Blood* and other Juices of the Body we constantly discover great Quantities of *volatile Salts*, and sometimes either from an infected Air, or bad Diet, and from several other Causes, *sour* Juices may be derived to the *Blood*, which may so act upon those *volatile Salts*, the *Blood* so much abounds with, as to give a notable Sense of *Cold*. It is no new thing for us to meet with Patients, that have thrown upon their *Stomach* and *Bowels* (which are the great *Emunctories* of the *Blood*) very *sour* Liquors, such as when they happen to fall upon the *Teeth*, will corrode those hard Parts. Thus in our *Experiment* it is plain, that a foreign *Acid* meeting with a *volatile Salt* drawn from the *Blood*, does produce a *cold Effect*: And since we know no Liquors but a Mixture of this Kind, that gives such a *cold Phenomenon*, it seems not unreasonable to believe that the *cold Fit* of an *Ague* may be due to such a Mixture.

As to the *Incalescence* made in our Mixture, I should have told you, that it was done by the bare Addition of some Drops of Oil of *Sulphur per Campanam*, being a Liquor that owes its Origine to the *Fire*, I suppose it to have borrowed that *calorifick* Quality thence, which made it represent the *hot Fit*: For this I observed, that notwithstanding the Action of the *cold* Mixture, it grew more thick and slimy than it was at first, and that the Addition of the mentioned Oil, or *Spirit of Brimstone*, made it more clear and fluid. Thus the agile Spirits of the human Body, which though they cannot be thought to be actual Fire, yet are supposed to be somewhat analogous to it, being in more abundance poured into the turbid Mass of *Blood*, do by their Warmth and Action first attenuate those gross *Coagulums*, and then manifestly subdue and reduce many of those indisposed Particles to a good Texture, and expel those that are disagreeable by *Sweat* and *Urine*, or both ways; which is a good *Prognostick* of a Cure of that *Paroxysm*.

I shall only add this Objection made, *viz.* That there are no such *Acids* of so high a Degree of *Acidity* found in the human Body as we make our Experiments with. To which I may Answer, that there is no need also of so great a Degree of *Cold* to put our *Blood* into an *Ague*, a small Declination from its usual Temperature, being sufficient to make us very sensible.

7. A Member of the *R. Society* having proposed to try if the *Cortex Peruvianus* would not prevent this *artificial Ague*, we made a strong *Infusion* of our *Bark* in common *Vinegar*, and then injected a Quantity of the mentioned *volatile Salt*, a considerable *Commotion* of the Liquor ensued with a Degree of *cold*, but was not altogether so fierce as formerly; moreover, it abated much of rising to the Height of the former Experiment, when *Opium* was mixed with the mentioned *Cortex*; though in this Case the *Acidity* was
far

far from being quite mortified. As to the *Cortex*, I do not intend in this Experiment, to explain its Nature, which was only made to satisfy that sagacious Gentleman's Curiosity : For I never thought that *Febrifuge* did act the Part of an *Alkali* in performing the Cure. But if I can make it appear that there are other Medicines that do pertain or belong to the Family of *Alkalies*, which are effectual in the Cure of *Agues*, this may serve to prove, that they do it by destroying some morbid *Acidities* in the *Humours* or *Viscera*, and so prevent the usual *Commotions* such disagreeable Liquids are apt to make upon their Conventions. This is manifest, that *Coral* and *Crabs Eyes*, and other *testaceous* Bodies numbered amongst the *fixed Alkalies*, and not only these but those real *fixed Salts*, as *Sal Absynthii*, *Cardui Benedicti*, &c. as well as the *volatile Salts* in general, do highly correct and change *acid Humours* where they can meet them, and not only so, but do hinder Liquors that are apt to sour and corrupt from degenerating (thus *Milk*, and *Blood* itself, may be preserved much longer ; the first from growing *sour*, the last from *fermenting* and *putrifying*, by a Quantity of *volatile Salt* or *Spirit* mixed with them) which is in like manner granted to be true, that many *Agues* have been cured by Medicines of this Nature ; *Sal Absynthii* as well as *volatile Salts* are used as the principal Ingredients in common *Febrifuges*. For a farther Prosecution of this Experiment, we dissolved as much *Chalk* as strong *Vinegar* was able to do, and then having strained it through a Filter, we poured it upon a Quantity of the *highly rectified Spirit* of *Blood*, but found neither *Ebullition*, or any Sensation of *Cold* or *Heat* to follow.

n. 213. p. 200.

XVIII. 1. *A Catalogue of those Oils that will take Fire with a great Noise and Explosion, when the Compound Spirit of Nitre is poured upon any of them; and of those Oils that do only make a great Noise with Explosion, but will not take Fire; and also of those that do not make either Effervescence or Explosion. The first is marked with two Stars * *. The second with one * The last has no Mark at all. By Dr. Fred. Slare.*

O I L S

<p style="font-size: 2em;">{</p> <p style="font-size: 2em;">Vegetable</p> <p style="font-size: 2em;">}</p>	<p><i>Essential</i></p> <p style="font-size: 2em;">{</p> <p>Perfect Stillations made by the Analysis of the chymical Fires, where the oleaginous Particles are truly separated from all other,</p>	<p>Carvi * *</p> <p>Cummin *</p> <p>Fennel *</p> <p>Dill *</p>	<p style="font-size: 2em;">}</p> <p>Seeds.</p>
	<p style="font-size: 2em;">{</p> <p>Light, or <i>Æthereal</i>, which are specifically lighter than Water and Brandy, and some than Spirit of Wine, and are usually drawn from the Seeds of Vegetables: Such as from</p>	<p>Juniper *</p> <p>Bay *</p> <p>Thyme *</p> <p>Wormwood *</p> <p>Angelica *</p> <p>Hysop *</p> <p>Lavender *</p> <p>Rosemary *</p> <p>Penny-royal *</p> <p>Rue *</p> <p>Sage *</p> <p>Savin *</p> <p>Lemons *</p> <p>Oranges *</p> <p>Nutmegs *</p> <p>Cloves * *</p>	<p style="font-size: 2em;">}</p> <p>Berries.</p> <p style="font-size: 2em;">}</p> <p>Tops of Plants.</p> <p style="font-size: 2em;">}</p> <p>Fruits.</p>
	<p style="font-size: 2em;">{</p> <p>Ponderous or heavy, which do commonly sink in Water, being distilled from the heavy Parts either of the Wood or Cortex of Trees. Such as from</p>	<p>Sassafras * *</p> <p>Guajacum * *</p> <p>Box * *</p> <p>Campfire * *</p> <p>Jamaica Pepper * *</p> <p>Cinamon * *</p>	<p style="font-size: 2em;">}</p> <p>Wood.</p> <p style="font-size: 2em;">}</p> <p>Cortex.</p>
	<p><i>Not Essential.</i></p> <p style="font-size: 2em;">{</p> <p>Imperfect, made by Expression, which are decomposed of several Parts of the Plant; as of</p>	<p>Almonds</p> <p>Olives</p> <p>Walnuts</p> <p>Line</p> <p>Rape</p>	<p style="font-size: 2em;">}</p> <p>Fruits.</p> <p style="font-size: 2em;">}</p> <p>Seeds.</p>
	<p>Animal of solid Parts — — — — —</p>	<p>Hartshorn * *</p> <p>Man's Skull * *</p> <p>Hoofs * *</p>	<p style="font-size: 2em;">}</p>
	<p>Fluid — — — — —</p>	<p>Human Blood * *</p> <p>Amber or Succinum.</p> <p>Petroleum.</p> <p>Barbado's Tar</p> <p>Bee's Wax.</p>	<p style="font-size: 2em;">}</p>
	<p>Mineral of — — — — —</p>		

Spirit of Wine will give some Flashes of Fire. Balsam of Sulphur, a compound Body made with Oil of Turpentine and Brimstone, if not too thick, will flame.

You have twelve Sorts of Oils that do make Ebullition, Explosion, and Flame; 18, Ebullition and Explosion without Flame; 4, that produce neither; by the Mixture of our Compound Spirit of Nitre.

2. Take

2. Take of any of the *essential Oils* set down in the Catalogue, one Part; of the *compound Spirit* of *Nitre* two Parts (these may be *Drachms* if you please) and they will, with great Celerity and a great Noise, produce a *Flame* which lasts a very little while, but leaves an insipid *Caput Mortuum*, as light and tasteless as a Cobweb.

A Mixture of two cold Liquors producing an actual Flame. Ib. p. 201.

Note, 1. This Experiment should be made under a Chimney, or any convenient Draught, that so the offensive Steams may evaporate.

2. A Gally-pot spacious enough to hold 4 or 5 *Ounces* of Water, may be a convenient Vessel for this Experiment, if you only use the fore-mentioned Proportion; but if you please to use larger Quantities, then you must enlarge the Vessel.

3. You must put the *Oil* into the Gally-pot first, and then pour the *Spirit* on the *Oil*; because the *Spirit* being heavier, does the better pass through the *Oil*, and make a more expeditious Mixture. This must not be dropped in gradually, but conveyed in all together.

4. Hold not your Head too near the Gally-pot, lest the sudden *Explosion* of the Matter should strike up some of it in your Face.

5. The *compound Spirit* will lose much of its Virtue if kept too long.

3. Take of *Salt Peter* and *Oil of Vitriol* equal Parts, and *distil* these out of a *Retort* in a good *Sand Furnace*, so that the Sand continue red-hot for some Hours; for the *Fire* cannot be too great: The *Fumes* will rise of a very deep red Colour, and will settle in the *Receiver*, in the Form of a *Liquor*, which must be carefully preserved from the Air; this being the *Spirit* with which all our Experiments were made, which are referred to in the Catalogue.

The Way of Preparing the compound Spirit of Nitre. Ib. p. 202.

To make the common *Spirit of Nitre*, you need only to mix 5 or 6 Times as much Clay as you take of *Nitre*, and *distil* them in a *Retort*, and you may obtain a strong *Spirit of Nitre* this Way, especially if you *dephlegm* it, and *rectify* it to the best Advantage.

With this we have made an Experiment of *Accension*, that succeeds sometimes, but with great Uncertainty; but the first, which I call the *compound Spirit of Nitre*, is only to be relied on.

This *compound Spirit* seems to be the active Principle that stirs up the *oily*, or more passive Particles to take *Fire*; which will more easily be agreed to, if we consider that our *compound Spirit of Nitre* does not only consist of all those *igneous* Particles to be found in *common Spirit of Nitre*, but that it has also those *igneous* Particles which *Oil of Vitriol* contains in it, crowded into our *Spirit of Nitre* made this Way.

For further Illustration, let us consider, that *Oil of Vitriol* is a Creature of the *Fire*; that the *Sulphur*, which is plentiful in *Vitriol*, or in *Copperas*, is *accended*, and afterwards *distilled* over in the Form of a *Liquor*, which is a liquid Sort of *Fire*, as having many Properties of it. If you put it to Water, it will make it *boiling hot*: It *burns* not only Linnen and Woollen, but Wood to a Coal, and scarce spares any thing.

Nitre, the other Ingredient of our *Spirit*, is very susceptible of *Flame*, which does also incorporate many *igneous* and corrosive Particles, after it has

so many Hours lain ignited in the *Fire*, comes over, by *Distillation*, very highly impregnated with the same *fiery* Particles; which is obvious to any one that has used to make Experiments with it. For *Nitre* itself has no dissolving or heating Quality, but is a great Cooler, and scarce can be reckoned amongst *Acids*; but after it comes out of the *Fire*, in the Form of a *Spirit*, it tears in Pieces almost all Metals, and brings them to a sort of *Fusion*, as *actual Fire* does: It dissolves Animals and Vegetables, and Minerals; and has many Effects of *Fire*. Therefore from an Union of these two very *fiery Spirits* results a much greater Quantity of *igneous* Matter.

That *Fire* is very apt to incorporate with Fluids, and even such as have had but a small Communication with it, an Experiment, which I formerly exhibited at a *Meeting* of the *R. Society*, makes probable.

We took of *Spirit of Wine*, that was highly *rectified*, a Wine Glass half full, and placed a tender Weather-Glass or *Thermometer* in the Glass, and then put a Spoonful of Water to it; this immediately *warmed* the Liquor, and made the *Weather-Glass* ascend two Inches at least: The Liquor in the *Weather-Glass* subsided as the other Mixture grew *cold*. I made it also sensible to the Touch, by filling the Palm of the then *President's* Hand with *Spirit of Wine*, and putting a small Quantity of *cold Water* into the same Hand, which made it sensibly *warm* his Hand, as well as others that made the Trial. But from this *Spirit*, which is too *volatile* to endure much Communication with the *Fire*, you may expect only a mild tepid *Heat*. I am apt to believe, that there is scarce any thing which lies long in the *Fire*, but is apt to retain some *igneous* Particles; which does appear to be so in all *fixed Salts*, in *quick Lime*, and more particularly in *Iron*. If you take a Bar of *Iron*, though of an hundred Years old, and *file* off about a Pound of it, and then you do mix and imbibe these *Filings* with a due Proportion of *Water*, enough to make the whole just moist; the *Fire*, which all this while lay concealed in the *Iron*, being more disposed to enter into the *Fluid*, does, by these means, *warm* the whole Mass. The *Iron* gained this *heating* Quality by *Fusion* in those fierce *Fires* which first separated the *Metal* from the *Ore*: For it is not in the Nature of the *Ore* before *Fusion* to emit any *Heat*, as I have found by mixing *Water* with it. There are a great many other Instances which make it very plain, that *Fire* will add both to the Bulk and Weight of Bodies; but these affect solid Bodies more manifestly. The Effect itself produced by our *Fluid*, does necessarily prove the inherent *fiery* Particles to have caused the *Accension*.

And this leads us to consider the other Part of our Matter, which, in Conjunction with the *compound Spirit*, causes this *Accension* and *Explosion*.

But here it will not be amiss to premise a Distinction of *Oils* into *Vegetable*, *Animal*, and *Mineral*; having made some Experiments with all these, but most of all with *Vegetable*; for which reason we subdivide again the *Vegetable* into those made by *Expression*, and those made by *Distillation*: And of those made by *Distillation* we distinguish those that are made out of the *Seeds* from those that are made out of the *Trunks*, or *Cortex*, or *Roots*, or any other Part of the *Vegetable*. We further observe a Difference betwixt those

those *Seeds* that have only a fragrant Smell and a pungent Taste alone ; those that have both odorous Emanations and a brisk Taste together ; and those that are insipid, and have no smart Taste.

In the first place we must set aside those *Oils* made by *Expression* : For having tried *Oil* of *Linseds*, of *Nuts*, of *Olives*, of *Almonds*, &c. we found these would not make *Explosion*, or *Ebullition*, or so much as any *Fermentation*, with our *fiery Meteor*. Nor could I, without much stirring, bring them to incorporate ; and when they did incorporate, the *Heat* was but just sensible ; and the Reason may be, because this sort of *Oil*, though it must be allowed to be a true *Pabulum Flamme*, for it may be made to *flame* all away ; yet it is not a true *Oil*, although it must be allowed to have one Property of *Oil*, that it mixes not with *Water* ; yet it doth not stand the Test of the *Fire* ; for if you *distil* it, you may part from it *Water* and *Earth*, and *Soot*, and a true *essential Oil*, which afterward will bear repeated *Distillations* without any further *Dissolution*.

Having set by these *vegetable*, but not *essential Oils*, we will briefly examine the *mineral Oils*, of which there are some, as *Oil* of *Vitriol*, *Oil* of *Sulphur per Campanam*, that have not any Property of *Oils*, but are rather *Acids* and corroding *Menstruums*. There are others which have the true Property of *essential Oils*, as *Oleum Petrolei*, and *Barbados Tar* highly rectified, which do not produce any remarkable *Heat*, much less make an *Ebullition* or *Explosion* : Nor does that active *Oil* of *Amber* do any thing more.

The *stillatitious Oil* of *Bees-wax* had much the same Effect, when it was incorporated with our *compound fiery Spirit* : And this inclines me to believe that the *Wax* itself may be a Compound more belonging to a *mineral* than *vegetable* Nature.

And now we will examine those *essential Oils*, which do produce great *Ebullition*, *Explosion*, and *Flame*, with the *compound Spirit*. Of these we have two Sorts, *Vegetable* and *Animal*.

The true *vegetable essential Oils* do all of them make violent *Ebullition* and *Explosion*, and several do actually take *Fire*, and *flame*, as the Catalogue of Experiments does specify.

If it be inquired into, what Share the *Oil* has in producing this Fire, whether only it be a *Pabulum*, or Fuel, for the *Spirit* to actuate, and so be merely passive ? Or whether it contributes any Particles that do help to excite this *Flame* ?

In order to resolving this Doubt, we consider, that these *essential Oils* are produced from *Seeds* that have very active or warm Parts or Spirits, such as will easily ferment and heat, and having a warming Influence upon our Tongues, and do give Heat to the Stomach and Blood of Animals. That the *Seed* is the System or Concentration of the whole *Plant*, and has *Spirit* or *Ferment* enough lodged in it to assimilate all that insipid watry Element (which contributes Matter to its *Growth*) into its own Nature : From hence the great Quantities of *essential Oils* are produced. 'Tis true, out of the *Trunks*, and *Roots*, and other Parts of *Trees*, we have *essential Oils*

extracted, but with a vast Disparity, there being only a very small Quantity (in Proportion to what is in the *Seeds*) floating up and down the other Parts of the *Vegetable*.

But I am not only to take notice of the potential Warmth of the *Vegetable*, there being, in my Opinion, another Ingredient fit to be observed, which our *essential Oils* may be proved to contain, and that is a *volatile Salt*, which gives much of that Pungency to the Taste. If we consider the constituent Parts of these active *Vegetables*, they much abound with *Salts*, which by a moderate Fire are made *volatile*, and by a violent Fire are *fixed*. This seems to me more than probable by what I have found in a Quantity of *Oil of Cinnamon*, having had it in my own keeping for 20 Years; for about 10 or 12 Years it continued the same, but within these 6 latter Years it has annually let fall some *Salt*, infomuch that it is now one half of it turned to *Salt*, and this without Addition, or any Art used to reduce it to this Form.

There is also separated in *Distillation* of great Quantities of *Vegetables*, as of *Thyme*, *Origany*, *Penny-royal*, &c. a *volatile Salt* of a peculiar Nature (which our excellent Chymist, Mr. *Molt*, first shewed me, and keeps Quantities of it by him): This is very clear, or crystalline; in its *specifick Gravity* a small Matter heavier than Water; and seems to be *Salt* and *Oil* coagulated into a Body: It will not dissolve in Water, but easily evaporates when heated. I now consider these *Salts* as *Alkalies*, which all true *volatile Salts* are: They do presently *ferment* and make great Collision with *Acids*, and therefore I am much inclined to make this Inference, that our *Oil* is not a bare *Pabulum Ignis*, or an unactive Principle, but does, upon a double Account, as well upon the Score of the incalcent *Oil* as of the inherent *Salt*, conspire with the *compound Spirit* to make this great *Heat*, *Explosion*, and *Accension*.

In the *Catalogue* of Experiments, we may further observe, that of the light *essential Oils* drawn from *Seeds* of *Vegetables*, all of them do make a great *Ebullition* with an *Explosion*, but that few of them do actually take *Fire*; and that all of those that are drawn from *Trunks*, or other Parts of our *Vegetables*, do certainly take *Fire*, and *flame*. Wherefore having observed, that those that do not take *Fire*, or *flame*, did yet make as great an *Explosion* and *Ebullition*, and probably as great an *Heat* as those that did, I was apt to impute it to the Lightness and too great Subtility and Volatility of those *essential Oils*, whose very active Particles did too soon exhale or fly away. And this Conjecture is something justified by the Addition of a more ramous Body (which was *Balsam* of *Sulphur* made with *Oil* of *Turpentine*) to our most *volatile* or *subtile Oils*, which then produced a *Flame*, whose Particles being more crass or ramous, will detain the more *volatile Oil* from too quick an *Explosion*, and give more Time to the *fiery Spirit* to penetrate, and mix itself with those combustibile Materials. And this may be one Reason why the *ponderous Oils* distilled from the Roots or ligneous Parts of a *Plant* do all take *Fire*; namely, because the Parts of this Sort of *Oil*, lying closer together, do not so soon dissipate after the *Spirit* is cast
upon

upon it. And then as to the *specifick Gravity*, the Difference is also very considerable, which any one may find by this familiar Way: If you fill a Glass with one Ounce of the *essential Oil* of the *Seeds*, you will require Nine *Drachms* of the *ponderous Oil* of the *Vegetable* to fill up the same Space.

This is also very obvious to any Spectator, that most of these *Oils*, thus distilled, are more *ponderous* than common Water, by their sinking to the Bottom; whereas all our *essential Oils*, drawn from the *seedy* Parts, do swim on Water, and some are lighter than the best *rectified Spirit* of *Wine*, but most are lighter than *Brandy*, which has made our Chymists call them *æthereal Oils*.

In the *Catalogue* of Experiments, you may find which are the *ponderous Oils* that do constantly take *Fire*. Moreover, the *ponderous Oils* have yet one Advantage above the *lighter volatile Oils*, they having been exposed to a longer and stronger Degree of *Fire* than the others, and so do incorporate more *igneous* Particles with themselves, which, being put in Motion, may contribute something to cause this *Accension*.

The *Oils* distilled from *Animal Bodies* do all of them take *Fire* and *Flame*, but with this Difference, they do not make so great an *Explosion* as the *Vegetable* do, but do more certainly take *Fire*, and will continue their *Flame* longer, but not so fierce as the other. If we rightly examine the Constitution or Texture of this *Oil*, we have several Properties adapted to the Production of this Effect. You have a much greater Degree of *Fire* required in the *Distillation* of this *Oil* than is necessary for that of the *Vegetable*. You have also a great Quantity of *volatile Salts* (which are true *Alkalies*) that do pass over with your *Oil*: And you have a *ponderous Oil*, that sinks in Water; which being considered, and weighed together, do make it equitable to expect a more constant *Accension* from the *animal Oils* than from any other.

Oleum Succini is justly put in the *Catalogue* of *Minerals*, and is produced by a strong Degree of *Fire* (as is above-mentioned), yet does it not make any *Motion*, and scarce any *Incalescence* with this *Oil*, notwithstanding its abounding with *volatile Salts*: The Reason is, because these *Salts* are not properly *volatile*, as *Alkalies* are, but do belong to the Family of *Acids*, and so can make no *Ferment* with this *compound Spirit*, which is itself highly *Acid*.

Having now made it plain and easy for any one to make two Liquors, actually cold, without any adventitious *Heat* or *Fire*, boil up to *Flame*, it will seem strange that, after so many Experiments made in the World, by all Sorts of *Chymists*, and with all manner of fermenting and *fiery* Ingredients, none should have discovered a certain Way of producing this great and desirable Effect. For though I will not question the Veracity of the great *Borrichius*, who declares to the World, that he made his *Oil* of *Tur-* Vid. Sup. Sect.
pentine and *Spirit* of *Nitre* to take *Fire* and *flame*; yet, for my Part, after XVII.
so many unsuccessful Experiments made with the greatest Accuracy I could,
I must still own my Incapacity to perform it: But if you add some Drops
of

of *Balsam of Sulphur* to that *Oil of Turpentine*, the Effect will then very certainly succeed, and your Mixture advance to an actual *Flame*.

Explosion and
Accension
made in Va-
cuo. *Ib.* p.
212.

I shall venture here to add one surprising Effect of this *fiery* Mixture, which was done in the Presence of several Spectators.

We took *half* a *Drachm* of the *Oil of Carvi-seeds*, and poured it into a little Gally-pot, and placed over it a *Glass* that held 3 *Pints*, upon *Monsieur Papin's exhausting Engine*; and having soon cleared it of the *Air*, we turned up the *Phial*, in order to see what Effect would ensue, in this Sort of *Vacuum*, upon this Mixture: But, in the twinkling of an Eye, the *Receiver* was blown up, and the Mixture in a *Flame*; which stupendous Phænomenon surprised and frightened us all: Nor did I ever see or hear of the like by any Mixtures made in *Vacuo*, though I have myself seen a Thousand. For if we look into these many and admirable Experiments made by the immortal *Mr. Boyle*, the Removal of the *Air* did almost always extinguish *Light*, and *Fire*, and *Flame*.

The *Blowing up* of the *Glass* does also make the Experiment the more astonishing, and puzzles one how to account for so great a Quantity of *Air* as was produced from these Liquors, which amounted only to a *Drachm* and *half*; for here was required not only *Air* enough to fill up the Capacity of the Vessel, but also there was required so great a Pressure within as did exceed that great incumbent Weight of the *Air* that pressed upon this capacious *Glass* without (whose Diameter was 6 *Inches*, and the Depth above 8), for otherwise it would not have thrown it up into the *Air*.

If we review and consider well the Phænomena of this Experiment, we may find the Resistance of some hundred Weight that was countervailed; and not only so, but with a much greater Force exploded.

That it was not produced by an Expansion of the common *Air*, for that was seen to rise out of the Liquors themselves, and was drawn out of them in their separate State, by the *exhausting Engine*, which suffers no *elastic Air* to lie concealed in Liquors.

That it was produced in an Instant, by the mutual Collision and Agitation of these active and self-expanding Liquors.

That it was not absolutely generated *de Novo*, but that the *Air* was antecedently there, we may reasonably believe, although in a very differing State from what it is in when *in pleno*. For all that the *exhausting Engine* does, is to deliver the *Air* from a State of Compression, by leaving it to stretch itself like a Bladder, that has full Liberty to swell up, and has no hard Body to strengthen or oppose its Expansion: So that we have Cause to conclude our Liquors to be furnished with this sort of *Air*, which, being by the *Accension* of these two Liquors put to a new and violent Motion, do expand themselves *de Novo*, and to that Degree, as to answer so great an Effect as is above-mentioned.

5. The Circumstance of which Phænomenon will allow me to call this Mixture a sort of *liquid Gun-powder*, which brings me to make a Comparison betwixt *Gun-powder* and the *fiery Mixture*.

These

These *Phænomena* agree, in that both do *heat*, and *burn*, and *flame*; and also do considerably resist and raise up Bodies that do oppose them. In both, the *Air* is much agitated and *expanded*: For in *Gun-powder* you have much *Air* coil'd up and included in Particles of *Nitre*, which the *Brimstone* and *Charcoal*, by their sudden *Accension*, do violently expand and swell to that Degree, that, like a Storm of Wind, it bears every heavy and resisting Body before it, especially when it is compressed or restrained within just Bounds.

The Experiment just above-mentioned can only account for that *Explosion*, by charging it to some little concealed *Air* our *fiery Mixture* expanded; in so much that I doubt not, that if a Way were invented (which seems to me not impracticable) to make it go off as *Powder* does out of a *Gun*, it would project a heavy Body a great way.

We further made an Experiment *in pleno*, or after this manner.

We put a small Quantity of the *Oil* in a Gally-pot, and some of the *Spirit* in an open Glass, and fixed a Plate of Copper upon the Gally-pot, so as to cover it pretty exactly, and then set a Weight upon the Plate, and pulling a String, made the *Spirit* to mix with the *Oil*, which did at that Instant *blow up* the Cover, and throw off the *Weight*.

But though it doth in some Respects agree with *Gun-powder*, yet in others you see a great Disparity; for *Gun-powder* will not be made to take *Fire*, or make any *Explosion in Vacuo*, both which this Mixture performed with the same Celerity it did in the *Air*.

*Vide Par. II.
Cap. I.
Sect. LXXIX.*

Gun-powder is a Composition of the most *dry* and combustible Materials we can pack together; in our Mixture of two *Fluids*, one of them is not easily made to *burn* by itself, and the other will extinguish common *Fire*.

Gun-powder requires actual *Fire* to bring it to an *Accension*, whereas in this you have only two Waters or Liquors, both *cold* to the Touch, that do produce *Fire* and *Flame* by the bare joining and mixing them together.

And now we will conclude this Experiment, only taking notice of the *Caput Mortuum* (as *Chymists* call it), or what remains after the *Accension* is over; which seems to be something uncommon.

In case you have adjusted the Proportion of *Spirit* to the *Oils* exactly well, you will not fail to make the Mixture *flame*: And upon the *Extinction* of the *Flame* you will have a light and blackish Substance, which will indeed vary both as to the Bulk and Complexion, according to the Difference of the *Oils*. But in this they all agree, namely, to leave behind a spongy and exceeding light Matter, and perfectly *insipid*. Sometimes it swells up into a great Protuberance, and as big as a Man's Fist above the Gally-pot; and if you *taste* it (which you may safely do) and macerate it in your Mouth, you will find it to be as *tasteless* as Paper, or even Paper when burnt to Ashes. In so much that we may safely conclude, that by this powerful Mixture a third *solid* Body results, absolutely differing from either of the two mentioned *Liquors*: And which makes it the more remarkable, that both these *Fluids*, which have so great an Impression upon the Organs of *Smell*, and a very

great

great one on the Organs of *Taste*, should in an Instant be destroyed, and terminate in a *dry insipid Caput Mortuum*, which will not melt in the *Air*, nor be dissolved by *Water*, nor other corrosive *Menstruums*, but remains as much a *Caput Mortuum* as a Piece of Paper, or a Rag burnt to Ashes, if not much more.

Upon a Review of the Whole, this Experiment will possibly not only surprise and amuse some, but please and delight others; and not only so, but perhaps afford some Instruction to a Philosophical Genius. By this the Power of *Motion*, in order to the producing those great Effects of *Heat*, *Fire*, *Flame* and *Light*, may be considered; the Nature of *Oils* somewhat examined and distinguished; the Productions of new Bodies by the Power of *Mixture* represented; and I hope, in time, some mechanical Use made of it, at least it is heartily wished so.

R. S. Vid.
Sup. Sect.
XVII.

Mr. Mott, a most ingenious Chymist, and deservedly a *Fellow* of the *Royal Society* (to whom I must acknowledge an Obligation for the liberal Use he allowed me of his great and excellent Collection of *Essential Oils*) affirms to me, that he hath sometimes made *Oil of Turpentine* take *Fire*: But yet it proves so hard a matter to bring it to an *Accension*, that he is always doubtful of the Success.

I know, that if a *Candle* be brought any thing near the *Smoke* raised by this Mixture, then the *Oil* will certainly take *Fire* from the *Flame* of the *Candle*. Not but that I am glad of this or any Opportunity to do Justice to the Memory of the famous *Borrichius*, who has printed an Experiment of this sort in the *Acta Hafniensia*.

Mr. Mott did also inform me, that *Spirit of Wine* would give a *Flash* of *Light* with this *Compound Spirit*, but not *burn*; and he has observed the same Circumstance in his Experiment, which I did formerly (in the Year 1683), that if you put your *Spirit of Wine* to that of *Nitre*, you will have a great *Efferescence* immediately ensue; but if you invert the Order, and put the *Spirit of Nitre* on the *Spirit of Wine*, you will not have any *Ebullition* for some time: But this Circumstance is quite contrary to all the other Experiments we have made about the *Oils*.

That the *Spirit of Wine* does not take *Fire*, seems to proceed from the same Impediment, which hinders *light Oils* from coming up to an *Accension*, because they are so suddenly thrown off; and there seems to be a great Analogy betwixt *æthereal Oils* and the *Spirit of Wine*, both as to *specifick Gravity*, and as to all other Properties; *Spirit of Wine* seems to be a more thin and diluted *essential Oil*, that contains some *Water* and more *Air* in its Pores; they seem to own the same material Cause: For if you distil an *essential Oil* out of any *Seed*, you shall not then be able to produce any *Spirit*, and *Vice Versa*, if you distil off the *Spirit*, no *Oil* will follow. There is also a great Affinity in Texture; for the *Spirit* and *Oil* do easily unite and mix together, especially if the *Spirit* be highly *rectified*, and have less of *Water* or other heterogeneous Matter in it; as any one may find, if he will take the Pains to shake a true *essential Oil* with *Spirit of Wine*, a good Proportion of the former will incorporate with the latter.

XIX. I have found a *sulphureous Spirit*, which being mixed with a *volatile Alkali*, such a *Spirit of Sal Armoniac*, or *Urine*, &c. gave it a *red Colour* in a Moment. I make the *Spirit* by *distilling* 2 or 3 Pounds of *Ben-zoin* with a little Sand in a *Retort, ad Siccitatem*, and put the *Oil, Spirit, and Flowers* all together into a *Paper Filtre*, and the *Spirit* comes *first* through. You may put two Parts of this *Spirit* to one of *Spirit of Sal Armoniac*, and shake the *Glass* or *Bottle*, and it will be *red* in a Moment, though both the *Liquors* were clear before; and the more the *Glass* is shaken, the deeper or blacker *Red* it will be. It produces this Effect without any *Effervescence*. This Experiment may, perhaps, be serviceable in the demonstrating of *Sanguification*.

*A clear sul-
phureous Spi-
rit, which be-
ing mixed
with a vola-
tile Alkali,
gives a red
Colour; by
Mr. Edw.
Coles. n. 228.
542.*

XX. To make the *first* of these *Liquors*, put a small Handful of *dried red Roses* into a *Glass Bottle*, pour on them *rectified Spirit of Wine*, till it cover them an Inch. Let them infuse in the Cold all together in the *Bottle* for 4 or 5 Hours, then pour off the *Spirit of Wine*, which will be clear, and have no Colour.

*Two clear in-
flammable
Liquors, which
being mixed,
give a Carna-
tion Colour;
by Mr. Geof-
fery. n. 249.
p. 43.*

This *second* *Liquor* is made by putting into some good *Spirit of Wine* some Drops of good *Spirit of Vitriol*, or *Oil of Sulphur*, so that scarce can the *Acid* or *Sour* be discovered by the *Tongue*.

If you put a little of this *last* *Liquor* into the *first*, it will give a fine *reddish Colour*, without any *Effervescence*, or other sensible Alteration.

If, instead of this *Wine* mixed with *Acids*, you put to the *first* some Drops of any *volatile Alkalies*, as of *Spirit of Sal Armoniac*, or other, it will give a *green Colour* to the Infusion.

XXI. An ingenious Teacher of *Mathematics* having Occasion to make a Composition for a new *Fire-Engine*, whereof he was to shew his Majesty a Trial, mingled divers Ingredients in an earthen Pot, over kindled Coals; but could not, or did not, do it so warily, but that the Matter took Fire, and began to blaze furiously; which obliged him to stifle the Flame as hastily as he could: And having removed the Vessel from the Fire, and suffered it to grow cold, when afterwards he came to look upon it, to see if what remained might be of any Use to him, he was surprised to find it variously and briskly moved. Wherefore having set it aside, and to be sure that it might be thoroughly cold, he, after some Hours, visited it again, and found it move as before. And having cast Store of Seeds upon it, to see if the *Liquor* would move them also, the bituminous Part of it connected them into a kind of thick Scum, that covered most of the Superficies; but yet left some Intervals, in which the *Liquor* appeared, and discovered, that it continued its *Motions*. Two Days after, the Engineer discoursing with me of his *Fire-work*, about which he had advised with me before, told me, among other things, of this odd Accident. And when I had asked him, if the *Motion* continued still, and had been answered affirmatively,

*A strangely
self-moving
Liquor; by
Mr. Robert
Boyle. n. 170.
p. 1188.*

tively, my Diffidence or my Curiosity made me engage him to send for the Pot, as it was; partly to be sure of the Matter of fact, and partly to try if the Knowledge I had of the Ingredients, which he had before told me, would afford any Hint of the Cause of so odd an Effect; alike to which in Kind, though not in Degree, I had many Years before devised, and successfully practised the Way of producing.

The Vessel being come, there did appear manifest Signs of such *Motion* as the Engineer had ascribed to it; and therefore I caused it to be set aside in a *Laboratory*, where some *Furnaces* kept the Air constantly warm, and did there and elsewhere, at distant Times, look heedfully upon it, now and then displacing, or quite taking off some of the thick Scum, that too much covered the Surface of it; and by this Means I had the Opportunity to take notice of several Phænomena, whereof these are the chief:

1. I observed, that the *Motion* of this Liquor was not only brisk, but very various; so that, having loosened some small Portions of the Scum from the rest, one of them would be carried towards the Right Hand, for Instance, and another toward the Left, at the same Time. 2. Where the Liquor came out first from under the Scum, it seemed to move the most briskly, flowing almost like a Stream, whose *Motion* upwards had been checked, and as it were reverberated by that incumbent Obstacle. 3. Several *Motions* in this Liquor were the more easy to be observed; because though it were dark, yet it was not uniform, consisting in Part of *oily* and *bituminous* Ingredients, which though they seemed to have but one common Superficies with the rest of the Liquor, yet by their Colours and Power of vigorously reflecting the Light, they were easily enough distinguishable from the rest. And I often observed, that some of the *unctuous* Portions of the Matter, emerging to the Surface of the Liquor, though perhaps at first one of them would not appear bigger than a Pin's Head; yet, in the *moving* forwards, it would at the same time *diffuse* itself circularly, and make as it were a great *Halo*, adorned with the *Colours* of the *Rain-bow*, and so very vivid, as afforded a very pleasant, and at first surprising Spectacle: These Phantasms often nimbly succeeded one another, and lasting till they lost themselves against, or under the thick Scum. 4. The *Motions* of this odd Liquor were not only various, but frequently *vortical*: To be satisfied of which, I sometimes put short Bits of Straw, or Fragments of some such like Stuff, upon the discovered Part of the Surface of the Liquor, by which they were carried towards very distant, if not opposite Parts of the Vessel at the same time. But to make the *vortical Motion* more evident, I several times detached considerably large Pieces of the thick Scum from the rest of the Body, and had the Pleasure to see them *move* both with a progressive *Motion* in crooked Lines, and with a *Motion* about their own middlemost Parts. All this while the Liquor, whose Parts were thus briskly *moved*, was actually *cold* as to Sense. 5. To observe what the Presence or Absence of the *free Air* would do to this Liquor, I caused many Spoonfuls of it, with some of the Scum, to be put into a cylindrical Glass, which, though large itself, had a Neck belonging to it, that was but about the Bigness of one's Thumb, that it might be well stopped with a Cork.

But

But having by this means kept the *free Air* from having a full and immediate Contact with the whole Surface of the Mixture, as it had when that Mixture lay in the wide-mouthed Vessel; I could not perceive the Liquor to *move* to and fro, no not though the Orifice of the Neck were left open; whereas, having at the same time poured some of the Liquor into a very shallow and wide-mouthed Vessel, called, in the Shops, a clear caked Glass, it *moved* rather more than less nimbly and variously than in the great earthen Pot (which yet was of the same Shape), and shewed us many of those *vivid* and *self-dilating Circles*. 6. Though the *Motions* of the Liquor did not seem to be always equally brisk, yet they appeared to continue manifest and various in some Diversities of *Weather*, as to *Cold* and *Heat*, and when I looked on it by the Candle Light, as well as by Day Light.

I kept some Spoonfuls of this Liquor close stopp'd in a Phial, and by this means I had the Opportunity to observe, that when I poured out the Liquor into a wide-mouthed Vessel it would *move* as before, though this were done some *Weeks* after it had been put up. About the Beginning of *June*, that is about five *Months*, or more, after the Liquor was first observed to *move*, to gratify the Curiosity of a *foreign Minister*, and that of some other ingenious Men then present, I caused the Phial to be brought; and having un-stopp'd it, I poured out the Liquor in a conveniently shaped Vessel; in which, after we had suffered it to rest a while, they were delightfully surpris'd to see it *move* (though not, in my Opinion, quite so briskly as before, yet) very manifestly and variously. This encouraged me to think it possible, that it might retain some *Motion*, tho' but languid, 7 or 8 *Weeks* after; and therefore, on the 25th of *July*, I looked upon it again; and having caused it to be poured into a China Cup, it manifested at first a brisk and various *Motion*: But this, after a while, did so slacken, that I began to have some *Suspicion*, that the *Motion* it was put into by Effusion, and the first Contact of the Air, might have given it the greatest Part of its Agitation; but this was only *Suspicion*.

XXII. *A Paper of less general Use omitted; viz.*

A Factitious stony Matter or Paste, *shining* in the *Dark* like a glowing Coal, after it hath been a little while exposed to the *Day* or *Candle Light*; invented by *Christ. Adolphus Balduinus*, and presented by him to the *King*, and to the *Royal Society*. n. 31. p. 788.

XXIII. *Accounts of Books omitted.*

1. **P**harmacologia, seu Manuductio ad *Materiam Medicam*; in qua Medicamenta *Officinalia Simplicia*, hoc est *Mineralia, Vegetabilia, Animalia*, eorumque *Partes*, in *Medicina Officinis* usitata, in *Methodum naturalem Digesta* succinctè & accuratè *Describuntur*, cum *Notis Generum Characteristicis, Specierum Synonymis, Differentiis & Viribus*. à *Sam. Dale*. n. 204. p. 925.

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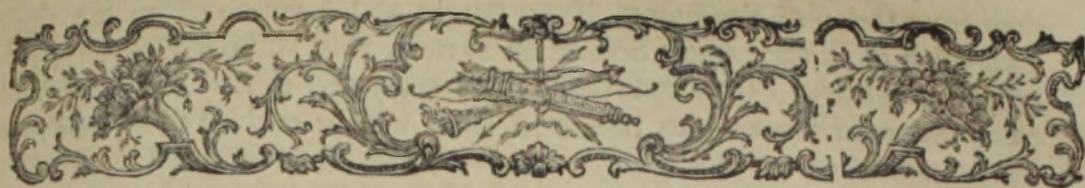
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2. *Medicina*

- n. 192. p. 488. 2. *Medicina Hydrostatica*, or *Hydrostaticks* applied to the *Materia Medica*; shewing how, by the Weight that divers Bodies used in *Physick* have in Water, one may discover whether they be *genuine* or *adulterate*; by the Honourable *Rob. Boyle*. London, 1690, in 8vo.
- n. 76. p. 2287. 3. *Dan. Ludovici*, Medici Ducal. Saxo Gothani, de *Pharmacia* Moderno Seculo applicanda, *Dissertationes Tres*. Gothæ, 1671, in 12mo.
- n. 60. p. 4087. 4. *Hermann Grube*, M. D. *Commentarius de Modo Simplicium Medicamentorum Facultates Cognoscendi*. Hafn. 1669. in 8vo.
- n. 85. p. 5023. 5. A rational Way of preparing *Animals*, *Vegetables* and *Minerals*, for a *physical Use*; by *Edw. Bolnest*, Med. Reg. Ord. Lond. 1672, in 12mo.
- n. 75. p. 1176. 6. *Pharmacopœia Regia*, sive *Dispensatorium Novum Locupletatum & Absolutum*, cum annexa *Mantissa Spagyrica*, & *Gemino Discursu Apologético* contra *Ott. Tachenium*, & *Franc. Vernis*. Auth. *Job. Zwelfer*, M. D. 1668, in Fol.
- n. 123. p. 709. 7. *Pharmacopœe Royale, Galenique & Chymique*, par *Moyse Charas*, à Paris, 1676, in 4to.
8. The *Royal Pharmacopœia Galeno-chymical*, according to the Practice of the most eminent and learned Physicians of *France*, and published with their several Approbations; by *Moses Charas*. In *English*.
- n. 133. p. 833. 9. *Pharmacopœia Collegii Regalis*. Lond. 1677, in Fol.
- n. 206. p. 1000. 10. *Pharmacopœia Bateana*; or, *Bates's Dispensatory*, translated into *English* by *Will. Salmon*. Lond. 1694, in 8vo.
- n. 264. p. 612. 11. *Pharmacopœia Harlemensis*, Senatus Autoritate munita. Harlemi, 1693, in 12mo.
- n. 52. p. 1058. 12. *Histoire Naturelle des Animaux, Plantes, & Mineraux*, qui entrent dans la Composition de la *Tberiaque D' Andromachus*; par *M. Charas*. A Paris, in 12mo.
- n. 74. p. 3237. 13. *De Laudano Opiato*, Auth. *Matth. Tillingio*, M. D. *Francofurti*, 1671, in 8vo.
- n. 99. p. 6166. 14. *Pharmaceutice Rationalis*, sive *Diatriba de Medicamentorum Operationibus* in Humano Corpore: Auth. *Tho. Willis*, M. D. *Oxon.* 1673, in 4to.
- n. 39. p. 779. 15. *Olai Borrichii*, Med. Reg. de *Ortu & Progressu Chemiæ* *Dissertatio*. Hafniæ, 1668, in 12mo.
- n. 50. p. 1019. 16. *Ottonis Tachenii Hippocrates Chymicus*. Venetiis, in 12mo.
- n. 135. p. 886. 17. A new Treatise of *Chymistry*, &c. Written in French by *Christ. Glasser*, and now faithfully englished, by *F. R. S.* Lond. 1677, in 8vo.
- n. 175. p. 1183. 18. A Course of *Chymistry*; by *Nic. Lemery*, M. D. translated from the French, by *Walter Harris*, M. D. Lond. 1686.
- n. 175. p. 1186. 19. *Officina Chymica Londinensis*. Opera & Studio *Nicolai Staphorsii*. Lond. 1685, in 12mo.
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The End of the First Part.



THE

Philological and Miscellaneous Papers,

PUBLISHED and DISPERSED in the

Philosophical Transactions,

AND

COLLECTIONS,

ABRIDGED and DISPOSED under

GENERAL HEADS.

CHAP. I.

PHILOLOGY.

GRAMMAR.


 HAVING observed a great Difficulty in truly *writing* what *An Essay to-*
 is pronounced, or truly *pronouncing* what is written, either *wards an*
 in our own or foreign Languages, by the ordinary *Universal*
Al- *Alphabet;*
phabets now in Use, arising either from the want of some *by Mr. Lod-*
 Letters, or the differing Pronunciation of the same Cha- *wick. n. 182.*
p. 126.
 racters or Letters in differing Languages, and the Irregularities of its
 various Sounds in any one Language, I saw a Necessity of some such
 Expedient as I have here attempted, *viz.* An *Universal Alphabet*, which
 should contain an Enumeration of all such single Sounds or Letters as are
 used

used in any Language. By the Help of such a Collection being perfect, 1. Children from their first Beginning, being taught and accustomed to the true Expression of all these single Sounds or Letters, will, without Difficulty, be brought to *pronounce* truly and readily any Language. 2. Any one accustomed to the true *Pronunciation* of this *Alphabet* will be enabled to *describe* the *Pronunciation* of any Language whatever, that shall in his Hearing be distinctly pronounced; so as another also accustomed to this *Alphabet*, although he before never had heard this Language pronounced, shall notwithstanding at first Sight of such *Writing*, be able so truly to pronounce it, that it shall (if at all) very little differ from the original *Pronunciation*. 3. This *Alphabet* will also be useful to *perpetuate* the true Sounds of any Language, and serve as a Standard thereof to After-ages: For if all the single Sounds expressible be here *characterized*, and that no one *Character* have more than one *Sound*, nor any one *Sound* be expressed by more than one *Character*, it cannot fall out that any *Character* should be *falsly pronounced*, but it will soon be discovered; for this *false Sound* he giveth it must be the *true Sound* of some other *Letter* of this *Alphabet*.

In this Collection I proceed according to these Rules. 1. That no true *single Sound* can be truly described or expressed by the *Conjunction* of any two or more other single Sounds; *viz.* If a *Vowel*, by the *Conjunction* of other *single Vowels*, or if a *Consonant*, by the *Conjunction* of other *single Consonants*.

2. That whatever *Sound* cannot be expressed or described but by the *Conjunction* of two or more single Sounds, is no *single*, but a *compounded Sound*.

3. That in every *Composition* of *single Sounds*, the particular single Sounds which make up that *Composition* ought to be truly and clearly discerned in the *Sound* of the *Composition*, otherwise it cannot truly be said to be a *Composition*, and composed of such *single Sounds*.

The *single Sounds*, usually named *Letters*, are commonly distinguished into *Vowels* and *Consonants*. *Vowels* are such as are *singly* expressible, as *a, e, i, o, &c.* *Consonants* are such as cannot *singly* be expressed without the *Conjunction* of a *Vowel*, as *b, d, f, g, &c.*

The whole Number of *Vowels* are these 14 following; to which, for the better discerning of their *Sounds*, I have annexed so many Words wherein they are expressed, all *English* but 3, *viz.* 7, 8, 12; because no *English* Words occurred to my Memory, wherein they are expressed.

1 a as Tall	5 ea Teal	9 y Tile	13 oo Tool
2 a Tallow	6 i Till	10 o Tone	14 ou Could.
3 a Tale	7 u Dure, French	11 u Tunne	
4 e Tell	8 ui Muis, Low-Dutch	12 u Une, French.	

These are the *Vowels*, each of which are *long* and *short*: *Short* as in the Words, *God, Man, Sin*; *long* as in *Ball, Demand, Seen, &c.*

A *Diphthong*, in the ordinary Use of the Word, signifies a Compound of *two Vowels*; but those in ordinary so named, are most of them nothing but only

only *single Vowels*, as *ea*, *oo*, *eo*, *ai*, in the Words, *Teal*, *Fool*, *could*, *People*, *Main*, &c. That these are but *single Sounds*, will appear, if we consider the Sounds of the *Vowels singly*, that make those supposed Compositions; and then whether those Sounds in Composition will make out the true Sound required, so as both of them may be *clearly discerned* in these pretended *Compounds*. For instance, in *ea* in *Teal*; consider the Sound of *e* in the Word *sent*, or in the Word *Scene*; and *a* in the Word *Ball*, or in the Word *and*, or in the Word *Tale*; and then whether *e*, in either of the two Sounds going before, and *a* in either of the three Sounds following, joined together, will make out the true Sound of *ea* in the Word *Teal*: If not, then it is a *single Sound*. Thus, if you proceed to examine all the other, you will, I doubt not, find the same Event, and, I believe, the true *Diphthongs* and *Triphthongs* of the *Greeks* were no other, but a true Expression of the *single Vowels* they joined together, but in so short a time, as both or all three were expressed in the time that ordinarily one single Vowel was expressed.

The whole Number of *Consonants* are these under-mentioned, as nigh as I could collect by examining all the Languages I am acquainted with, or have heard expressed: And I think few, if any *single Consonants* have escaped my Notice, all which, in this following Table, I have ranged in 11 *Files*, and 6 *Ranks*.

	1	2	3	4	5	6
1	B. Bond.	D. Dark.	J. Jest.	G. Game.	=	=
2	P. Pond.	T. Tart.	Ch. Chest.	K. Came.	=	=
3	M. Mind.	N. Name.	gn. Seignior. } Fr.	ng. Song.	=	=
4	=	jh. This.	J. Jean. } L. D.	g. Gaen. } V. Valley.	Z. Zeal.	
5	=	th. Thing.	sh. Shall.	ch. Dach. } Folly.	S. Seal.	
6		n. Danse. Fr.				

	7	8	9	10	11	
1	L. Lane.	H. Hand.	Y. Yarn.	R. Rand.	W. Wand.	Fr. signifies French. L. D. Low-Dutch. W. Welsh.
2						
3						
4						
5	lh. W.					
6						

The *first File* contains 3 *Consonants*, the *second* 6, the *third* and *fourth* 10, the *fifth* and *sixth* 4, the *seventh* 2, the remaining *four* each 1; in all 29 *Consonants*.

The *second Rank* in each *File* contains *Derivatives* [so I shall name them], in relation to the *first Rank*, or their *Primitives*, all alike in kind; so also all the *Derivatives* in the 3d, 4th, and 5th *Ranks*, whereby their Sounds will be comprehended.

Those

Those Places filled with two Strokes (=) signify, that *Sounds* may be expressed by the same *Posture* of the *Mouth* with their *Primitives*, answering in kind to those in the same *Rank* wherein they stand; but they would be so like in *Pronunciation* to some others in the *Table*, that the Difference would be too nice for common Discernment; and also for that I have not observed them used in any Language I have heard expressed by a perfect Mouth, I thought it needless to characterise them.

As those of the 4th and 5th *Rank* in the 1st *File* are like those of the 4th and 5th *Rank* in the 5th *File*, and those of the 1st, 2^d and 3^d *Ranks* in the 5th *File*, are like those of the same *Ranks* in the 1st *File*, so those of the 1st, 2^d, 3^d *Ranks* in the 6th *File*, are like those of the same *Ranks* in the 2^d *File*.

Some of these above-mentioned 29 *single Consonants*, are vulgarly supposed *compounded*, as *th*, *ch*, *sh*, *gn*, *ng*, &c. But if you consider the Sound of each *single Consonant* in the Composition apart, and then the *Conjunction* of them in that Order, so as the *single Sounds* may be clearly discerned in the Composition, you will never make the *Sounds* required: And if neither by this nor by any other *Conjunction* the required *Sound* can be made out, it must be a *single*, and no *compound Sound*.

All *single Sounds* ought to have *single* and *distinct Characters*: But it will be impossible in the Use of the present *Characters* or *Alphabets*, to add those wanting, and to correct and limit the Sound of others in Use, thereby to constitute a *perfect Alphabet*, because People, so long accustomed or habituated to the corrupt and differing Expressions of the present *Characters*, will be always subject, on the Sight of the old, to give them those *Sounds* they have been used to, and to *spell* Words according to their old and corrupt Custom, whatsoever Rules shall be set to the contrary. I have therefore, in the following *Table* given a new Set of *literal Characters*, both *Consonantal* and *Vocal*. The Set of *Consonantal* are ranged in the same Method and Order with those in the foregoing *Table*. The *first Rank* in every *File* are those I name *radical Characters*; the other succeeding *Ranks* have each a distinct *characteristical* Addition to distinguish them one from another, which causeth some Complication: But yet I judged it necessary to express the same in the *Character*, the more regularly to sort them into Classes, and to express the *Derivation* of *Letters* of the same *Organ*, the one from the other.

The Set of *vocal Characters* is likewise in the same *Table*. In Writing they are to be placed over the *Consonants*, which they follow in Expression; and whereas some *Syllables* begin with a *Vowel*, place the 12th *consonantal Character* answering to the *Hebrew Aleph*, and over the same place the *Vowel* beginning such a *Syllable*. To distinguish the *long Vowel* from the *short*, add a Prick to the *vocal Character*. The 9, 11, 12, 13, 14th *vocal Characters* are (for want of single Strokes) compounded of the *first* and *second*. The *Diptongs* truly such (as I have before noted) may be made by the *Conjunction* of the *single Vocal Characters* in Order as they follow, and will be easily distinguished from the five foregoing *compounded Characters* of the

the *single Vowels*, because there will not likely occur any *Diphthong*, compounded of the *first two Vowels*.

The *Accent* may be a thwart Line under the *Syllable* that is to be *accented*. The 4 Marks of *Pauses* ordinarily used, namely , ; : . may be continued. The *Characters* signifying the various *Modes of Expression* may be these following, and ought to be placed at the Beginning and End of every Sentence requiring it. [] *Explications*. () *Parentthesis*. || *Emphasis*. ?? *Interrogation*. !! *Wonder*. :: *Irony*.

The Universal ALPHABET.

The Table of Consonants.

	1	2	3	4	5	6	7
1	ʃ l	ʒ d	ʒ j	ʒ y	ʒ =	ʒ =	P l
2	h p	h t	ʒ ch	ʒ k	h =	ʒ =	
3	m m	ʒ n	ʒ gn	ʒ ng	ʒ =	ʒ =	
4	ʒ =	ʒ dh	ʒ j	ʒ g	ʒ v	ʒ z	
5	ʒ =	ʒ th	ʒ sh	ʒ ch	ʒ f	ʒ s	B lh
6		h ñ					
8	h h	ʒ y	ʒ r	ʒ w	ʒ		

The Table of Vowels.

14	15	12	11	10	9	8	7	6	5	4	3	2	1
>	>	>	<	o	<)	c	-	o	c		\	/
ou	oo	ou	u	o	y	m	u	i	u	e	e	e	e

The Lord's Prayer in English.

>
 1 h z b h h z h i q h i m h b m, h p p i i 7 b m m b y m
 = 7 m h m. b y p 7 7 m i m y h q i b i h i b i m h b m. y b
 i b b b i i q i p i q i. i m i z h y b i z y h h h b h b b b i b y
 b h y b b m b h h h b h b i y m b h i b i m i p i i b m h i m
 = h h m h b m i h i p b h i b b h m i b p. b h b m i b b y m
 i m, i m i b h i q, i m i b y p q, b h i b h i m i i b h i m m.

An Essay to-
wards an uni-
versal Pri-
mer; by Mr.
Fr. Lodwick.
n. 182. p. 134.

II. As the present *Alphabets* are imperfect, so are also the *Primers* or first Books, wherein Children and others are taught to *spell* and *read*; *First*, in not having a perfect *Alphabet*: *Secondly*, in not being digested in such a Method, as is fit and proper to teach them as they ought to be taught. For the usual Way of teaching to *spell*, is to dismember every *Syllable* (of more than one *Letter*) into many *Syllables*, by expressing every *Letter* apart, and *syllabically*, and the *Consonants* with such a *Vowel* as they are ordinarily named with, and then requiring them to join these *Syllables* into one *Word*. But how preposterous this Method is, one Instance for all will manifest: Suppose the Monosyllable *Brand* be to be *spelled*, they will teach them thus to dismember it, *Bee, er, a, en, dee*, and then require them to join these into one *Syllable*, which it is impossible to do, and they must be necessitated as they have begun, to express this one *Syllable* by five *Syllables*, which was not designed; whereas they should teach them to express every *Syllable* intire at first Sight, without dismembring it. And to do this, they must proceed gradually; first beginning with the most *simple Syllables*, and so by Degrees proceeding to the more difficult and *compound-ed*, till they can readily pronounce a whole *Syllable* at first Sight, even the most difficult that are. To that End, let all the *Primers* be thus contrived; at the Top of the Leaf, let all the *Vowels* be placed *singly* in Order as they follow in one *Rank*: And under the same, place *Syllables*; *first*, of one *Vowel* and one *Consonant* following it, throughout all the Variations; then of one *Consonant* and one *Vowel* following; *Secondly*, of two *Consonants* before, and one *Vowel* following, throughout the Variations; *Thirdly*, of one *Vowel* and three or four *Consonants* following; and of three *Consonants* going before, and one *Vowel* following; *Fourthly*, of one, two or three *Consonants* going before a *Vowel*; and one, two, three or four *Consonants* following; *Fifthly*, some *Syllables* with *Diphthongs* or *Triphthongs*; for Instance:

a.	e.	i.	o.	u.	&c.
ab.	eb.	ib.	ob.	ub.	&c.
ad.	ed.	id.	od.	ud.	&c.
ba.	be.	bi.	bo.	bu.	&c.
ald.	eld.	ild.	old.	uld.	&c.
dra.	dre.	dri.	dro.	dru.	&c.
balm.	belm.	bilm.	bolm.	bulm.	&c.

After this, place a Number of Words of 2, 3, or 4 *Syllables*, from the more easy to the most difficult Expressions, without heed to their Significations. Further, let there follow some Words of several *Syllables*, with the *Accent* variously placed, as on the *first, second, third, &c.* Let there be also two or three small *Discourses* writ with this *Alphabet*, in so many several Languages,

Languages, with the *Accent* rightly placed, and truly distinguished by their *Pauses*.

In *Teaching* with this *Primer*, begin to teach them the true Sound of all the *Vowels* singly; then proceed to the following *single Syllables*, beginning with the easiest of Expression, and so proceed on gradually to the most difficult, and then to the *Words* of more *Syllables*, and lastly, to the Use of the *Accent* and *Pauses*. When the Learner hath past all these, you may exercise him in the Reading of the *Discourses*, and therein let him exactly observe the *Accent* and the *Pauses*. When they can *read* and *utter* exactly whatsoever is *written* in this *Alphabet* and *Character*, in what Language soever, teach them to *write* truly what they hear distinctly expressed, according to this *Alphabet*, proceeding therein gradually as before, and rightly to place the *Accent* and *Pauses*, and also the Use of the *Signs* of the different *Modes* of Speaking.

In *Teaching* also observe these necessary *Rules*. 1. Proceed leisurely and orderly; suffer them not to pass by any *Mispronunciation* uncorrected, from the Beginning to the End; cause them so oft to repeat a wrong *Pronunciation*, till with your Assistance they *pronounce* it truly, allowing for the natural Defects in the Speech of some Persons. The younger will learn these *Pronunciations* more easily: But the elder may attain them also, although with more Difficulty. 2. Suffer them at no hand in *Spelling*, to dismember any *Syllable* by repeating the *Letters* singly, but that they *pronounce* them whole as they find them.

This *New Primer* will without Change, except in the Title, be the same for all *Nations* and *Languages*.

III. Mr. Pezron's Notion of the *Greek, Roman, Celtick Languages*, being of one common Origin, agrees exactly with my Observation: But I have not advanced so far, as to discover the *Celtick* to be the *Mother Tongue*; though perhaps he may not want good Grounds (at least plausible Arguments) for such an Assertion. The *Irish* comes in with us, and is a *Dialect* of the *Old Latin*, as the *British* is of the *Greek*: But the *Gothick* or *Teutonic*, tho' it has also much Affinity with us, must needs make a Band apart.

IV. Whether there ever were any *Language natural*, I dispute not: But that there have been, are, and may be *Artificial Languages*, it is not difficult to prove. The *Chinese Court-Language* is said to be of this Kind, invented and spoken by the *Literati* and *Mandarins* throughout the whole Empire of *China*, differing from all the other *Languages* spoken in it: And I conjecture it to be nothing else but the Names of the *Characters*, by which they write and express their Meaning, arbitrarily imposed by them, as we in *Europe* set Names to *Arithmetical Figures*, not as we pronounce Words written with a *Literal Character*. This I judge by comparing the *Characters* with the Names, *Monosyllables*, or *Words*, they pronounce and read them with. Nor do they ascend above a *Monosyllabic Name*, tho' the *Character* be composed of many *single Characters*, each of which hath

its proper Sense and monosyllabical Name, and though the Meaning of each Character be an Ingredient in the Notion of that compounded Character.

But whatever we may judge of *Language*, it is past Dispute, that *Writing* was ever *artificial*, how antiently soever it were in Use; and was the Invention of some thinking and studious Men. 'Tis also evident that there have been various Ways thought of for expressing Significancy, according to the several *Genii* of the Persons that were the Inventors: As may be guessed by the *Egyptian Hieroglyphicks*, the *Chinese Characters*, the *Mexican Chronology*, and the *literal Characters* of several Nations: Each of which seem to proceed upon differing Methods and from differing Thoughts of Invention.

Which of these Ways is the most antient, is hard to prove. The *Ægyptian Mummies* and *Obelisks* prove a great Antiquity of the *Hieroglyphicks*; but yet the *Chinese Chronology* (if to be credited) outstrips the *Ægyptian* in Pretence to Antiquity. For the *Chinese* make *Fobi* the first King of *China* to be the Inventor of their *Character*: And account him to have lived 2950 *Years* before the Time of *Christ*; during all which Time they pretend to have a certain and written Account in their Books. But their Account of the Times preceding, they esteem more hypothetical and fabulous; depending chiefly upon Fiction and oral Tradition: As you will easily believe, when you understand how many *Years* they make it since the *Creation* of the *World* to the present *Year* 1686; which by the Account thereof in Mr. *Greaves* his Translation of *Ulug Beig*, will be found to be no less than 88640102 *solar Years*; there having been run out since the *Creation* 8864 *Ven* of *Years* (every *Ven* containing 10000 such *Years*), and of the present *Ven* this *Year* 1686 is the 102^d. Which Account is abundantly more extravagant than the *Ægyptian*: But this need not invalidate their History since *Fobi*; by which it appears, that their *Character* was invented before the Time of *Moses*, about 1400 *Years*, and even before *Menes* the first King of *Ægypt*, about 500 *Years*. So that the *Chinese* Invention of *Writing* or *Character*, seems to be the most antient of that Kind: And the Book *Yekim*, said to be written by *Fobi*, the most antient Book.

These Accounts made me the more desirous to understand somewhat of the Reality and Truth of what is related concerning the Knowledge of *Literature* and *Manual Arts*, which these People of *China* are said to have possessed so long a Time in so great Perfection, and without Alteration from the primitive Institution; especially upon the Account of their Art of *Printing*, which gave a Hint to the Inventors of that admirable and most useful of all Inventions (for the Commonwealth of Learning) the Way of *Printing* here in *Europe*. For *Paulus Jovius* affirms, that the first Occasion of that Invention in *Germany*, was a *German Merchant*, who returning out of *China* into his own Country, related what he had observed concerning the Practice of it as used in that Country. And tho' the *Chinese* Way be wholly differing as to the Method of *Composing*, from what was invented and perfected

fected here: Yet such an Intimation was enough to an ingenious Artist to improve the first Contrivance, and make it more accommodate to the *Literal* Way of Writing with us. And as our Way may possibly be now brought to the greatest Perfection for Exactness and Expedition, so without doubt must be their Way of *Printing* any thing just as it is written, since I find, that they can *Ingrave* their *Stamp* for a Sheet, as soon as one of our *Compositors* can *Set* and *Correct* a Sheet of our *Literal Character*, and when so done, one Man alone will print off 1500 Sheets in one Day. And though it is generally believed to be much the same with our *Wooden-Cuts* for *Printing*, yet from some Observations I have made, I believe it to be much another Way.

By a *Chinese* Manuscript, out of which I transcribed the Lord's Prayer, in the Year 1666 (when it was lost), I found that the Pronunciations had no Affinity with the Strokes of the *Character*. Whence I conceived it was either a *numeral Character*, consisting of *Numbers*, or else a *real Character*, but not a *Literal*, unless it were a *literal Character* of some other Language than that by which it was pronounced, whose Pronunciation is lost though the Significancy be retained: as if one should read what is written in *Hebrew* בראשית ברא into the *Latin* or *Roman* Language, in *Principio Creavit*, instead of *Brasit Bra*, or *Beresith Bara*, according to the *Masorethæ*.

Since that time I procured from *China* a *Dictionary* of the *Court-Language* (as I found it written upon by the Person that sent it me from thence). But this whole Book (which I found was *printed*) consisted only of the *Chinese Characters*, without any Interpretation or Pronunciation: However, by the Help of the Pictures of that, and a *Chinese Almanack*, I quickly found out their *Characters* for *Numbers*, and their Way of *Numeration*, together with the *Figure* and the Use of their *Abacus* or Counting-Board, for performing the Operations of *Arithmetick*, which I find pretty near to agree with that of the *antient Romans* (a Description and Picture of which is given by *Ursinus*, *Pignorius*, and *Velferus*); save only that, instead of Pins and sliding Grooves of the *Roman*, the *Chinese Abacus* hath Springs or Wires, and Beads to slide upon them; and that, instead of four Pins for *Digits* or *Unites*, the *Chinese* hath five Beads: So that it may seem to argue, that the *Chinese Abacus* was designed for a *Duodecimal Progression*: Whereas that of the *Romans* was designed for the *Decimal*. One thing is remarkable in the *Chinese*, that I find the Places in the *Abacus* to lie horizontal, and the first Place to be that next the Left-hand, which I judge was also the first in their old Way of *Reading*, much the same with ours, though their other *Characters* are erected, as I shall by-and-by shew from the Posture of *Writing* and *Reading*, which I conjecture they did at first make use of; and what does yet further agree with this Conjecture, it is remarkable in the newly mentioned Treatise of *Ulug Beig*, that whereas the Way of *Writing* and *Reading* used by the *Arabs*, was from the Right to the Left, the first Place or the Place of *Units* in their *Numeration*, was that next the Right-hand; and so came first to be read: as did that of *China*, who, as I conceive, read the contrary Way, from the Left to the Right.

It

It appears therefore, by this Remark, that we received this Way of expressing *Numbers* from the *Arabians*, for that we keep the same Posture or Position of Places with them, though our Progression in Writing and Reading be the contrary Way. And though we now read them also in the Order they are set, 21, 22, 36, 48, &c. yet we retain also the other Way of pronouncing, viz. *One and Twenty, Two and Twenty, Six and Thirty, Eight and Forty, &c.*

Now as the *Chinese* and *Roman Abacus* do much agree, save only that they proceed contrary Ways, so doth the Way of expressing Numbers by Letters or Marks, one Stroke or Line signifying *One*, 2 Lines *Two*, 3 Lines *Three*, a Cross *Ten*, 2 Crosses *Twenty*, 3 Crosses *Thirty*, and so onwards to a *Hundred*, which they expressed by a square Mark, and a Cross with a Stroke added for a *Thousand*, as will appear by the Table annexed. And though the *Characters* are not all the same; yet the Order and Method of one agrees very near with that of the other, especially if I may be allowed my Supposition, that the primitive Way of Writing and Reading with the *Chinese* was horizontal, and like the *Greek* and *Latin*, or *European* Way. Now that these are properly *Numeral Figures* or *Characters*, it is manifest from this, that they have also *Word Characters* for every Number, and they can (in the same manner as the *Romans* could) express a *Number* by their *Numeral Characters* or *Marks*, and by their *Literal* or *Word Characters*; for as one single Stroke signifies *One* or the *First*, so does the *Character* (in the Plate marked with E) signify the same Thing, that is, *One* or the *First*.

Having thus discovered their *Characters* for *Numbers*, and their Way of *Numeration*, I was next desirous to understand something concerning their *Language* and *Character*.

Upon perusing all the Accounts I could meet with in Books, I found very little Satisfaction as to what I inquired after, which was *First*, concerning the Method of their *Character*, whether it consisted of a certain Number of Marks, methodically disposed like *Letters* in a *Literal*, or like *Numbers* in a *Numeral*, or like *Radicals* in *Composite* or *Decomposite Derivations*? 'Tis said to be legible in a great many *Languages* considerably different one from another; but how this is effected is not related; only it is said, that the Marks are of the Nature of *Arithmetical Figures* (which are become almost universal, at least to us here in *Europe*). And, *Secondly*, concerning the Number of these *Characters*. To which I found as little Satisfaction: For by some Relations, I found that there were 120,000, by others 80,000, and by others 60,000. And that a Man must be able to remember to write and read at least 8,000, or 10,000, before he will be able to express his Meaning thereby; and that it is the Business of a Man's whole Life to be thoroughly understanding in the *Whole Character*, seeming to intimate, that the *Characters* are immethodical, and there are as many *primitive Characters* as Words. Others tell us of various Kinds of *Characters* which have been in Use in several Ages. The *First* they say were *hieroglyphical*, like the *Agyptian* or *Mexican*, consisting of Pictures of Animals and Vegetables: But that the *Last* are made up of Lines and Points; that they have no such Thing

Thing as *Letters* or *Syllables*, but every distinct Word and Notion has a distinct *Character*, and that all are *primitive* and *incomposit*; so that if *Calepine's* Dictionary were to be translated into the *Chinese*, 'twere necessary to have as many distinct *radical Characters* as there are Words therein to be found. Which Accounts do seem to insinuate, that this *Character* is the most difficult, and the most perplexed Piece of Learning in the World, and depends wholly upon the Strength of the Memory, in retaining the Form and Signification of a perplexed Scroul. But whether they who gave us these Accounts did do it knowingly, is much to be doubted, my own Observations at least, make me think otherwise.

I have not yet been able to procure sufficient Helps to inform myself of the whole Art of *Writing* and *Reading* the *Chinese Character*, and I fear the Relations I have hitherto met with concerning it, were written by such as did not well understand it: However, from such Helps as I had, what I collected, or do conjecture, I shall here relate. The best Help I had, was the Perusal of some Books printed in *China*, with the Pronunciation and Signification of the *Character* in *Latin Letters*. By these Books I then observed, *First*, that every one of their *Characters*, whether consisting of more or fewer Strokes or Marks, were comprised within a certain square Space, which is proportioned according to the Bigness of the Siz- or Manner of Writing they design there to make use of; not that the whole Square is filled with every *Character*, but that no Part of that *Character* does exceed the Limits of that Square, so that, though the *Character* have but one Stroke, it takes as much Room in the Line as another that hath 20 or 30 several Marks; so that their *Characters* are most exactly ranged in Rank and File, not unlike our *Numbers* in *Arithmetick*.

Notwithstanding which, I find they do vary the Bigness of the *Character* upon several Occasions, as in the *Titles* of *Books*; in the *Titles* of the *Chapters* or *Sections*; in the *Comments*, *Explications*, or *Notes*; and upon several other Occasions of Variety, which they do at Pleasure with their Pencil, as we use Variety of Letters in the *Printing* of a *Book*. The *Titles* of *Books* are generally in very large Characters, 6 or 8 *Times* as big as those of the *Book*; the *Explication Notes* half of the Bigness; the Contents usually *twice* as big; and the like Variety on several other Occasions. I have met with also *three* several Kinds of *Characters*: *First*, The most usual is the fixed or *set square* Form. The *second* Sort is the *Running Hand*, in which the Orders of the Courts are written, by their Secretaries, of which I have seen three or four Kinds, in which the Pencil is never taken off till the whole *Character* be finished, and sometimes two or three are all written without Break. The *third* seems to be somewhat like the *flourishing* great Letters used by Scriveners at the Beginning of Deeds, and by the *Germans* in the Beginning of Chapters and Sections. They are compounded of the same Strokes as the *Set Character*, but modulated and shaped a little otherwise, to make them appear the more beautiful and regular. A Specimen of each of these three are in the *Plate*. This *third* is made use of for *Epitaphs* and other *Inscriptions* on Buildings or Monuments.

ments. These 3 Sorts I may call the 3 general Kinds of Writing, but there is to be found an almost infinite Variety of Forms, which Men use. This will be the more easy to be believed, when we consider, that the *printed Characters* are exactly the same with the *written*, insomuch that every Variety in each Stroke, Line, or Point, that is or can be made with the Pencil, is perfectly expressed in the Impression, and the Form, Mode, or Hand, as we call it, of every Writer is exhibited so curiously, that I think it hardly possible to be performed after the Way of *Wooden Cuts*, as Authors affirm it is, but must be done after the Method of our *Copper-Cuts*, printed by a *Rolling Press*, which the Way of expressing the *Running* or *Court-Hand* does, I conceive, most evidently demonstrate; and from divers Circumstances, I could evidently make appear from the Book itself, which I cannot so well express in Writing. Their *Paper* is generally very thin, and fine, and very transparent, but brown; so that whatever is written or printed on it, is almost as legible on the Back as on the Foreside, which is of great Use in the cutting of their *Stamps*. And thence they never write or print on both Sides of the same Leaf, but only on one; and to make the Leaf appear printed on both Sides, they double the Sheet with the printed Sides outwards, and putting the folded Part forward, they sew, bind, or stitch together all these Sheets by the cut Edges, and upon whole Sheets instead of single Leaves. They begin the Book on the Top of the Right-hand Side of the Page that is next the Right-hand, and they read downwards to the Bottom, then begin the next Line towards the Left-hand at the Top, and so read to the Bottom, and so proceed to the End of the Book. But this I suppose not to be the primitive or first Way of Writing or Reading. The *Title* of the *Book* is set first upon the whole Leaf, usually of a thicker Paper, and some *Title* is likewise written upon the Folding or Edge of every Sheet, where is set also the Number of the Book, and the Number of the Sheet, half of which appears on one Side, and half on the other Side of the Fold.

As to the *Character* itself, I find (by all the Books and Writings I have yet met with of that Kind) that each of them is made up of a certain Number of Strokes, Lines, or Marks, which are very distinct from each other in their Shape and Position; and by reason that these are single Strokes, and, as I conceive, uncompounded, I think they may be called the *Letters*, *Elements*, or *Particles*, out of which the more *compounded Characters* are constructed or contexted. These are the first Kind, of which there are but a very few, and I think those I have described in the 13th Line of the *Plate* are all.

Two, Three, Four or more of these joined together in a certain Order and Contexture (in the doing of which there is a great Regularity and Order observed, which is not varied from, and all within the regular *square Space*), I conceive do make *Syllables* or *primitive radical Characters*, each of which have a primitive, single, or distinct Notion, or Signification, as well as Sound; which is made much use of in the more compounded Characters, or Words. Of this Kind I take the Figures of the Numbers to be: If at least they are not single Letters, like the Way of expressing Num-

Numbers in the *Hebrew, Greek, Arabic, &c.* Languages; for though there may be two or three of the single Strokes joined together into a compound Character, it hinders not but that it may still signify a *Letter*, as in the *Greek* Α. Α. Δ. Ι. Γ. Π. Τ; in the *Runick*, where every Letter hath one upright Line, and some other additional Marks: In the *Roman* I. L. F. E. O. Q. V. Y. Or it may signify a *Syllable*, as in the *Æthiopick*, and in the *Hanscrit*, and *Sunscrib Languages and Characters*; the first of which being the *Brachmans* Character, we find in *P. Kircher's China Illustrata*, described by *P. Roth*, who studied it 7 Years; and the second (being a *literal Character* used over all *India* by the Merchants), I have seen in a Transcript brought lately out of *India* by a very worthy Gentleman, who lived there many Years, and had the Curiosity to cause to be transcribed and translated also into *English*, a Dictionary of their Language, in their own Character.

In which *Characters* or Ways of Writing, a *Vowel* is always joined with a *Consonant* into one *compound Character*, to make it effable. And then the single Strokes may be taken for single ineffable *Letters*, as are the *Consonants*, and the Composition of two or three (of which one at least may be a *Vowel*) will make *Syllables*.

Of this kind there are not so many in the whole *Chinese Character*, but that it will be easy enough to assign each a proper *Monosyllable*, which shall have only one or two *Consonants*, and one or two *Vowels*: That is, the *Consonants* together and not separate, either both before the *Vowel*, or *Vowels*, if it be a *Diphthong*, or both after it or them.

Of this Kind I understand there are about 500, probably $8 \times 8 \times 8$, or 512. I could enumerate a great many, and give you also the *Name* or *Words* by which they are pronounced, as also their Significations. But (as I said before) First, I conceive the present *Chinese Language* to have no Affinity at all with the *Character*, the true Primitive, or first Language, or Pronunciation of it, having been lost. And Secondly, I want some further Help to make a full and complete Discovery.

The 3d Sort of *Characters* is a *decompounded* Sort, being made up of two, three, or more of those of the *second* kind, diminished proportionably in their Size, either as to their Length or Breadth, or both, from what they have in the same Writing when they are single, and fill up the whole *Letter Square* or *Word's Square*. For there being several of them to be crowded together within the same *Square*, according as they are more in Number, so they are always more squeezed together. In this *decompound* Sort, there is a regular Order observed in the placing of the several *Characters* of the 2d Sort; there being some that are always on the Left-side, some always on the Right, some at the Top, some at the Bottom. Of which I doubt not but that they have a certain regular Method, which, had we Dictionaries explained, would be easy enough to be discovered.

This Method alone of crowding together all the *Characters* (how many soever go to make up the *decompounded Character*) into one *Square* (which is of the same Size for the most *simple* and for the most *compound*) seems to be

the great Singularity, by which the *Chinese Characters* differ from those of all the rest of the World. And this, I conceive, has been the Reason why all People, and possibly even the very *Chinese* themselves have, and do believe it to be a *real* and not *literal Character*: For if the primitive Language, or Pronunciation of the *Characters*, be lost (as I conceive it is), and that the Disposition, Order, Method, Texture, or Manner of placing the more *simple* in the more *compounded Characters* be also lost, forgotten, or not understood, then the whole *Characters* become a *real*, and not a *literal Character*; and an immethodical one to such as want the Method, that must be learn'd by Rote, and depend wholly upon the Strength of the Memory to retain it. But I conceive it might be at first either a *literal Character*, and so the whole *square Character* was composed of so many distinct *Letters*, or *Syllables*, which composed the *Word* signified thereby; and so there might be a regular Order of placing these *Letters* in the *Characters*; that is, that the whole *square* being divided into so many *Parts*, there was a Rule which was the 1st, 2d, 3d, and 4th Place: So that there being placed in those the several *Letters* that made up the *Word*, according to the Order they had in the *Word*, it was easy by that Rule to *decipher* the said *Character*, and thence to find the *Word*, and the Signification, as regularly as if the *Letters* had been written one after another, as most other *literal Characters* we know are at this Day written. Or, *secondly*, it might be a *real Character* consisting of divers Marks or *Letters*, that expressed so many *simple* Notions, several of which joined together might make up the more *compounded Characters*, of which I have added some Examples in the *Plate*, which may be also made *literal* and pronounceable, though that Consideration were not made use of when they were first invented. What things I have observed in my *Chinese* Books that seem to respect this Method, I will give more Particulars of, by printing a Specimen of the Book *Ye-kim*; which, explicated by these Notions, will, I conceive, appear more intelligible than by the Accounts we find given of it by the *Chinese* Commentators, and those that have translated them into *Latin*, who seem not to have understood the true Design thereof. For both the *Chinese* and *European* Commentators assert it to be a *Conjuring-Book*, or a Book to tell Fortunes by, and to be made use of by the *Chinese* for that Purpose: Whereas, by the small Specimen I have seen of it, I conceive it to contain the whole Ground, Rule, or *Grammar* of their *Character*, Language and Philosophy; and that by the understanding of it, the Foundation and Rule of their Language, and *Character*, may be without much Difficulty *deciphered*, and understood.

The present Use of this *Character* I conceive to be differing from what it was at first, both as to the Position of *Writing* and *Reading* it; and as to the Expression and *Pronunciation* thereof. For the Way of *Writing* and *Reading* it, I conceive, might at first be exactly the same with that of the *Greeks*, *Romans*, *English*, and all other *European* Nations, and also the *Æthiopic* and *Coptic*: That is, they began at the Top of the Page towards the Left-hand,

and

and so proceeded towards the Right in the horizontal Line to the End of it, and then began at the left End of the next Line under the first, and proceeded with that in the same manner, and so with the next under that, and all the remaining, continuing to *write* the Words of the Line towards the Right-hand, and the Lines of the Page one under another, till the whose Discourses were completed, joining Leaf to Leaf one under another, after the same manner as the *Rolls* are at present writ, and as the *Volumina* were of the Antients. And to make the Parts of the *Volume* to be the more easily come at, without the Trouble of rolling and unrolling, as the antient *Romans* did, and we do with our *Rolls*, they contrived to *fold* them like the Folds of a Fan, forwards and backwards, and so stitching them together, that the written Sides might lie outwards, and open freely one from another; and that the fair Sides might meet together, it came to make the present form of their Books, which being laid, as we generally place our Books before us, they seem to begin at the Top of the Page on the Right-hand, and to proceed to the Bottom, and then at the Top of the next Line towards the Left-hand, and descend as in the former; proceeding in this Order with all the rest: Which Way must needs be very inconvenient for Writing, however they may use the Pencil differing from our Pen. Though there be a Way of Writing from the Top to the Bottom of the Page, which is very convenient for writing the *Syriac*, as also for writing *Latin*, *English*, or *Greek*, where the Writing is to be used for *cutting* the *Stamps* of *Wood*, or *graving* of *Copper-Plates* with the same *Character* for *Printing*; in which Case the *Letters* must be written backwards.

Secondly, As to the *Pronunciation* of this *Character*, by the *Court-Language*, or by any other now used, I conceive it to be wholly differing from that of a *literal Character*, that is, from being *pronounced* or spoken according to the Marks or Figures thereof, whether they be *Simple*, or *Compounded*, and made up of *simple Characters* (though there are some Instances of Affinity in *Characters* and *Words*). The Reason of which differing *Pronunciation*, I conceive may have proceeded partly from the Loss of the Primitive Language, for which it was made; partly from a most inconvenient Affectation of *monosyllabical Words* in this *Court-Language*: To help the Poverty of which, they are fain to make one *Syllable* to signify many differing Notions; to do which they have introduced a kind of musical *Toning* or *Accenting* of each of them, and that not singly, but compounded of two or three *Tones* to each Signification of every one of these *Monosyllabies*; partly from the using this Way of Writing by divers Nations of differing Languages, who minding only the Figure and Signification, read it in their own Mother-Tongues, as we in *Europe* do *arithmetical Figures*; and partly also from the Omission of most *grammatical Distinctions*, the same *Character* serving for *Substantive* and *Adjective*, *Singular* and *Plural*, in all Cases (save only they have some Characters for Particles, as *of* and *to* in *English*), for the *Verb* in all *Tenses* and *Numbers*, &c. for the *abstract* and *concrete* Signification, and for divers *metaphorical*, if at least the Interpretation I have met with in the Books I have perused be exact;

partly also from the *Syntaxis* of them; it being necessary to consider the whole Sentence, to discover which Part of Speech each *Character* is of, in that Sentence wherein the Order and the Positions of the *Characters* to one another, for which they have Rules, hath its Signification: And, lastly, from the Loss of the very Notion of a *literal Character*, whence, for the expressing of *proper Names*, they are fain to make use of several *Characters*, whose *Sounds* or *Words* come nearest to the Sound of the *Syllables* of that *Name*, as in the *Plate*, *tam, jo, vam*; for *Adam, Jovan*.

Now, though I conceive this *Character* is not effable properly as a *literal Character*, by any of their present Languages; and though possibly it might be at first a *real Character*, that is, each of them compounded of such Strokes or Marks as by their Figures, Positions, and Numbers, in the *Square*, denoted the several philosophical Ingredients that made up the Notion of the whole *Character*, as the Book *Ye-Kim* seems to shew, by giving Rules, as I conceive, for the Order and Significancy of Places in the *Square*, &c. yet I think it not difficult to make it a *literal*, or at least a *syllabical Character*, and legible, into a Language somewhat after the manner of the *universal Character*, invented by the Reverend Bishop of *Chester*, *Dr. Wilkins*. And though this would not be the primitive Language for which it was made, yet for the present Uses of it (the chiefest of which is the assisting and refreshing the Memory, and helping the Imagination by proper Sounds) it might be as good: Wherein the *single Characters* might be *Monosyllables*, and the *compounded, Dissyllables, Trissyllables, &c.* according to the Number and Order of *simple Characters* in the *Square* of the *compounded*. And I am apt to think, that the present *Pronunciation* of Languages, as of *Hebrew, Syriac, Arabic, Greek, and Latin*, or any other Language that has been so long written, may be as much differing from what it was 2000 Years since, as an arbitrary one now invented, and grounded on the *Letters*, might possibly be. And such an arbitrary *Pronunciation*, if generally agreed upon, might serve as well for a Help to learn the Signification of *Words*, or *Word-Combination* of *Characters*, as if we now knew the exact primitive *Pronunciations* as critically as the *Masorethæ* are said to have done that of the *Hebrew*, and possibly also *much better*; for that by such a one a great many Irregularities and Difficulties of *Pronunciation* (which are to be found in all Languages now spoken) might be omitted, and the Whole made exactly regular and easy, as might be shewn in the *Hebrew*, and *Greek*, and especially in the *Arabic*, whose Difficulties are sufficiently manifested by the *Alphabetum Arabicum*, printed at *Rome* 1592. Now as by such a Language the *Character* might be made effable without *musical Tones*, or difficult *Aspirations*, so had we Dictionaries of the Signification of the *Characters*, we might as soon learn the *Chinese Character* as we can *Latin*, or any other Language to be learned by *Book*, and not by *Speaking*.

Two Persons
deaf and
dumb, taught
to speak and to understand a Language;

V. 1. About the Beginning of *Jan.* 1661-2, I undertook to teach a Person *dumb and deaf* to *speak* and to *understand a Language*. The Task consists of two very different Parts; each of which doth render the other more difficult

difficult

by *Dr. J. Wallis. n. 61. p. 1087.*

difficult: For, besides that which appears upon the first View, to teach a Person who *cannot bear to pronounce the Sound of Words*, there is that other of teaching them to *understand a Language*, and know the *Signification* of those *Words*, whether spoken or written, whereby he may both express his own Sense, and understand the Thoughts of others. That each of these do render the other more hard, is obvious. We find by Experience, that the most advantageous Way of teaching a Child his first Language, is that of perpetual Discourse; not only what is particularly addressed to himself, as well in pleasing Divertisements or delightful Sportings (and therefore insinuates itself without any irksome or tedious Labour), as what is directly intended for his more serious Information: But that Discourse also which passeth between others, where without Pains or Study he takes Notice of what *Actions* in the Speaker do accompany such *Words*, and what Effects they do produce in those to whom they are directed; which doth by Degrees insinuate the Intendments of these *Words*: But these Helps are wholly obstructed in our Case by *Deafness*. And as *Deafness* makes it the more difficult to teach him a *Language*, so, on the other hand, that Want of *Language* makes it more hard to teach him how to *speak* or *pronounce the Sounds*: For there being no other Way to direct his *Speech*, than by teaching him how the *Tongue*, the *Lips*, the *Palate*, and other *Organs of Speech* are to be applied and moved, in the forming of such *Sounds* as are required; to the end that he may, by Art, *pronounce* those *Sounds* which others do by Custom, they know not how, it may be thought hard enough to express in *Writing*, even to one who understands it very well, those very nice Curiosities and Delicacies of Motion which must be observed (though we heed it not) by him, who, without Help of his *Ear* to guide his *Tongue*, shall form that Variety of *Sounds* we use in *Speaking*; many of which Curiosities are so nice and delicate, and the Difference in forming those *Sounds* so very subtle, that most of ourselves who *pronounce* them every Day, are not able, without a very serious Consideration, to give an Account by what Art or Motion ourselves form them; much less to teach another how it is to be done. And if by *writing* to one who *understands a Language* it be thus difficult to give Instruction, how, without the Help of *Hearing*, he may utter those *Sounds*, it must needs increase the Difficulty, when there is no other *Language* to express it in but that of *dumb Signs*.

These Difficulties, however, did not so far discourage me from that Undertaking, but that I did still conceive it possible that both Parts of this Task might be effected. As to the *first* of them, though I did not doubt but that the *Ear* doth as much guide the *Tongue* in *Speaking* as the *Eye* doth the *Hand* in *Writing*, or *playing* on the *Lute*; and therefore those who by Accident do wholly lose their *Hearing*, lose also their *Speech*, and consequently become *dumb* as well as *deaf* (for it is in a manner the same Difficulty for one that *bears* not to *speak* well, as for him that is *blind* to *write* a fair *Hand*). Yet since we see that it is possible for a Lady to attain so great Dexterity as in the *Dark* to play on a *Lute*, though to that Variety

Variety of nimble Motions, the *Eye's* Direction, as well as the Judgment of the *Ear*, might seem necessary to guide the *Hand*; I did not think it impossible, but that the *Organs* of *Speech* might be taught to observe their due *Posture*, though neither the *Eyes* behold their *Motion*, nor the *Ear* discern the *Sound* they make. And as to the other, that of *Language* might seem yet more possible. For, since that in Children, every Day, the *Knowledge* of *Words*, with their various Constructions and Significations, is by Degrees attained by the *Ear*, so that in a few Years they arrive to a competent Ability of expressing themselves in their *first Language*, at least as to the mere usual Parts and Notions of it; why should it be thought impossible, that the *Eye* (though with some Disadvantage) might as well apply such *Complication* of *Letters* or other *Characters*, to represent the various *Conceptions* of the *Mind*, as the *Ear* a like *Complication* of *Sounds*? For tho', as things now are, it be very true, that *Letters* are, with us, the immediate *Characters* of *Sounds*, as those *Sounds* are of *Conceptions*; yet is there nothing in the Nature of the thing itself, why *Letters* and *Characters* might not as properly be applied to represent immediately, as by the Intervention of *Sounds*, what our *Conceptions* are. Which is so great a Truth (though not so generally taken notice of), that it is practised every Day, not only by the *Chinese*, whose whole *Language* is said to be made up of such *Characters* as do represent Things and Notions independent on the *Sounds* of *Words*; and if therefore differently *spoken* by those who differ not in the *writing* of it (like as what, in *Figures*, we write, 1, 2, 3, for *One, Two, Three*, a *Frenchman*, for Example, reads *Un, Deux, Trois*), but, in part, also among ourselves, as in the *Numeral Figures* now mentioned, and many other *Characters* of *Weights* and *Metals* used indifferently by divers Nations to signify the same *Conceptions*, though expressed by a different *Sound* of *Words*; and more frequently in the Practice of *Specious Arithmetick*, and Operations of *Algebra*, expressed in such Symbols, as so little need the Intervention of *Words* to make known their Meaning, that when different Persons come to express, in *Words*, the *Sense* of those *Characters*, they will as little agree upon the same *Words*, though all express the same *Sense*, as two Translators of one and the same Book into another Language.

And though I will not dispute the practical Possibility of introducing an *universal Character*, in which all Nations, though of different *Speech*, shall express their common *Conceptions*; yet, that some two or three (or more) Persons may, by Consent, agree upon such *Characters*, whereby to express each to other their *Sense* in *Writing*, without attending the *Sound* of *Words*, is so far from an Impossibility, that it must needs be allowed to be very feasible, if not facile. And if it may be done by new-invented Characters, why not as well by those already in Use? Which though to those that know their common Use, they may signify *Sounds*; yet, to those that know it not, or do not attend it, may be as immediately apply'd to signify *Things* or *Notions*, as if they signified nothing else: And consequently, so long as it is purely arbitrary, by what *Character* to express such a *Thing* or *Notion*, we may as well make use of that *Character* or *Collection* of *Letters* to express
the

the Thing to the *Eyes* of him that is *deaf*, by which others express the Sound or Name of it to those that *hear*. So that, indeed, that shall be to him a *real Character*, which expresseth to another a *vocal Sound*, but signifieth to both the same *Conception*, which is, to *understand the Language*.

These were the fundamental Grounds of Possibility in Nature; to which I added the following Considerations, which made me think it morally possible, that is, not impossible to succeed in Practice. I considered from how few and despicable Principles the whole Body of *Geometry*, by continual Consequence, is enforced; and if so fair a Pile and curious Structure may be raised, and stand fast upon so small a Bottom, I could not think it incredible, that we might attain some considerable Success in this Design, how little soever we had at first to begin upon, and, from those little *Actions* and *Gestures*, which have a kind of natural Significancy, we might, if well managed, proceed gradually to the Explication of a *complete Language*, and withal, direct to those Curiosities of *Motion* and *Posture* in the *Organs of Speech*, requisite to the *Formation* of a *Sound* desired, and so to effect both Parts of what we intend. I was further encouraged by the Consideration of the Person, who was very ingenious and apprehensive, and so far, at least, a *Mathematician*, as to draw Pictures, whereby he was already accustomed to observe and imitate those little Niceties in a Face, without which it is not possible to draw a Picture well. I shall add this also, that once he could have *spoken*, though so long ago, that, I think, he doth scarce remember it. But having, by Accident, when about five Years of Age, lost his *Hearing*, he consequently lost his *Speech* also; not all at once, but by Degrees, in about half a Year's Time; which, though it do confirm what I was saying but now, how needful it is for the *Ear* to guide the *Tongue* in *Speaking* (since that Habit of *Speaking*, which was attained by *Hearing*, was also lost with it) and might therefore discourage the Undertaking; yet I was thereby very much secured, that his Want of *Speech* was but a Consequent of his Want of *Hearing*, and did not proceed originally from an Indisposition in the *Organs of Speech* to form those *Sounds*.

But though I did believe it possible for him to *learn* so to *speak* as to be understood; yet I could not promise myself, that he should *speak* so accurately, but that a critical Ear might easily discern some Failures or little Differences from the ordinary *Tone* or *Pronunciation* of other Men; because the Neglect of it in his younger Years, when the *Organs of Speech*, being yet tender, were more pliable, might now render them less capable of that Accurateness which those of Children attain unto, whereof we have daily Experience; it being found very difficult, if not impossible, to teach a Foreigner, well in Years, the accurate *Pronouncing* of that *Sound* or *Language*, which in his tender Years he had not learned. Besides, the *Ear* being so necessary to guide and correct the *Tongue*, it is not reasonably to be expected, that he who cannot *hear*, though he may know how to *speak* truly, should yet perform it so accurately, as if he had the Advantage of his *Ear* also.

Nor could I promise, nor indeed hope, that how accurately soever he might learn to *speak*, he should be able to make so great a Use of it as others do: For since that he cannot *bear* what others say to him, as well as express his own Thoughts to them, he cannot make such Use of it in Discourse as others may. And though it may be thought possible, that he may in Time discern, by the *Motion* of the *Lips* visible to the *Eye*, what is said to him, yet this cannot be expected till at least he be so perfectly Master of the *Language*, as that by a few *Letters* known, he may be able to supply the rest of the *Word*, and by a few *Words*, the rest of the *Sentence*, or at least the Sense of it, by a probable Conjecture (as when we *decipher* Letters written in *Cipher*). For, that the *Eye* can actually discern all the Varieties of *Motion* in the *Organs* of *Speech*, and see what *Sounds* are made by those *Motions* (of which many are inward, and are not exposed to the *Eye* at all) is not imaginable. But as to the other Part of our Design, I see no Reason at all to doubt, but that he might attain a *Language*, and the *Elegancy* of it as perfectly as those that *bear*.

The Way I have taken towards this Design, is in general sufficiently intimated already: As to that of *Speech*, I must first, by the most significant *Signs* I can, make him to understand in what *Posture* and *Motion* I would have him apply his *Tongue*, *Lips*, and other *Organs* of *Speech*, to the forming of such a *Sound* as I direct; which, if he hit right, I confirm him in it; if he miss, I signify to him in what he differed from my Direction, and to what Circumstances he must attend to mend it. And for this Work I was so far prepared before-hand, that I had heretofore, upon another Occasion, (in my Treatise *de Loquela*, prefixed to my *Grammar for the English Tongue*) considered very exactly (what few attended to) the accurate Formation of all *Sounds* in *Speaking* (at least as to our own Language, and those I knew) without which it were in vain to set upon this Task. As to that of teaching him the *Language*, I begin with that little Stock of such *Actions* and *Gestures* as have a kind of natural Significancy; and from them, or some few *Signs* which himself had before taken up, to express his Thoughts as well as he could, proceed to teach him what I mean by somewhat else; and so, by Steps, to more and more: And this, so far as I well can, in such Method as that what he knows already may be a Step to what he next is to learn.

He hath been already with me somewhat more than two *Months*, and the Success is more than I did expect. There is hardly any *Word* which (with Deliberation) he cannot *speak*; and he hath already learned a considerable Part of *English Words* of most frequent Use: So that I may say the greatest Difficulty of both Parts of the Undertaking is almost over; what remains is little more than the Work of Time and Exercise.

A further
Account by—
ibid. p. 1098.

The Person to whom the foregoing Discourse doth refer, is Mr. *Daniel Whaley*, Son of Mr. *Whaley*, late of *Northampton*, and Mayor of that Town. He was present at the Meeting of the *Royal Society*, May 21. 1662, and did there, to their great Satisfaction, pronounce distinctly enough such *Words* as by the Company were proposed to him; and though not altogether

together with the usual *Tone* or *Accent*, yet so as easily to be understood. About the same Time also (his Majesty having heard of it, and being willing to see him) he did the like several Times at *Whitehall*, in the Presence of his Majesty, his Highness *Prince Rupert*, and divers others of the Nobility. In the Space of a *Year*, which was the whole Time of his Stay with *Dr. Wallis*, he had read over a great Part of the *English Bible*, and had attained so much Skill as to *express* himself intelligibly in ordinary Affairs; to *understand Letters* written to him, and to write Answers to them, though not elegantly, yet so as to be *understood*: And, in the Presence of many Foreigners (who out of Curiosity have come to see him), hath oftentimes not only *read English* and *Latin* to them, but *pronounced* the most difficult *Words* of their Languages (even *Polish* itself) which they could propose to him.

The said Doctor hath since done the like for Mr. *Alexander Popham* (a young Gentleman of a very good Family, and a fair Estate), who did from his *Birth* want his *Hearing*.

VI. In order to teach a *Language* to a *deaf* Person, it is necessary, in the *first* Place, that he be taught to *write*, that there may be somewhat to express to the *Eye* what the *Sound* (of *Letters*) represents to the *Ear*.

It will *next* be very convenient (because Pen and Ink is not always at Hand) that he be taught how to *design* each *Letter*, by some certain Place, Position, or Motion of a Finger, Hand, or other Part of the Body (which may serve instead of *Writing*): As for Instance, the 5 Vowels, *a, e, i, o, u*, by pointing to the Top of the 5 Fingers: And the other Letters, *b, c, d, &c.* by such other Place or Posture of a Finger as shall be agreed upon.

After this, a *Language* is to be taught the *deaf* Person, by like Methods as Children are at first taught a *Language* (though the thing perhaps be not heeded); only with this Difference: Children learn *Sounds* by the *Ear*, but the *deaf* Person is to learn *Marks* (of those *Sounds*) by the *Eye*. But both the one and the other do equally signify the same Thing or Notions, and are equally (*Significantia ad Placitum*) of mere *arbitrary* Signification.

It is then most natural (as Children learn the *Names* of Things) to furnish him (by Degrees) with a *Nomenclator*; containing a competent Number of *Names* of Things common and obvious to the *Eye* (that you may shew the Thing answering to such a *Name*). And these digested under convenient *Titles*, and placed under them in such convenient Order (in several Columns, or other orderly Situation in the Paper) as by their Position best to express to the *Eye* their *Relation* or Respect to one another. As, *Contraries*, or *Correlatives*, one over-against the other; *Subordinates*, or *Appurtenances*, under their Principals; which may serve as a kind of *local Memory*. Thus in *one* Paper, under the Title *Mankind*, may be placed (not confusedly, but in decent Order) *Man, Woman, Child, &c.* and if you please, the *Names* of some known Persons; with Spaces left to be supplied with other like *Names* or *Words*, as after there may be Occasion. Then (in *another* Paper) under the Title *Body*, may be written (in like convenient Order)

*A Method of
instructing
Persons deaf
and dumb to
speak and un-
derstand a
Language; by
Dr. J. Wallis.
n. 245. p. 353.*

der) the *Parts* of the *Body*, as *Head*, (*Hair, Skin, Ear*), *Face, Neck, Breast, Belly, &c.* with like Spaces, as before, for more to be added, as there is Occasion. And when he hath learned the Import of *Words* in each Paper, let him write them in like manner in distinct Leaves or Pages of a Book (prepared for that Purpose) to confirm his *Memory*, and to have Recourse to it upon Occasion. In a *third* Paper you may give him the inward Parts, as *Skull, Throat, Stomach, Heart, Lungs, &c.* In another Paper, under the Title *Beast*, may be placed the several *Kinds* of *Beasts*, as *Horse, Cow, Sheep, Hog, Dog, Hare, &c.* Under the Title *Bird* or *Fowl*, the several *Kinds* of *Birds*; as *Hen, Duck, Goose, Kite, Lark, &c.* Under the Title *Fish*, put *Pike, Eel, Plaice, Salmon, Lobster, &c.* You may then put *Plants* or *Vegetables*, under several Heads, or Subdivisions of the same Head, as *Trees, Fruits, Flowers, Herbs, Corn, &c.* And the like of *Inanimates*, as *Heaven, Sun, Moon, Stars, Elements; Earth, Metals, Minerals, Waters, Air, Meteors, Fire, &c.* Under the Title *Cloaths*, put the several Sorts, both *Woollen, Linnen, &c.* And under the Title, *House, Room, &c.* the *Parts, Furniture, and Utensils* belonging thereunto, with Divisions and Subdivisions, as there is Occasion. And in like manner from Time to Time may be added more Collections or Classes of *Names* or *Words*, conveniently digested under distinct Heads, and suitable Distributions, to be written in distinct Leaves or Pages of his Book, in such Order as may seem most convenient.

When he is furnished with a competent Number of *Names*, it will be seasonable to teach him (under the Titles *Singular, Plural*) the Formation of *Plurals* from *Singulars*, by adding *s* or *es*, *Hand, Hands, Face, Faces; Fish, Fishes, &c.* with some few *Irregulars*, as *Man, Men; Woman, Women; Foot, Feet; Mouse, Mice; Ox, Oxen, &c.* which (except the *Irregulars*) will serve for *Possessives* (to be after taught him) which are formed from their *Primitives*, by like Addition of *s*, or *es*, except some few *Irregulars*; as *my, mine; thy, thine; our, ours, &c.* And in all those, and other like Cases, it will be proper first to shew him the *Particulars*, and then the *general Title*.

Then teach him in another Page or Paper the *Particles*, as *a, the, these, &c.* And the *Pronouns*, as *I, Thou, He, They, Who, &c.* Then, under *Adjective, Substantive*, teach him to connect these, as *my Hand, your Head, their Shoes, &c.* To furnish him with more *Adjectives*, under the Title *Colours*, you may place *Black, White, Grey, &c.* and having shewed the *Particulars*, let him know, these are called *Colours*. The like for *Taste, Smell, Hearing, and Touch* or *Feeling*. From whence you may furnish him with Examples of *Adjectives* with *Substantives*, as *White Bread, Soft Cheese, My Black Hat, &c.* And then inverting the Order, *Substantive* and *Adjective* (with the *Verb Copulative* between) as *Silver is White, Gold is Yellow, Lead is Heavy, I am not well, &c.* which will begin to give him some Notion of *Syntax*. In like manner, when *Substantive* and *Substantive* are so connected: As *Gold is a Metal; a Rose is a Flower; Larks are Birds, &c.* Then as those before relate to *Quality*, you may give him some other *Words* relating to *Quantity*; as *Long, Short, Broad, Many, Full, &c.* Then

Words

Words of *Figure*; as *Strait, Round, Concave, Convex, &c.* Of *Gesture*, as *Stand, Sit, &c.* Of *Motion*; as *Move, Run, Fly, Creep, &c.* Then Words relating to *Time, Place, Number, Weight, Measure, Money, &c.* are (in convenient Time) to be shewed him distinctly; as likewise the Names and Situations of *Places and Countries*, which are convenient for him to know; which may be orderly written in his Book, and shewed him in *Maps, &c.*

After the *Concord of Substantive and Adjective*, he is to be shewed (by convenient Examples) that of the *Nominative and Verb*; as for Instance, *I go, He sits, the Fire burns*; with the Titles on the Top, *Nominative, Verb*. After this, under the Titles *Nominative, Verb, Accusatives*, give him Examples of *Verbs Transitives*; as, *You see me; the Fire burns the Wood*: Or even with a *Double Accusative*; as *You teach me (Writing, or) to write*. After this you may teach him the *Flexion or Conjugation of a Verb*, or what is equivalent thereunto. For in our *English Tongue*, each *Verb* hath but *Two Tenses*, the *Present* and the *Preter*, and *Two Participles*, the *Active* and the *Passive*; all the rest is performed by *Auxiliaries*. Which (*Auxiliaries* have no more *Tenses* than the other *Verbs*. Those *Auxiliaries* are, *Do, Did; Will, Would; Shall, Should; May, Might; Can, Could; Must, Ought to; Have, Had; Am (Be) Was*: And if by Examples you can insinuate the Signification of these few Words, you will have taught him the whole *Flexion* of the *Verb*. And here it will be convenient (once for all) to write him out a full *Paradigm* of some one *Verb* (suppose to *see*) through all those *Auxiliaries*. The *Verb* itself hath but these 4 Words to be learned; *See, Saw; Seeing, Seen*; save that, after *thou* in the *second Person singular* (in both *Tenses*) we add *est*; and in the *third Person singular* (in the *Present Tense*) *eth* or *es*; or instead thereof, *st, th, s*; and so in all *Verbs*. Then, to the *Auxiliaries, Do, Did; Will, Would; Shall, Should; May, Might; Can, Could; Must, Ought to*, we adjoin the Indefinite *See*; and, after *Have, Had, Am (Be) Was*, the *Passive Participle Seen*; and so for all other *Verbs*.

But the *Auxiliary, Am or Be*, is somewhat *irregular*; in a double Form; *Am, Art, Is*; Plural, *Are, Was*; *Wast, Was*; Plural *were*.

Be, Beest, be; Plural *Be. Were, Wert, Were*, Plural *Were*.

Be (Am) Was; Being, Been.

Which (attended with the other *Auxiliaries*) make up the whole *Passive Voice*.

All *Verbs* (without Exception) in the *Active Participle*, are formed by adding *ing*; as, *See, Seeing; Teach, Teaching, &c.* The *Preter Tense* and the *Passive Participle* are formed (regularly) by adding *ed*; but are oft subject to *Contractions*, and other *Irregularities* (sometimes the same in both; sometimes different). And therefore it is convenient here, to give a Table of *Verbs* (especially the most usual) for those *three Cases* (which may at once teach their Signification, and their Formation) as, *Boil, Boiled, Boiled; Bake, Baked, Baked, &c. Teach, Taught, Taught; Buy, Bought, Bought, &c. Give, Gave, Given; Write, Wrote, Written, &c.*

The *Verbs* being thus dispatched, he is then to learn the *Prepositions*, wherein lies the whole *Regimen* of the *Noun* (For, Diversity of *Cases* we have none). The Force of which is to be insinuated by convenient Examples, suited to their different Significations; as, for Instance, *Of*; *A Piece of Bread*; *A Cup of Water*; *A Pint of Wine*, &c. And in like manner, for *Off*, *On*, *To*, *From*, *At*, *In*, *By*, &c. And by this Time he will be pretty well enabled to understand a single Sentence.

In the last Place, he is (in like manner) to be taught *Conjunctions* (which serve to connect, not *Words* only, but *Sentences*); as, *And*, *if*, *But*, *Because*, *Therefore*, &c. and these illustrated by convenient Examples; as, *Because* I am cold, *Therefore* I go to the Fire, *That* I may be warm; *For* it is cold Weather.

By this Time his Book (if well furnished with Plenty of Words, and those well digested, under several Heads, and in good Order; and well recruited from Time to Time, as new Words occur) will serve him in the Nature of a *Dictionary* and a *Grammar*. And in case the *deaf* Person be otherwise of a good natural Capacity, and the Teacher of good Sagacity, by this Method (proceeding gradually, Step by Step) you may (with Diligence and due Application of Teacher and Learner) in a *Year's* Time, or thereabouts, perceive a greater Progress than you would expect; and a good Foundation laid for further Instruction, in Matters of *Religion*, and other *Knowledge*, which may be taught by Books.

It will be convenient, all along, to have Pen, Ink, and Paper at hand, to write down in *Words* what you signify to him by *Signs*, and cause him to write (or shew him how to write) what he signifies by *Signs*: Which way (of signifying their Minds by *Signs*) *deaf* Persons are often very good at. And we must endeavour to learn their Language (if I may so call it) in order to teach them ours, by shewing what *Words* answer to their *Signs*. It will be also convenient, as you go along (after some convenient Progress made), to express, in as plain Language as may be, the Import of some of the Tables. As for Instance, *The Head is the highest Part* of the *Body*; the *Feet* the *lowest Part*; the *Forehead* is *over* the *Eyes*, &c. And such plain Discourse, put into *Writing*, and particularly explained, will teach him, by Degrees, to understand plain Sentences. And like Advantages a sagacious Teacher may take, as Occasion offers itself from Time to Time.

This is the *Method* I used, with good Success, about 34 Years ago, when I taught Mr. *Alexander Popham*, who was born *deaf*, to *speak* distinctly, and to *understand* a *Language*, so as to express his Mind (tolerably well) by *writing*, and to *understand* what was *written* to him by others, as I had before taught Mr. *Daniel Whaley*.

VII. *A Paper of less general Use omitted ; viz.*

A Catalogue of some *Indian and Chinese Manuscripts*, which were sent to *n. 246. p. 421.*
 Dr. Arthur Charlett and the late Dr. Edw. Bernard, by Mr. George Lewis,
 from Fort St. George, in 1698. *These curious Manuscripts being shewn to*
the Royal Society by the Favour of Dr. Charlett, it appeared, by a Sample or
Specimen of the Leaves and Fruit of the Ampana Hort. Mal. Tom. I. p. 13.
Fig. 10. or Palma Malabrica, Floſculis Stellatis, Fructu Longo Squamato
D. Syen. ib. or Palma Coccifera Folio Plicatili Flabelliformi major. Ampana
H. M. Raii Hist. p. 1366, brought to the Society by Mr. James Petiver,
that the several Leaves of all these Books were made of the Leaves of the
Palm wrought on by a Stile.

VIII. *Accounts of the Books omitted.*

1. *Petri Lambecii Lib. Primus Prodromi Historiæ Literariæ.* *n. 30. p. 575.*
2. A Discourse touching the *Original of Human Literature*, both *Phi-* *n. 74. p. 2231.*
lology and Philosophy; in two Parts; by *Theop. Gale, M. A. Ox.* 1669,
 and 1671, in 4to.
3. *Reflections upon Antient and Modern Learning*; by *W. Wotton, B. D.* *n. 214. p. 264.*
Lond. 1694, in 4to.
4. *Librorum Manuscriptorum Academiarum Oxoniensis & Cantabrigiensis, n. 211. p. 260.*
& Celebrum per Angliam Hiberniamque Bibliothecarum Catalogus; cum
Indice Alphabetico. Cura Edw. Bernardi. Tomis Duobus in Fol. The Ac- *n. 247. p. 442.*
count of this Book is here enlarged, and several Instances given of the great
Usefulness of such Catalogues.
5. *Systema Bibliothecæ Collegii Parisiensis Soc. Jesu. A Paris, 1678, in n. 140. p. 1012*
4to.
6. *Julii Pflugk Equitis Saxonici Epistola ad perillustrem atque Generosissimi- n. 243. p. 305.*
um Virum Ludovicum à Seckendorff, Virum de utraque Republica Meri-
tissimum, præter fata Bibliothecæ Budensis, Librorum quoque in ultima Ex-
pugnatione repertorum Catalogum exhibens. Jan. 1688, in 8vo.
7. *Of Education, especially of young Gentlemen: In two Parts; the 2d n. 123. p. 572.*
Impression with Additions. Oxon. in 8vo.
8. *Alphabetum Naturæ, Auth. F. M. B. V. Helmont. 1667. n. 31. p. 602.*
9. *Discours Physique de la Parole, par M. De Cordemoy; à Paris, in n. 37. p. 736.*
12mo, translated into English. Lond. 1668, in 12mo.
10. *Elements of Speech: An Essay of Inquiry into the natural Produc- n. 39. p. 788.*
tion of Letters; together with an Appendix to instruct Persons deaf and
dumb: By Will. Holder, D. D. Lond. 1669, in 8vo. n. 47. p. 958.
11. *An Essay towards a real Character, and a philosophical Language; n. 35. p. 690.*
by Jo. Wilkins, D. D.
12. *A Grammar of the English Tongue, in Fol. by Dr. Jo. Wallis. To n. 61. p. 2099.*
which is prefixed a Treatise De Loquela, by the same Author, 1652.

- n. 23. p. 4054. 13. A short Essay, directing how to divide a *Period* into *Sentences*; with what *Points* the *Sentences* shall be distinguished, &c. by Mr. Lewis.
- n. 110. p. 235. 14. An Essay to facilitate the *Education* of *Youth*, by bringing down the Rudiments of *Grammar* to the Sense of *Seeing*; which ought to be improved by *Syncrasis*, fitted to Childrens Capacities, for the Learning especially of the *English*, *Latin* and *Greek Tongues*: In 3 Parts; an *Accidence*, a *middle Grammar*, and a *critical* or *idiomatical Grammar*. By Mr. Lewis of *Tottenbam*. Lond. in 8vo.
- n. 48. p. 975. 15. An Examen of the Way of *Teaching* the *Latin Tongue* by *Use* alone. *Englified* out of *French*. Lond. 1669, in 12mo.
- n. 48. p. 973. 16. An historical Essay, endeavouring a Probability that the *Language* of *China* is the *primitive Language*; by Jo. Webb, Esq; Lond. 1669, in 8vo.
- n. 140. p. 1013 17. *Glossarium ad Scriptores Mediæ & Infimæ Latinitatis*; in quo *Latina Vocabula Notatæ* Significationis explicantur: complures *Ævi Medii Ritus & Mores*; *Legum, Consuetudinum Municipalium, & Juris-Prudentiæ Recentioris Formulæ & Obsoletæ Voces*; utriusque *Ordinis Ecclesiastici & Laici Dignitates & Officia, &c.* Enuceantur, & Illustrantur: Innumera denique *Scriptorum Loca, Græcorum, Gall. Lat. Ital. Hispan. German. Anglo-Sax.* Expenduntur, Emendantur, Elucidantur. Auth. *Carolo du Fresne*. A Paris, 1678, in Fol. 3 Vol.
- n. 126. p. 642. 18. *De l'Art de Parler*; à Paris, 1675, in 12mo.
- n. 93. p. 6014. 19. *De Poematum Cantu & Viribus Rhythmi*. Oxon. 1673, in 8vo.
- n. 227. p. 522. 20. Λυκοφρόνος τῆ Χαλκιδεῶς Αλεξανδρα. *Lycophronis Chalcidensis Alexandra*; cum *Græcis Isacii Tzetzis Commentariis*. Accedunt *Versiones, Variantes Lectiones, Emendationes, Annotationes, & Indices necessarii. Cura & Opera Joh. Potteri*. A. M. Oxon. 1697.
- n. 54. p. 1093. 21. *Athanasii Kircheri Ars Magna Sciendi sive Combinatoria*. Amstel. 1669, in Fol.
- n. 106. p. 139. 22. *Logica, sive Ars Cogitandi*; è *Tertia* apud *Gallos* Editione *Recognita & Aucta*, in *Latinum Versa*. Lond. 1674, in 8vo.

CHAP. II.

Chronology, History, Antiquities.

- To find the Year of the Julian Period: by R. P. De Billy. n. 18. p. 324.
- I. 1. **M**ultiply the *Solar Cycle* by 4845, and the *Lunar* by 4200, and that of the *Indiction* by 6916; then divide the Sum of the Products by 7980, which is the *Julian Period*: The Remainder of the Division, without having Regard to the Quotient, shall be the *Year* of the *Julian Period* required. e. g. Let the *Cycle* of the *Sun* be 3; of the *Moon* 4; and of the *Indiction* 5. Multiply 3 by 4845, and you have 14535; and 4 by

by 4200, comes 16800; and 5 by 6916, comes 34580. The Sum of the Products is 65915; which, being divided by 7980, gives 8 for the Quotient, and the Number 2075, which Remains is the Year of the Julian Period.

2. The Julian Period is a Basis, whereon to found Chronology not liable to Controversy, as the Age of the World is: And it is the Number above-said, to wit, 7980, which is the Product of 28 (the Solar Cycle) \times 19 (the Lunar Cycle) \times 15 (the Indiction). This Period (first invented by Robert Lotbaring, Bishop of Hereford, and 500 Years after fitted for Chronological Uses by Joseph Scaliger) is such a Limit to Chronology, that within the Space of 7980 Years, the Number of the Sun's Cycle, the Prime and the Year of the Roman Indiction (which relates to their antient Laws and Records) can never happen alike. And these Remarks being given, the Year of the Julian Period is by the former Rule infallibly found.

Demonstrated by Mr. J. Collins. n. 30. p. 36

The Problem itself may be thus proposed; Any Number of Divisors, together with their Remainders after Division, being proposed, to find the Dividend.

This Problem thus generally proposed was resolved long since by John Geysius, by the Help of particular fixed Multipliers: And to clear up what Authors have omitted concerning them, we say that each of these Multipliers is relative to the Divisor to which it belongs, and thus define it; It is such a Number, as divided by the rest of the Divisors, or their Product, the Remainder is 0; but divided by its own Divisor, the Remainder is an Unit.

We require the Divisors proposed to be primitive to each other, i. e. that no Two or more of them can be reduced to lesser Terms by any common Divisor: For if so, the Question may be possible in itself, but not resolvable by Help of such Multipliers, such being impossible to be found. The Reason is, because the Product of an odd and even Number is always even, and that divided by an even Number, leaves either nothing, or an even Number.

$$\begin{array}{l} \text{Divisors. } 28 \\ \quad \quad 19 \\ \quad \quad 15 \end{array} \left. \vphantom{\begin{array}{l} 28 \\ 19 \\ 15 \end{array}} \right\} \text{The Multipliers relative thereto are } \left\{ \begin{array}{l} 3845. \\ 4200. \\ 6916. \end{array} \right.$$

The Definition affords Light enough for the Discovery of these Numbers. To instance in the first; the Product of 19 and 15 is 285, which multiply by all Numbers successively, and divide by 28, till you find the Remainder required. Thus twice 285 is 570, which divided by 28, the Remainder is 10; also thrice 285 is 855, which divided by 28, the Remainder is 15. Thus if you try on successively, you will find, that 17 times 285, which is 4845, is the Number required, the which divided by 28, the Remainder is an Unit. Hence then we shall find

$$\left. \begin{array}{l} 4845 \\ 4200 \\ 6916 \end{array} \right\} \text{ is equal to the Solid, or Product of } \left\{ \begin{array}{l} 19, 15, 17. \\ 28, 15, 10. \\ 28, 19, 13. \end{array} \right.$$

For the *Demonstration* of the *Theorem* proposed we thus argue.

1. *Each Multiplier multiplied by its Remainder, is measured or divided by its own Divisor, leaving such a Remainder as is proposed.* For before, each *Multiplier* was defined to be a *Multiplex* of its own *Divisor*, Plus an *Unit*. Wherefore multiplying it by any *Remainder*, it doth only render it a greater *Multiplex* in the said *Divisor*, Plus an *Unit* multiplied by the *Remainder*; which is no other than the *Remainder* itself; but if 0 remain, that *Product* is destroyed.

2. *The Sum of the Products divided by each respective Divisor, hath the Remainder assigned.* For concerning the first *Product*, it is by the first *Section* measured by its own *Divisor*, leaving the *Remainder* proposed; and if we add the rest of the *Products* thereto, we only add a *Multiplex* of its own *Divisor*, which in *Division* enlargeth the *Quote*, but not the *Remainder*. Particularly the second *Multiplier* is $28 \times 15 \times 10 \times \text{Remainder}$, all which is but a *Multiplex* of 28. And so the third *Product* is $28 \times 19 \times 13 \times \text{Remainder}$. And what hath been said concerning the *Sum* of the *Products* being divided by the first *Divisor*, and leaving the *Remainder* thereto assigned, may be said of each respectively.

3. *The Sum of Products divided by the Solid of the 3 Divisors, leaves a Remainder so qualified as the said Sum.* For concerning the said *Sum*, it is evident by the *Second* hereof, that it is no other than the *First Product*, increased by adding a just *Multiplex* of the first *Divisor*, that thereby we did only enlarge the *Quote*, not alter the *Remainder*: By the like Reason the *subtracting* a just *Multiplex* thereof, doth only alter the *Quote*, not the *Remainder*; but the *Solid* of all 3 *Divisors* multiplied here by the *Quote*, as there by the *Remainder*, is no other than a just *Multiplex* of the first *Divisor*. Wherefore the *Remainder*, after this *Division* is performed, is of the same Quality as the *Sum* of the *Products*; and divided by the first *Divisor*, leaves the *Remainder* proper thereto. And the like may be said concerning each *Divisor*.

As in the *Method* hitherto delivered, we required the *Divisors* to be *primitive* to each other; so, if we take the *Problem* as generally proposed, in the *Preface* to *Helvicus's Chronologia*, we are told, *common Arithmetick* fails in the *Solution* thereof; and *Tacquet* denies it to be performable by the *Regula Falsi*, and being unlimited, we must do it by *Trials*. Wherefore, *When any two Divisors with their Remainders are proposed, try the Multiples of one of them, increased by its Remainder, and divide by the other: If you find such Remainders as are not for the Purpose, and that they are repeated, the Problem is impossible.*

Example. Divisors $\left\{ \begin{array}{l} 6. \\ 8. \end{array} \right\}$ Remainders $\left\{ \begin{array}{l} 3. \\ 5. \end{array} \right\}$

The

The *Multiplices* of 8, increased by 5, are 13, 21, 29, 37, 45, 53.

Those *divided* by 6, the *Remainders* are, 1, 3, 5, 1, 3, 5.

Here you see 21 and 45, for the Purpose, and take the *Progression*, adding the common Difference 24 (which is the least *Dividend* measured by 6 and 8) and you have 21, 45, 69, 93, 117, 141.

Admit the Question had concerned these 3 *Divisors* :

6)	}	The Remainders being	{	6	Then dividing the former Pro-
8)				gression by 9, the Remainders	
9)				are 3, 0, 6, 3, 0, 6.	

Wherefore I conclude, that the 3d and 6th of these Numbers are those sought, to wit, 69, 141, and so on progressively; whereas, if you had propounded the *Remainder* of 9 to have been any other Number than 3, 0, 6, the *Problem*, as concerning all these, had not been possible.

Some easy *Cases* of the *Problem* are these: When the *Remainder* of some *Divisor* is 0, and of each of the rest of the *Divisors* an *Unit*, or less by an *Unit* than the *Divisor*. In which *Cases* you are to find such a *Multiplex* of the *Product* or least *Dividend* measureable by those *Divisors* that have *Remainders*, which increased or diminished by an *Unit*, may be a just *Multiplex* of that *Divisor* that hath no *Remainder*.

II. 1. To find the Year of the *Julian Period* for any Year of our Lord proposed, it is necessary to be furnished with the *Prime, Cycle* of the Sun, and the *Number* of the *Roman Indiction*, which the industrious Mr. Street performs :

Several chronological Problems solved; by Mr. J. Collins. n. 30. p 572. To find the Prime, Solar Cycle, and Indiction.

When 1, 9, 3, to the Year hath added been,

Divide by 19, 28, Fifteen;

The *Remainders* are the Numbers sought.

The Use of the *Prime* is, to find the *Epaact*, and thereby the *Moon's Age*, *Time of High-Water*, &c.

2. A farther Use of the *Sun's Cycle*, is to attain the *Dominical Letter*, and thereby to know the Day of the Week on which any Day of the Month happens. But this is more easily and with less Caution obtained, by finding on what Day of the Week the first of March happens for ever: In brief thus;

To the Number 2, add the Year of our Lord, and its even 4th Part,

neglecting what remains, if any; then divide that Sum by 7, and the Remainder (neglecting the Quotient) shews the Number of the Day of the Week, accounting Sunday first. If 0 remain, the first of March falls on a Saturday. Thus $2 + 1669 + 417 = 2088$ being divided by 7, the Remainder is 2; shewing the first of March in the Year 1669, to fall on a Monday. If it were required to perform this for Years preceding our Saviour's Nativity, then take this Rule :

To the Year add its even 4th Part, the Sum divided by 7, the Remainder shews the Day of the Week, accounting Sunday first, Saturday second, and so backward.

3. To find what Day of the Month, in the first Week of each Month, happens to be on the same Day of the Week, as the First of March, use the (plain) following Verses, in which the 12 Words relate to the 12 Months of the Year, accounting March the first.

*Ask Endless Comfort, God Enough Bestows,
From Divine Axioms Faith Confirmed Grows.*

The Alphabetical Number of the first Letter of the Word, proper to the Month proposed, is the Answer; e. g. If the Month were April, the Word proper thereto is *Endless*, and E is the 5th Letter in the Alphabet. Wherefore conclude, that the First of March, and the 5th of April, do for ever happen on the same Day of the Week.

4. To find on what Day of the Week the first Day of each Month happens, supposing the First of March known: It might be reckoned from the former Problem; but the following Verses, beginning with March, as the former, are more ready for the Purpose.

*A Dreadful Fire, Beholders Daily Gaze,
Chastiz'd England. Ah Cruel Fatal Blaze!*

Example. In the Year 1669, the First of March is Monday; I would know on what Day of the Week the First of October happens. The Word proper to the Month is *England*; then count alphabetically to E. viz. A. Monday; B. Tuesday; C. Wednesday; D. Thursday; E. Friday; which is the Day sought.

Whence conclude, that the 1st, 8th, 15th, 22d, 29th Days of October are all Fridays. Thence it is easy to reckon on what Day of the Week any Day of that Month happen'd; and so for all other Months.

5. To find on what Day of the Month the Sun enters into any Sign of the Zodiack; *ex superabundanti*, we give the following Verse.

*Charles Brought Content, Divers Effects Ensue,
Envy, Fear, Dolour, Danger, Bids Adieu.*

Here again the 12 Words relate to the 12 Months, March being the first. To the Number of the Letters of the Alphabet the Word begins with, add 7, e. g. *Fear* is the Word for October, and F. the 6th Letter: Wherefore the Sun enters into the 8th Sign, to wit, *Scorpio*, on the 13th of October.

The Rubricks for the Seat of Easter, according to the Julian Account, explained: by Dr. J. Wallis. n. 240 p. 185. III. The fundamental Rule of the *Nicene Council* (which we pretend to follow) for the keeping of *Easter*, is to this Purpose; *Easter-Day* is to be that Sunday which falls upon, or next after, the first Full-Moon which happens next after the *Vernal Equinox*. This *Vernal Equinox* was then observed to fall on the 21st of March, though it does now fall on the 11th of March, or sometimes on the 10th of March. And therefore, instead of next after the *Vernal Equinox*, we say, next after the 21st of March.

But

But then it is said (by a Mistake, I suppose, *after the first Full-Moon*, instead of *upon*, or *next after the First Full-Moon* (for so it is to be understood) and added, *and if the Full-Moon happens on a Sunday, Easter-Day is the Sunday after*; which must needs be a *Mistake*: For in such Case, it is to be *that Sunday*, not the *Sunday after*. And so the Tables agree (contrary to this Note) both that *for 40 Years*, and that *to find Easter for ever*. And so it was observed, in the Years 1668, 1678, and 1682. And so whenever the Case happens that the *Ecclesiastical Full-Moon* falls on a *Sunday*.

The only Doubt remains, on what Day we must reckon the *Ecclesiastical Full-Moon* to fall: For we are not to judge either the *Equinox* or the *Full-Moon*, according as they happen in the *Heavens*, or in our *Almanacks*; but according to the *Paschal Tables*, fitted to the Time of the *Nicene Council*. And accordingly we are to account the *Equinox* to be now (as then it was) on *Mar. 21*. The *Golden Number* (fitted to the *Cycle* of 19 Years, after the End of which, it begins again at 1, 2, 3, &c.) is placed in the first Column of our *Calendar*, to tell us on what Day (of such a Year) the *New-Moon* is *supposed* to happen, in each Month; and the 15th Day of that *Moon* is *reputed* the *Full*. Thus the *Golden Number* for the Year 1698, is 8 (that is, this is the 8th Year of such *Decem-novenal Cycle*, or *Circle* of 19 Years, commonly called *Cyclus Lunaris*, or the *Circle* of the *Moon*; as the other *Circle* of 28 Years is called *Cyclus Solaris*, the *Circle* of the *Sun*, or rather of the *Sunday Letter*.) And this Number 8 stands in the *Calendar* at *Mar. 6*; which we must therefore suppose to be *New-Moon* (though the *New-Moon* were indeed *March 2*.) Now *March 6*, being the *New-Moon*, or first Day of the (*reputed*) *Lunar Month* (for such Year) *March 20* will be the 15th Day, or the (*reputed*) *Full-Moon* for the Month of *March* this Year, which happens to be *Sunday*; the *Dominical Letter* for this Year being *B*. But this happening before *March 21* (the *supposed Equinox*) cannot be the *Paschal Full-Moon*; but we must wait for another: And we shall then find the *Golden Number* 8 standing at *April 5*, for the *New-Moon* of *April*, the same Year. And therefore the *Full-Moon*, or 15th Day of that (*reputed*) *Lunar Month*, is to be *April 19*. Which being *Tuesday*, the *Sunday* next following is *April 24* (where stands *B*, the *Sunday Letter* for this Year) which is therefore to be *Easter-Day*, according to the *Intent* of these *Tables*; and it was observed accordingly.

But it were to be wished, there had been somewhere a *Rubrick* to direct how we are to find this (*reputed*) *Full-Moon*; and what is the Use of the *Golden Number*.

The Difference of the *Ecclesiastick Account*, in the *Paschal Tables*, from that of the *Heavens* (both as to the *Equinox* and as to the *Full-Moons*) doth arise from hence:

1. The *common Julian Year* (by which we reckon) of 365 Days and 6 Hours, is somewhat too long; being about 11 Minutes of an Hour longer than the true *Solar Year*. By reason whereof, the *Equinox* (and other *annual Seasons*) go forwards about 11 Minutes every Year: Which from the Time of the *Nicene Council* till now, amounts to about 11 Days; so that

the *Equinox*, which *then* happened *March 21*, is *now* come back to *our March 10*. Which upon *Pope Gregory's* reforming the *Roman Calendar* (above 100 Years since) causeth the Difference of 10 Days between what we call the *New Stile* and the *Old Stile*.

2. It was *then* supposed, that in 19 Years (which is the Compass of the *Golden Number*) the *Lunations* (of *New-Moon* and *Full-Moon*) did return to the same Day and Hour as they were 19 Years before. But though this be pretty near the Truth, yet it comes short by about an *Hour and half*: Which *Hour and half* in every 19 Years, doth since that Time, amount to 4 or 5 Days. Whence it comes to pass, that the *reputed Full-Moon* is later, by 4 or 5 Days, than that of the *Heavens*. But our *Easter* is reckoned according to the *reputed Full-Moons* (derived from the *Golden Number*) not according to those of the *Heavens*.

A Report of the Consultation upon Mr. Dee's Proposal for reforming the Calendar, A. 1582; by the Lord Treasurer Burleigh. n. 257. p. 355.

IV. 1. It was agreed by Mr. *Digges*, Mr. *Savile*, and Mr. *Chambers*, that upon their several Perusals of the Book, written by Mr. *Dee*, as a Discourse upon the *Reformation of the vulgar Calendar* for the *Civil Year*, that they do allow of his Opinion, that whereas in the late *Roman Calendar reformed*, there are 10 Days cut off, to reduce the *Civil Year* to the State it was established in at the *Council of Nice*, the better *Reformation* had been to have cut off 11 Days, and to have reduced the *Civil Year* according to the State it was in at the *Birth of Christ*. And so they all agree, that such a *Reformation* had been more agreeable to the *Account of Christ*. And so they do also assent, that having Regard to the *Council of Nice*, the Substraction of 10 Days is agreeable to Truth: And therefore the better to agree with all Countries adjacent, that have received their *Reformation* of subtracting 10 Days only, they think it may be assented unto without any manifest Error; having Regard to observe certain *Rules* hereafter for omitting some *Leap Years* in some hundred Years. And for the subtracting of 10 Days, Mr. *Dee* has compiled a Form of a *Calendar*, beginning at *May*, and ending at *August*, wherein every of these 4 Months, *May*, *June*, *July*, *August*, shall have in the Ends of them some Days taken away without changing of any *Feast* or *Holy-Day*, Moveable or Fixed, or without altering the *Courses* of *Trinity Term*; that is to say, *May* to consist of 28 Days, taking from it 3 Days; *June* to have 29 Days, taking from it but one Day; *July* to consist of 28 Days, taking from it 3 Days; *August* to consist of 28 Days, taking from it 3 Days: All which Days *subtracted* make 10 Days. In the which 4 Months no *Festival Days* are changed, but remain upon the accustomed Days of their Months.

And because the *Roman Calendar* hath joined to it a great Company of *Rules*, of which only are capable the *skilful Computists* or *Astronomers*, it is thought good to make a short Table like an *Ephemerides*, to continue the Certainty of all the *Feasts Moveable*, depending only upon *Easter*, and agreeing with the *Roman Calendar*; which may serve for *one hundred*, or *two hundred Years*, and so be easily renewed when there shall be Occasion for it.

2. The *Reformation* of the *Roman Calendar* proposed by Mr. Dee, as I cannot wholly approve, so I cannot altogether disapprove: For I like the *Substraction* of 10 Days, as the *Church of Rome* has done, beginning the *Computation* from the *Council of Nice*: Though it cannot be denied, but that the *Reformation* from the Time of *our Saviour* had been much better. But since the *Fathers* of the *Council of Nice* thought it more Wisdom to look forwards than to look backwards, and to have greater Care of avoiding Distractions in the Church, about the *Celebration* of *Easter* for the future, than to remedy the Errors past; I think we should do well with the *Church of Rome* to follow their Example. And whereas some have thought of a more exact Calculation than this *Emendation*, introduced by Pope *Gregory XIII*, which they ground upon the late *Astronomical* Observations of the learned *Tycho Brahe*; yet since the Difference is not so great, as to make any sensible Error in many Ages, and since that Error may be easily corrected by the Omission of an *intercalary Day*, I think it not fit, for so small a Nicety, to make a new Diffension in the Church. Much less am I of their Opinion, who think, that this Correction of the Year is therefore to be rejected, because it comes recommended by the *Church of Rome*; which were all one as to refuse some wholesome Potion, because it is prescribed by a Physician whose Manners we approve not of.

But I cannot subscribe to his Opinion, that this *Reformation* should be by the *Substraction* of 10 Days out of one Year alone: For though I grant, that this were a quick Cure of a lingering Disease, yet it is against all Rules of Art, in curing one Malady to make 10. For it cannot be, but that the *Defalcation* of 10 Days in one Year must be of infinite Disturbance in the Commonwealth in all *Contracts*, where necessarily a certain Time is defined. I shall therefore humbly recommend to his Majesty's Wisdom and favourable Consideration, that Course which was long since proposed by many able Mathematicians to Pope *Gregory*, upon the first Notice of his Purpose of *correcting* the *Calendar*. The Manner was this; That for 40 Years Space there should be no *Bissextile* or *intercalary Years*, or, as we call them, *Leap Years*, inserted in the *Calendar*. By which Course it is most evident that 10 Days will be *subtracted* in 40 Years, and these 40 Years will be each of them *Anni Æquabiles*, consisting of 365 Days, as our common and ordinary Years do, without any Alteration in the whole Year. And this being beyond all Exception, had been readily entertained by Pope *Gregory*, had not his *Ambition* been greater than his Judgment; for he was willing to have the Honour of this *Emendation*, and not to leave it to his Successors; whereby the Year ever since has been called *Annus Gregorianus*.

3. Against this Expedient of *observing no Bissextile* for the Space of 40 Years, or now of 44 Years, there seems to me this great Objection. In the Time of *Julius* and *Augustus Caesar*, there was a Year which was called *Annus Confusionis*, upon the settling and resettling the *Julian Year* (Of which *Kepler* gives an Account with the Mischiefs of it) And the like in the Year 1582, when Pope *Gregory* did, at once, strike out 10 Days of that Year.

Considered An.
1645; by Mr.
J. Greaves.
Ib. p. 356.

An. 1699. by
Dr. J. Wallis.
Ib. p. 348.

Tab. Rudolph.

Year. But if this Advice should take Place, we should now, instead of one *Annus Confusionis*, have a Confusion for 44 *Years* together; wherein we should agree neither with the *Old* nor with the *New Account*; but be sometimes 10 *Days*, sometimes 9 *Days*, sometimes 8 *Days* (and so forth) later than the *one*, and sooner than the *other Account*. And a *Foreigner* would not be able to judge of an *English Date*, without knowing in which of these *Years* we vary 10, 9, or 8 *Days* (and so forth) from either of these *Accounts*: And this for 44 *Years* together. Which seems to me a much greater *Confusion*, than if (as in 1582) we should (once for all) cast out 11 *Days*. But I cannot think it adviseable to do *either*.

The Julian
Account not
to be changed
for the Gre-
gorian; by
Dr. J. Wallis,
n. 257. p. 343.
350.

V. Concerning the *Alteration*, at this Time suggested of the *Julian Account* for the *Gregorian*, I am at a Loss what to say. That there is in our *Ecclesiastical Computation* of the *Paschal Tables* somewhat of Disorder, is not to be denied: But I am very doubtful, that if we go to *alter* that, it will be attended with greater Mischiefe, than the present Inconvenience. By removing *Ptolemy's first Meridian* (though upon some plausible Pretences) it is now come to pass, that we have (in a manner) *no first Meridian* at all; but every new *Map-maker* placeth his *first Meridian* where he pleaseth; which hath brought a great *Confusion* in *Geography*. It is agreed by most (if not all) *Chronologers*, that as to the *Year of our Lord*, the *Annus Vulgaris* is not the *Annus Verus* (though it be not agreed how much it differs) But it would be a horrible *Confusion* in *History*, if we should now go about to alter this *Vulgar Account*. And as to the Disorder in the *Paschal Tables*, it was a Thing noted and complained of for 3 or 400 *Years*, before *Pope Gregory* did (unhappily) attempt the *Correction* of the *Kalendar*. But it was all that Time thought adviseable, rather to suffer that Inconvenience, than, by *correcting* it, to run the Hazard of a greater Mischiefe.

The *Celebration* of *Easter* a *Week* or a *Month* sooner or later, doth not influence at all our solemn *Commemoration* of *Christ's Resurrection*. But if it be thought necessary, that the *Seat* of *Easter* should be *rectified*, and the *Paschal Tables* corrected (and *Pope Gregory* made no other Pretence) that may easily be done. For, if in the *Rule* for *Easter*, instead of saying *next after the 21st of March*, you say, *next after the Vernal Equinox*, the Work is done; and we might be excused the Trouble of *Paschal Tables*, and the intricate Perplexities of the *Gregorian Epacts*: For then every *Almanack* will tell you when it is *Equinox*, and when it is *Full-Moon*, for the present *Year*, without disturbing the *Civil Account*. And this *Pope Gregory* might as well have done, without troubling the *Account* of *Christendom*. But if he would needs disturb the *Civil Year*, he should have *rectified* it (not to the Time of the *Nicene Council*, but) to the Time of our *Saviour's Birth*: For our *Epocha* is not from the *Nicene Council*, but from the *Birth* of *Christ*. And most certain it is, that at our *Saviour's Birth* the *Vernal Equinox* was not on the 21st of *March* (as the *New Account* would suppose) but nearer to the 25th.

However,

However, this pretended *Reformation* of the *Kalendar* introduced that *Confusion* of *Old* and *New Stile*, which we now complain of, and which now can never be remedied, unless all Nations should, *at once*, agree upon *one*: I say *at once*; for if some sooner, and some later do *alter* their *Stile*, the *Confusion* (in *History*) will yet be greater now it is. It is true, that upon Pretence of the Pope's (usurped) *Supremacy* in *Spirituals* (and in *Temporals* also in order to *Spirituals*) most *Popish Countries* (but I think not all) have submitted their *Civil Year* (as well as their *Ecclesiastical*) to the single Authority of the *Pope's Bull*. But the *Church* of *England* had long before this pretended *Correction* renounced the *Pope's Supremacy*, and is therefore unconcerned in it: And I see no Reason why (after so long a Disclaimer) we should be *now* fond to re-admit it: For what greater Evidence (of owning that *Authority*) can (in Practice) be expected, than obeying their Commands in Things (otherwise) unadvisable? No doubt the *Hand of Joab* is in this Matter, though perhaps we do not see it. Besides, this *Alteration* cannot be made without altering the *Common Prayer-book* (for, at least, all the *Kalendar* must be new framed) And some are so warm against touching that in the least, that they are even against considering, whether ought in it may be changed for the better. Had this been started in King *James's* Time, with what Face would it have looked? And if the Mask be taken off, the Face is still the same.

But it is not *England* alone that useth the *Julian Year*; but all the three Kingdoms of *England*, *Scotland*, and *Ireland*, and all our *Foreign Plantations*, which are not a few; and the two Kingdoms of *Denmark* and *Sweden*; the *Protestant Cantons* of *Switzerland*; and four of the seven *United Provinces*; and many of the *Protestant States* in *Germany*. So that if *we* should change our *Stile* in Compliance with some of our *Popish* Neighbours from whom we differ, we should then vary from the *Protestants* with whom we now agree; and particularly from *Scotland*, with whom we are more concerned to agree than with *France*. A new *Law* in *England* would not comprise *Scotland*; and we cannot promise ourselves that they would presently comply also: They are not so pliable to the *Modes* of *Rome* as some in *England* are; as is evident in their not admitting *Episcopacy*; and the *Business* of *Easter* (which was the sole Pretence for the first *Alteration*) would to them signify nothing, who (according to their Constitution) observe no *Easter* at all, but do rather declare against it.

If it be said, that the other *States* may, in Time, be induced to follow our Example: Perhaps some may (not all) But this would but make the *Confusion* yet greater. For thenceforth, we must be obliged (if we would understand their *Dates*, and be at a Certainty in *History*) not only to know what Countries do use this or that *Stile*, but from what Time they began so to do. So that there will still be as great Necessity of *S. V.* and *S. N.* (*Old Stile* and *New Stile*) as now there is: And with that *Distinction* we are now as easy as if we change.

That

That the *Old Julian Year* is, in itself, a better Form, and more adviseable than the *New Gregorian*, is so notorious, that all *Astronomers* (even *Papists* themselves) are fain first, to adjust their *Calculations* to the *Julian Year*, and thence transfer them to the *Gregorian*. The *Equinox* going backward (for 10 or 11 *Minutes* each Year) is very inconsiderable, and which, in *Celestial* Computations, is easily rectified; as are many other *Inequalities* of much greater Concernment. And I think it was never pretended that the *Civil Year* must needs agree (exactly to a *Minute*) with the *Celestial*; and if never so much affected, is impossible to be had. For the *Solar Tropical Year*, and the *Sidereal Year*, differ more from each other than the *Julian* from either; which is a Middle betwixt them.

It would therefore be much more adviseable (if the *Papists* would be as compliant as they would have us to be) for the *Papists* to return to their *Old Julian Year*, than for us to embrace their *New Gregorian*; and it might much easier be effected: For, if the *Pope* could be persuaded to grant a *Bull* to that Purpose, all the *Papists* would, at once, be as much obliged so to do, as by *Pope Gregory's Bull* to vary from it. If it be said, there is no Hope of that, then the Argument stands thus: If the *Pope* will not leave his *pretended Supremacy*, then we must admit it. But this surely is no Inducement for us to exchange our better *Julian Year* for one that is much worse.

The Conclusion of the Protestant States in Germany, An. 1669, for reforming the Calendar; by . . . n. 260. p. 459.

VI. The *Protestant States* of the *Empire* in the *Imperial Diet* of *Regensburg*, having deliberated upon the projected *Reformation* of their *Almanacks*, have resolved on the following Particulars.

1. That after the 18th of *February* 1700 *Old Stile*, the following 11 *Days* shall be left out in the *Almanacks*, and the *Feast* of *St. Matthias* be kept on the 18th of *February* aforesaid.

2. The *Computation* of *Easter*, and the *Feasts* thereon depending, shall, for the future, be calculated according to the true *Astronomical Calculation*; and this to continue only for this following *Century*, the *Astronomers* being left at *Liberty*, in the mean time, to consult on further *Methods*, to prevent any further *Variation*.

The *Mathematicians* shall be ordered to consider how for the future the *Abuse* of *judiciary Astrology* in the *Almanacks* may be abolished.

This *Resolution* doth not proceed from any *Condescendence* to the *Roman Catholics*, nor can be interpreted an accepting of the *Gregorian Kalendar*, considering, 1. The *Omission*, or leaving out of these 11 *Days* intercalated, is quite different from that which they had done before; for here the *Calculation* of *Time* is only reduced to the *Course* of the *Sun*, as it was before the *Nicene Council*. 2. Wherefore the principal Thing in the *Gregorian Kalendar*, and the *Gregorian Cyclus*, is yet retained by them. 3. The *Astronomical* *Computation* of *Easter* in the *New Kalendar*, is a perpetual and annual real *Protestation* against the *Injunction* of *Pope Gregorius*; and yet 4thly, the different *Methods* of *Computation* (the *Astronomical* which we use, and the *Cyclus* which they use) to find the *Easters* and *Feasts* depend-

depending thereon, makes no great Difference in the thing itself, except in one only case, otherwise they fall every Year on the same Day. This Case is, that our *Easter* will fall 8 Days later than theirs, when the *æquinoctial Full-Moon* shall fall too near a *Sunday*. For then the *Gregorians*, according to their *Cyclus*, will observe their *Easter* on the *Sunday* immediately following: But the *Protestants*, to avoid observing *Easter* on the same Day with the *Jews*, which, according to the *astronomical Calculation*, keep their *Easter* 8 Days after; and that, according to an antient *Rule* and *Practice* of the *Christian Church*, which when *Easter Full-Moon* fell on a *Saturday*, and that *Saturday* happened to be the 21st of *March*, then the *Easter* is to be observed on the *Sunday* following, 8 Days after.

This *Resolution* will not be an *Occasion* of any further *Variance* and *Difference* in the *Computation* of *Time*. For, 1. The numbering of the *Days* continues uniformly without any *Difference* all the next *Century*; and before this *Century* be ended, a *Method* will be found, to agree about the *secular intercalary Day*. 2. The *Gregorian Kalendar* does not depart much, nor will hereafter, from the *Course* of the *Heavens* and the *Canons*; and, except in the aforesaid *Case*, the *Computations* of *Easter* will every *Year* actually agree. 3. It is not now necessary to trouble ourselves with the feared notable removing of *Easter* from its due *Term*, which the *Gregorian Kalendar* will occasion; for before that happens, if the *World* shall stand yet many *Ages*, *Means* will be found to prevent it.

If any *Correction* of the *Gregorian Kalendar* should happen (which is hardly to be presumed), yet our *astronomical Calculation* will always be more accurate than their *Cyclus*, and if they will not transgress against the *Canons*, and the *Course* of the *Heavens*, they must comply with us. It being thought fit that 11 *Days* should at once be left out, it was also thought best to do it immediately before the 1st of *March St. No.* and that in the *Year* 1700, instead of writing and numbering after the 18th, the 19th of *Feb.* to write the 1st of *March*; and that because, 1. In these 11 *Days* is no *Feast-Day*, and *St. Matthias* falls on a *Sunday*, so that it's all one whether it be observed on the one or the other *Sunday*, 8 *Days* sooner or later. 2. Because thus the *Old* and *New Stile* will be fully united and reconciled, and that at once.

VII. The *Garter* shews the *Number* of *Days* (30, 29, 30, 29, &c.) which each of these 12 *Months* of the *Year* is to contain; and in the *Buckle* is discovered, through a *Hole*, the *Days* of a 13th *Month* (31, 30, 31, 30, &c.) to be added to the *Years* 2, 5, 7, 10, 13, 15, 18, 21, 24, 26, 29, 32, 34, 37,; in all to 14 of 38, as in a *Cycle* behind; which being supposed moveable one 38th *Part* every *Year* backwards or contrary to the *Months* in the *Garter*, its *Revolution* is completed in 38 *Years*: And the 38th *Year* current, or the *Year* of the *Period* or *Cycle*, is shewed through another *Hole*.

Once every *Century*, or to one *Year* in 100, add one *Day*, viz. To the first 50th *Year*, or middle of the *Century*, or rather to the first 70th *Year*

A new Luni-
solar Year,
and a perpe-
tual Alma-
nack, by Mr.
R. Wood. Ph.
Col. n. 2. p. 26.
Fig. 2, 3.

(because the first New-Moon, March 10, 1680, happens a little after Midnight, and after the Vernal Equinox), and then to every 100th Year following; which additional Day being omitted every 230th or 240th Century (or near thereabouts, if any one shall require such great Exactness) will balance the Account for ever.

The *New Year*, and *Account*, may best begin with the *Vernal Equinox*; or rather with the Day of the *New-Moon* happening near Midnight about that Time, as *March 10, 1680*.

The *Egyptian Hieroglyphick* of the *Year* was a *Serpent* carved into a Circle or Ring, with Tail in Mouth; but the *emblematical Garter* will be much more proper for *England*; and is so exactly fitted to the *Moon's Motion*, that one Day will not be lost or got in *Millions of Years*.

(a) *Almon ac.* This (a) *Almon-ac* measures Time principally by the *Moon*; but with a great and near respect to the *annual Motion* of the *Sun* on Earth. The Unit, or least Measure, is a *Day*; and the *Garter* or *Luni-solar Year* will be at a Medium within about a Week, or half a hundredth Part of the true *Solar Year*; that is, so near, that the Difference will not be discerned by ordinary popular Observation (and therefore must needs answer the Ends of *Husbandry* and other *civil Affairs* well enough), and come often near, and sometimes very near; and at certain *Periods* they balance one another, and have a kind of *Coincidence* or *Agreement*, much better than the *Sun's Course* has with the *Italian Account*, so much magnified by *Scaliger* and others.

Our Ancestors used to carve the Courses of the Moon of the whole Year upon a Squared Stick, which they called an *Almon-acht*, that is, *Almoon-heed*. Veritegan. p. 53. The Dutch *Al-mean-acht* imports the same.

I find the elder World generally computed their Time (and most of the *Eastern Countries*, if not the Bulk of Mankind, do so still) by the *Moon*, or by the *Lunar*, or *Luni-solar Year*, made up of *Moons*, or real *Months*, or somewhat near the Matter such; which *Months* were for the most part 12, and some Years 13. This appears from their *Kalendars*, &c. 'Tis plain (from 1 *Sam. c. xx. v. 5, 18, 24*, compared with *v. 27, 34*) that the Days of the *Jewish Month* were the same with those of the *Moon*: And the *Grecians* (where *Astronomy* as well as other Arts and good Learning most flourished) and particularly the *Athenians* (according to the Institution of their wise Legislator *Solon*) did thus reckon their Time; and so did the *Romans* too, till *Julius Cæsar* altered, I cannot say mended, the Year.

Among the *Grecians* there lived, in three not far distant Ages, three famous *Astronomers* in their several Times, *Meton*, *Calippus*, and *Hipparchus*, each of whom still farther improved *Astronomy*, and rectified the *Accounts* of Time more and more one after another respectively, according to their Light, and the Observations of their own and the foregoing Ages. *Hipparchus*, the last of them, flourished about 100 or 90 Years before *Julius Cæsar* altered the Year: Yet *Cæsar*, or his *Astronomer Sosigenes*, followed *Calippus* in framing the *Julian Year*; as I find by examining their *Accounts*. For *Calippus's Period* of 76 Years consisted of 27,759 Days, and so do 76 *Julian Years*. About 3 Centuries and a half after *Cæsar*, the Council of *Nice* (first) and about 2 Centuries after that *Dionysius Exiguus* (again) introduced the *Decennial Cycle* (called the *Golden Number*) for the Celebration of *Easter*, following

following *Meton*, the *first* and *least exact* of the *three*; or rather following both *Meton* and *Cæsar*, two Masters, who were neither of them the best, and would, after some Time, disagree, and part further from each other though both *Cæsar* and the *Church* might have had a much better Copy from *Hipparchus*: Which Mistakes of theirs (and their Eyes being dazzled with the *Sun*, whereas they might more safely have looked on the *Moon*) have occasioned those *Anticipations* and Differences that have embarrassed the *Accounts* of *Time*, and these Parts of the World in the succeeding Ages. And though many have proposed laudable Ways of redressing the said *Accounts*, yet still building upon the old Foundations which were infirm, Pope *Gregory XIII.* in his *Reformation* of the *Kalendar*, about 100 Years since, was necessitated to wave the *Golden Number*, and yet he has but palliated the Disease; so hard it is to cure an Error in the first Concoction.

The *Council of Nice* appointed *Easter* to be kept the *first Sunday after the first Full Moon after the 21st of March*, because the *Vernal Equinox*, which was on the *25th* in our *Saviour's Time*, was then come to be on the said *21st Day*; and therefore the *Gregorian Reformation* has reduced the *Vernal Equinox* back to that Day: But in this *Garter-Year*, *Easter* will always be the *first Sunday after the first Full-Moon of the New Year*; that is, after the *Vernal Equinox*, according to the true Intent and Meaning of the *Nicene Council*, or as it was in the *primitive Times*, and be but a *Week moveable*, or a *Month less moveable* than now, either after the *Old* or *New Stile*: Which might perhaps have prevented the Difference, or served as an *Expedient* for reconciling the *West* and *East Churches*.

The three *Cycles* of *Meton*, *Calippus* and *Hipparchus*, were all of them too large for the *Sun*, and primarily intended for the *Moon*, or for a *Lunisolar Year*; however, that of *Hipparchus* was nearest to both, and very near the *Moon's Period*.

Perhaps, at first View my *38 Years Period* may be looked upon but as a *double Metonic*, or *Semi-Calippic* one, &c. But upon farther Consideration, it will be found otherwise: For *Meton* and *Calippus* their *Periods*, as also that of *Hipparchus*, were all of them too big, not only for the *Circuit* of the *Sun*, as I said before, but for that of the *Moon* also; whereas *mine*, on the other hand, is too little for either, and needs one *additional Day* in near about every 100 Years.

Meton's 19 Years Cycle, or Enneadecaeteris, had 6940 Days, } the Double whereof is	13880
Calippus's Period, or 76 Years, had 27759 Days, the Half } whereof is	13879½
Hipparchus's Period, or 304 Years, had 111035 Days, the } 8th Part whereof is	13879⅛
Whereas my 38 Years Period hath but just Days	13879

So that it may easily appear to any one who shall please to examine it, wherein my *Cycle* or *Period* differs from all theirs: But the Frame of my

Contrivance of this so nice Matter, for the easy Explication thereof, even to the grossest Capacities, as to Practice and Use, is wholly different from theirs, and every one's else I ever yet heard of.

I chose rather to take the *Revolution* of the *Moon*, than that of the *Sun*, for my chief and primary Measure of *Time*: Because, *first*, the *Lunar Phases*, and consequently *Months*, are more easily discerned, than the *Sun's Annual Period*, even by the most ignorant vulgar Eyes; who need but look up, almost any Night, to see their *Almonac*. *Next*, The Observations upon the *Moon*, made by the more knowing Men, have been more in Number, more exact, and of far greater Antiquity; *Astronomers* having had the Help of *Eclipses* of very distant Ages for their Guide, in finding out very near the true Measure of the *Moon's mean Motion*. *Lastly*, Keeping an *Account* by the *Moon*, we may reckon by the *Sun* also, that is to say, by *Months* and *Years* too; whereas, on the contrary, reckoning by a *Solar Year*, the *Months* are but empty Names, and, in *measuring* of *Times* and *Seasons*, the *Moon* is rendered of no Use; though some *inanimate* Bodies (so considerable, that they take up and possess perhaps half this our Globe) as the *Seas*, do exactly observe the *Moon's Course*; and there are *living* Creatures also, thought perhaps no less considerable at Land, that do the like; which I need not mention, nor take any farther Notice of the near Affinity, if not Consanguinity, with the Garter.

The Time and
Place of Cæ-
sar's Descent
upon Britain;
by Mr. Edm.
Halley. n. 193.
p. 495.

VIII. The Authors that mention *Cæsar's Expedition* into *Britain* with any Circumstances, are *Cæsar* himself and *Dion Cassius*. It is certain that this Expedition of *Cæsar* was in the Year of the *Consulate* of *Pompey* and *Crassus*, which was in the Year of *Rome* 699, or the 55th before the usual *Æra* of *Christ*; and as to the *Time* of the *Year*, *Cæsar* says, that *Exiguâ parte Æstatis reliquâ*, he came over only with two *Legions*, viz. the 7th and 10th, and all *Foot*, in about 80 Sail of Merchant Ships, 18 Sail that were ordered to carry over the *Horse*, not being able to get out at the same *Time* from another Port, where they lay *Wind-bound*. He says, that he arrived about the 4th *Hour* of the *Day*, viz. between 9 and 10 in the Morning, on the Coast of *Britain*; where he found the *Enemy* drawn up on the Cliffs ready to repel him; which Place he thus describes, *Loci hæc erat natura, adeo Montibus angustis Mare continebatur, ut ex locis superioribus in Littus Telum adjici possit*; by which the Cliffs of *Dover* and the *South-Foreland* are justly described; and could be no other Land, being, he says in the 5th *Book* of his *Commentaries*, in *Britanniam Trajectum esse cognoverat circiter Millium Passuum Triginta à Continenti*. Here he says he came to *Anchor*, and stayed till the 9th *Hour*, or till about between 3 and 4 in the *Afternoon*, expecting till the whole *Fleet* was come up; and in the mean time called a *Council of War*, and advertised his Officers, after what Manner they were to make their *Descent*, particularly in relation to the *Surff* of the *Sea*, whose Motion he calls *Celerem atque Instabilem*, quick and uneven. Then, viz. about 3 in the *Afternoon*, he weighed *Anchor*, and having got the *Wind* and *Tide* with him, he sailed about 8 *Miles* from the

the *first Place*, and anchored against an open and plain Shore. Here he made his *Descent*, and, having told us the Opposition that was made, and the Means he used to get on Shore, he comes to say, after that he had been 4 *Days in Britain*, the 18 Ships with his *Horse* put to Sea, and were come within Sight of his *Camp*, when a sudden Tempest arose, with contrary Wind, so that some of the Ships put back again, others were driven to the *Westward*, not without great Danger; and, coming to an Anchor, they found they could not *ride* it out: So when Night came on, they put off to Sea, and returned from whence they came. The same Night it was *Full-Moon*, which makes the *greatest Tides* in the *Ocean*, and they being ignorant thereof, their *Gallies*, which were drawn on Shore, were filled by the *Tide*, &c. Then he says, that the *Day* of the *Autumnal Equinox* being at hand, and after some Days Stay, wherein there passed no Action, because he kept close in his Camp by the Shore, and not thinking it proper to stay till the *Winter* came on, he returned into *Gallia*. The next Year he made a further *Expedition* with 5 *Legions* and a good Body of *Horse*: But there is little in the History thereof serving to our Purpose, excepting that he says, he set Sail from the *Portus Icius* about *Sun-set* with a gentle S. W. Wind, *Leni Africo profectus*; that about *Midnight* it fell calm, and being carried away with the *Tide*, by the Time it was Day, he found he had left *Britain* on the *Left-hand*; but then the *Tide* turning, they fell to their Oars, and by *Noon* reached that Part of the Island where he *landed before*, and came on Shore without Opposition; and then marched up into the Country, leaving his Ships at Anchor in *Littore molli & aperto*.

Dion Cassius, speaking of the Landing of *Cæsar*, says, ὁ μὲντοι οὐκ ἦτορ προσελθόντι; that is, as I translate it; but he *landed* not where he intended; for that the *Britains*, hearing of his Coming, had possess'd all usual Places of Landing, ἄλλαν ἐν τινὰ προελθόντων περιπλαύσας ἑτέροις παρακλίθεσι. Κανίσθητα τὸς προσελθόντας οἱ ἐς τὰ τεύχεα ἀπεβαίνοντι νικήσας, ἔσθη δὲ γῆς κρατήσας. In my *English*, Wherefore doubling a certain Head-land, he made to the Shore on the other Side, where he overcame those that skirmished with him at the *Water's Edge*, and so got well on Land.

From these *Data*, that it was in the Year of the *Consulate of Pompey* and *Crassus*; that it was *Exiguâ parte Æstatis reliquâ*, and 4 *Days* before a *Full-Moon*, which fell out in the *Night-time*; the Time of this Invasion will be determined to a *Day*: For by the *Eclipse* of the *Moon*, whereof *Drusus* made so good Use to quiet the Mutiny in the *Pannonian Army*, upon the News of the Death of *Augustus*, it follows that *Augustus* died *Ann. Cbr. 14*, which was reckoned *Anno Urbis Conditæ 767*; and that this Action was 68 *Years* before, *viz.* in the 55th Year before *Christ Current*. In which Year the *Full-Moon* fell out *Aug. 30*, after *Midnight*, or 31 in the Morning before Day. The preceding *Full-Moon* was *Aug. 1*, soon after *Noon*; so that this could not be the *Full-Moon* mentioned, as falling in the *Day-time*: Nor that in the Beginning of *July*, it being not 10 *Days* after the *Summer Solstice*, when it would not have been said *Exiguâ parte Æstatis reliquâ*. It follows, therefore, that the *Full-Moon* spoken of, was on
August

August the 30th at Night, and that the *Landing on Britain* was Aug. 26, in the Afternoon, about a Month before the *Autumnal Equinox*; which agrees to all the Circumstances of the Story in Point of *Time*.

As to the *Place*; the *Highb-land* and *Cliffs* described, being allowed by all to be those of *Dover*; it only remains to examine whether the Descent was made to the Northward or Southward of the Place where he first anchored. The *Data* to determine this, are 1st, that it was 4 Days before the *Full-Moon*. 2. That that Day by 3 of the Clock in the Afternoon, the *Tide* ran the same Way he sailed. 3. That a *S. by E. Moon* makes *High-water* on all that Coast, the *Flood* coming from the *Southward*. Hence it will follow, that that Day it was *High-water* there about 8 in the Morning, and consequently *Low-water* about 2; wherefore by 3, the *Tide of Flood* was well made up; and it is plain that *Cæsar* went with it; and the *Flood* setting to the Northward, shews that the *open plain Shore*, where he landed, was to the Northward of the *Cliffs*, and must be in the *Downs*. A 2d Argument is drawn from the *Wind* wherewith he set out on his second Expedition, viz. *S.W.* as appears by the Words *Leni Africo profectus*, with which the Navigation of these Times would hardly permit a Ship to sail nearer the *Wind* than 8 Points, or a *N. W.* Course; which would serve, indeed, to go into the *Downs*, but would, by no means, fetch the Lowland towards *Denge-ness*, which is much about West from *Calais*, and not more than *W. N. W.* from *Boulogn*, if it shall be said, that that was the *Portus Icius* from which *Cæsar* set out. Whence I take it to be evident, that if *Cæsar* was not bound more northerly than the *South-Foreland*, he could not have thought the *Africus* or *S. W. Wind* proper for his Passage, which was then intended for the Place where he first landed the Year before.

Justly to determine which the *Portus Icius* was, I find no-where sufficient Grounds; only *Ptolemy* calls the *Promontory of Calais-Cliffs* by the Name of *Ἰκίον ἀκρον* whence there is Reason to conjecture, that the *Portus Icius* was very near thereto, and that it was either *Ambleteuse* on one Side, or *Calais* on the other. The same *Ptolemy* places *Γισσφριακον ἐπιπεδον* in the same Latitude with the *Ἰκίον ἀκρον*, but something more to the East: Which seems to refute those that have supposed the antient Port of *Gessoriacum* to have been *Boulogn*; whereas by *Ptolemy's* Position, it must be either *Dunkirk* or *Gravelingue*, but the former most likely, both by the Distance from the *Ἰκίον ἀκρον*, being about 20 Miles, or half a Degree of *Longitude* to the East, or $\frac{2}{3}$ of the whole Coast of *Flanders*, which he makes but a Degree and Quarter from the *Acron Icion* to the Mouth of the *Scheld*, which he calls *Ostia Tabudæ*; as also for that *Pliny*, l. 4. c. 16, speaking of *Gessoriacum*, says the *Proximus Trajectus* into *Britain* from hence is 50 Miles, which is too much, unless *Gessoriacum* were something more easterly than *Calais*. *Dion Cassius* makes the Distance between *France* and *Britain* 450 *Stadia*, or 56 Miles, and says, likewise, it is the nearest, τὸ συντομώτατον. But this is in Part, amended by the Explication given in the *Itinerary of Antoninus*, where the Space between *Gessoriacum* and *Rutupium* is said to be 450

Stadia

Stadia (for this was the ordinary Passage of the *Romans* into *Britain*) *Rutupium* being more northerly, and *Gessoriacum* more easterly than the *Termini* of *Cæsar's* Voyage, and, consequently, the Distance more than 30 Miles, which *Cæsar* had observed; and now lately an accurate Survey has proved the Distance, between Land and Land, to be 26 *English* Miles, or 28½ *Roman* Miles; which shews how near *Cæsar's* Estimate was to the Truth.

A farther Argument (but not of equal Force with the former, because of the Modernness of the Author, who writ above 150 Years after) may be drawn from the Words of *Dion Cassius*, where he says, Ἀκραν τινα περιχρυσαι, περιπλάσας ἐτέρωσε παρικομισθη, that after his first anchoring he failed about a Promontory to the Place where he landed. Now there are no other Promontories on all that Coast but the *South Fore-Land* and *Dengenefs*; the latter of which it could not be, because *Cæsar* says, he failed but 8 Miles, and the *Nefs* itself is about 10 Miles from the South and nearest End of the Chalk-Cliffs, by the Town of *Hitbe*; and to have gone round that Point to the other Side, the Distance must have been much greater. So that the Promontory spoken of by *Dion*, must needs be the *South-Foreland*, and *Cæsar* must needs anchor near overagainst *Dover*; from whence failing 8 Miles, he would double a Head-Land and come to the *Downs*; which is such a Coast as he describes in one Place by *Apertum ac Planum Littus*, and in his 5th Book, by *Molle ac Apertum Littus*.

As to *Dion's* Words, τὰ τεναγία, which I have translated at the *Water's* p. 5. 498. Edge, I have the Authority of *Suidas* for doing it, who says, τεναγος, πελαγία ἰλός, or the *Sea Mud*, and is therefore properly the *Ouse* on the *Sea-shore*. And the *Etymologists* derive it from τενω, *Madefacio*, because the Wash and Breach of the Sea do always keep it wet. And this Word τὰ τεναγία is used by *Polybius* for the *Sea-Ouse*; and in another Place he speaks of the Difficulty of landing at the Mouth of a River εἰς τὴν τεναγωδὴν παραβολήν, *ob Limosum Accessum*; so that it is not to be doubted that it ought to be rendred in this Place, *ad Vadum Maris*, rather than *in Paludibus*. And so this Objection against the Assertion that *Cæsar* landed in the *Downs*, which is known to be a firm Champaign Country, without Fens and Morasses, will be removed; and the whole Argument will, 'tis hoped, be admitted by the Curious.

IX. Here are found at *York*, in the Road, or *Roman-Street*, without *Mid-* Roman Urns
sel-gate, and likewise by the River-side, where the Brick-Kilns now are, and other An-
Urns of three different Tempers, viz. 1. *Urns* of a bluish grey Colour, having tiquities near
 a great Quantity of coarse Sand wrought in with the Clay. 2. Others of York; by Dr.
 the same Colour, having either a very fine Sand mixed with it full of *Mica*, Col. n. 4.
 or *Cat-silver*, or made of Clay naturally sandy. 3. *Red Urns* of fine Clay, p. 87.
 with little or no Sand in it. These Pots are quite throughout of a red Co-
 lour like fine *Bale*. Also many of these red Pots are elegantly adorned with
 Figures in *Basso Relievo*, and usually the *Workman's Name*, which I
 think others have mistaken for the *Person's Name* buried there, upon the
 Bottom or Cover, as *Janarius*, and such-like; but that very Name I have
 seen

Burton's C.
 Ant. It. p. 183.
 230.

seen upon several *Red Pots*, found both here and at *Aldborough*. After all, these are glazed, Inside and Outside, with a kind of Varnish of a bright Coral Colour.

The Composition of the first Sort of Pots did first give me Occasion to discover the Places where they were made; the one about the Midway betwixt *Wilberfosse* and *Barnby on the More*, 6 Miles from *York*, in the Sand Hills, or Rising Ground, where now the Warren is. The other *Roman Pottery* on the Sand-Hills at *Santon*, not far off *Brigg* in *Lincolnshire*. In the first Place, I have found widely up and down broken Pieces of *Urns*, *Slagg*, and *Cinders*. At the latter Place there are yet remaining (though it is a moveable Sand, and hurried every Way by the Wind, and has by that Means covered the Place all over) some of the very *Furnaces*, whose Ruins I take to be some of those *Metae*, or sandy Hillocks. Besides, here are many Pieces of *Pots* and *Urns* of different Shapes, and much *Slagg* and *Cinders*; this *Pottery* having taken up much Ground, as to one that shall diligently view the Place, it will appear. It is remarkable, that both the above-mentioned *Potteries* are within less than a Mile of the *Roman-Road*, or *Military High-Way*. I could not learn at either of those Places where any Clay for that Purpose was to be had near those Sands, which yet our *modern Potteries* chiefly seek after, which has made them to be forgotten and disused.

The *Roman Urns*, above-described, differ in these Particulars from what Pots are now usually made amongst us. 1. That they are without all manner of *Glazing* with *Lead*, which perhaps is a modern Invention. 2. That a far greater Quantity of Sand is used than Clay, which Thing alone made it worth their while to bring their Clay to the Sand-Hills. 3. That they were baked either with more Leisure, after long and thorough drying, or inclosed within certain Coffins, to defend them from the immoderate Contact of the Flames; which I am induced to believe, because there seem to be Fragments of such Things to be found. It is certain the natural Colour of the Clay is not altered by burning; so that both the Degrees of Heat and Manner of Burning might be different. And one of these *Potsherds*, as I have heard, baked over again in our *Ovens*, will become *red*. As to the two last Kind of *Urns*, it is likely the first of them, with their Particles of *Mica* in it, were made of a sandy blue Clay, of which Nature there is Plenty among the Western Mountains of *Yorkshire*, and particularly at *Carleton*, not far off *Ickly*, a *Roman Station*. The *red Urns* seem to have been their Master-piece, wherein they shewed the greatest Art, and seemed to glory most, and to eternize their Names on them. I have seen great Varieties of embossed Work on them. And lastly, for the elegant Manner of *Glazing*, it was far neater indeed, and more durable than our modern Way of *Leading*, which is apt to crack and crase both with Wet and Heat; and at the Fire is certainly unwholsome, by reason of the Fumes *Lead* usually emits, being a quick vaporable Metal. This ancient *Glazing* seems to have been done by the Brush, or Dipping; for both Inside as well as Outside of the *Urn* are glazed, and that before the Baking. And something of the Materials of it seems to be remembered by *Pliny*, *Fistilia*

lia ex Bitumine inscripta non delentur; *The Painting of Pots with Bitumen is indelible.* And again, *Tingi solidas ex Bitumine Statuas*; *The Bitumen*, Lib. 35. he says, *sinks into the very Stones and Pots*, which is something more than Glazing.

The great Plenty of these *Urns*, found in many Parts of *England*, seems to argue them also of *English* Manufacture; but where I cannot guess, unless wrought at the *Bole-Mines*, of which Clay alone they seem to be made, in *Cleveland*; for that the barren Tract of Land called *Black-Moor*, was well known to the *Romans*, the *Jet-Rings* taken up with these *Urns* do sufficiently testify. Now *Jet* and *Bole* are no-where, that I know of, to be found with us in *England* but in that Tract, being Fossils peculiar to those Mountains. Of these *Jet-Rings* some are plain, and others wrought, but all of them of an extraordinary Bigness, being, at least, three Inches Diameter, yet the inward Bore is not above an Inch and an half, which makes them too little for the Wrists of any Man, as they are much too big for the Fingers; so that probably they were never worn either as *Armillae* or *Annuli*.

Being upon this Subject of *Roman Clay-work*, we cannot but take Notice of the Opinion of *Camden*, who will have the *Obelisks* at *Burrow-Briggs*, in this County, *artificial*, when in Truth they are nothing less, being made of one of the most common Sorts of Stone, viz. of a coarse Rag, or *Milstone-grit*; but without doubt, the Bigness of the Stone surprized him, either not thinking them portable, or perhaps not any *English* Rock fit to yield natural Stones of that Magnitude: But *Roman Monuments*, I suppose, none does doubt them, because pitched here by a very remarkable and known *Roman Station*, *Isurium*. And then consider what Trifles these are, compared with the least *Obelisks* at *Rome*. And as to the Rocks whence they might be hewn, there are many of that Stone near the River *Nid*, and upon the Forest of *Knarsbourg*; and a little above *Ickley* (another *Roman Station*) within 16 Miles of *Burrow-Briggs* there is one solid Bed of this very Stone, whose perpendicular Depth only will yield *Obelisks* at least 30 Foot long. And yet at *Rudstone*, near *Burlington*, in the *Yorkshire Woods*, full 40 Miles wide of these Quarries, is an *Obelisk* of the very same Stone, Shape and Magnitude of these before-mentioned.

But we cannot let this pass without noting, that almost all the *Monuments* of the *Romans* with us were of this Sort of Stone; as the antient Walls of this City, as appears by what remains of the antient Gates, and the great Quantities of it that are wrought up in most of the Churches, and are still daily dug out of Foundations: But a most undeniable Instance is, a vast *Roman Head*, perhaps of some of the *Emperors*, upon a Neck or square Pedestal of one solid Stone, with the Point of the Square to the Eye, of as coarse a Grit as that of the *Obelisks* above-mentioned. This Stone is now in Mr. *Hilliar's* Garden, and was dug out of the Foundations of some Houses thereabouts. The only remaining *Inscription* that I could find at *Burrow-Briggs*, yet imperfect as well as odd, is upon this Sort of Stone in the Street-Wall of Sir *William Tanker's* House. Also two *Roman Altars* I have seen of this Stone; one the Original of that at *Ickley* mentioned in

The Obelisks at Burrow-Briggs not artificial, but natural Stones. Ib. p. 90.

Other Roman Antiquities. Ib.

Fig. 4.

Camden; another in the Possession of that learned Antiquary Mr. *Thoresby*, late of *Leeds*. And this I think sufficient to disprove that Mistake of *Camden*, that the Stones of *Burrow-Briggs* are *artificial*. There is but one only Instance that I ever yet met with of the *Romans* ever having used in these Parts of *England* any other Sort of Stone; yet it is not the common Lime-stone, but a certain Sort of Stone had from the Quarries about *Malton*, because of the *Lapides Judaici*, by me formerly described to be seen in the Texture of it. It is a small, but elegant Altar with Figures, in *Basso Relievo*, of sacrificing Instruments, &c. It has suffered an unlucky Accident by the stupid Ignorance of the *Masons*, who were ordered, by the late Lord *Fairfax*, to place it upon a Pedestal in the Court of his House at *York*; yet the Inscription was, by Chance, preserved.

Vid. Vol. II.
Cap. III.

Fig. 5.

n. 145. p. 73. I have also met with a large Pedestal of the same coarse *Rag*, found deep in the Ground on the West-side of the River; which by the Stone and its Mouldings was undoubtedly *Roman*, and must have been for a Pillar in some large Building.

Fig. 6.

There is a broken *Inscription* in the Church-Wall in *All-Saints, North-street*, with the Figure of a naked Woman in *Basso Relievo* on the Left-side of it. The Letters (as many of them as remain) are exceeding fairly cut, beyond any thing I have yet seen of *Roman Antiquities* in *England*, and the Stone is of a finer Grain than ordinary. It is a Monument of *conjugal Affection*. The first Stroke is the Out-side of a great M, and is Part of the *Dis Manibus*. The three last Lines may be read thus, *Benè merenti Antonio Conjugi*; yet it is hard to say, whether it was for the *Husband* or *Wife*, for it may be read *Antoniae*. The Points also betwixt the Words are here very singular; but this was the Caprice of the *Stone-Cutter*, who sometimes also uses a Leaf, hanging or erect, a Hand, a Feather, or such odd Fancy, for *Points*.

A Roman
Pottery near
Leeds; by
Mr. Ralph
Thoresby.
n. 222. p. 319.

X. I have lately discovered a *Roman Pottery* upon *Blackmore*, about two Miles from *Leeds* (the old *Leogeolium*) the Name, *Hawcaster Rigg*, gave me the first Occasion to hope for some *Roman Ruins* there; but instead of the Remains of a *regular Camp* or *Fortification*, I was surprized to find several Rounds, or circular Heaps of *Rubbish*, abundantly too small for any *military Use*: One by the Wheel was 16 *Perches* round; another in Walking, 76 *Paces*; and these I take to be the Ruins of some of the very *Furnaces*. It is a sandy Ground, yet Plenty of *Clay* at no great Distance. The Country People tell me of Heaps of *Slagg* and *Cinders*, but I had not the Hap to meet with any, the Place being grown over with *Moss*, &c. I am ready to fancy these might be for their *Bricks*, because of the great Plenty of *Clay* in the Neighbourhood, and the great Number of those *Roman Bricks*, yet to be seen in the Ruins of *Kirkstall-Abbey*: And that it belonged to the *Romans*, I conclude, because it is seated upon a Branch of the *Roman Way*, or one of their *Via Vicinales*, that leads from the great *military Road* upon *Bramham-Moor*, by *Thorner*, *Shadwell*, and *Kirkstall*, to *Cambodunum*. Besides, the very Name seems to import some *Roman Castrum*

Castrum near the adjoining Eminency that the Saxons called *Haws* or *Houghs*; and the Word is yet retained in some Parts of *Yorkshire*, witness *Hamleton-Hough* in the Road to *Selby*. And to conclude, the Village that succeeded the old *Pottery*, is called *Potter-Newton*.

XI. *Vitruvius* tells us, that the *Romans* antiently let their *Bricks* stand to dry a whole Year, sometimes longer, before they were burnt; and it is observable, that those stupendous *Remains* of that antient *Amphitheatre* of *Roman Work* being all *Bricks* near *Bourdeaux*, are still as firm as a *Rock*, excepting such Places as the *Rains* and *Storms* have spoiled, by getting in at *Top*: Which may also be seen in divers other old *Structures* in *Italy*, *France* and elsewhere.

The Excellency of Roman Bricks and Plastering; by . . . n. 93. p. 6010.

Their *Plastering* also to this Day, where it hath not met with violent knocking or breaking, is to be seen as free from *Cracks* or *Crevices*, and as smooth and polished, as if it were *Marble*; witness their *Aqueducts*, whose *Bottom* and *Sides* were thus *plastered*; and particularly that, whereof some *Yards* are still to be found on the *Top* of *Pont de Gare* near *Nismes*, for the *Support* of which that famous *Bridge* was built to carry *Water* to the said *Town*.

XII. An old earthen *Vessel* was lately found at the *Brick-kilns* without *Bowthant-Bar*, near *York*; and is preserved in the *Museum Ashmoleanum* at *Oxford*. It is supposed by some to be an *Urn*, by others to be a *Flower-Pot*. The *Clay* is of the Colour of *Halifax-Clay* when burnt; the *Potter's Part* is well performed, the *Face* being bossed from within with the *Finger*, when upon the *Wheel*; and some *Strokes* of *red Paint* about the *Curls* of the *Hair* and *Eye-brows*; and two *red Threads* about the *Neck*. On the *Back-side* of the *Vessel*, a *Leaf* is drawn in *red*, which is still very fresh; but no *Glazing*, neither upon the *Clay* nor *red Colour*: The *Face* upon the *Vessel* is as large as that of middle-sized *Women*.

An old Earthen Vessel found near York; by . . . n. 171. p. 1017.

XIII. Carefully viewing the *Antiquities* of *York*, the *Dwelling* of at least *two* of the *Roman Emperors*, *Severus* and *Constantine*, I found a Part of a *Wall* yet standing, which is undoubtedly of that *Time*; it is the *South Wall* of the *Mint-Yard*, being formerly an *Hospital* of *St. Laurence*, looking towards the *River*: It consists of a *Multangular Tower*, which did lead to the *Bowthant-Bar*, and about *Yards* of a *Wall*, which ran the Length of *Coning-street*, as he who shall attentively view it on both *Sides* may discern.

A Roman Wall and multangular Tower at York; by Dr. M. Lister, n. 149. p. 238.

The *Outside*, towards the *River*, is faced with a very small *Saxum Quadratum* of about 4 *Inches* thick, and laid in *Levels* like our *modern Brick-work*; but the *Length* of the *Stones* is not observed, but are as they fell out in hewing. From the *Foundation* 20 *Courses* of this small *squared Stone* are laid, and over them 5 *Courses* of *Roman Brick*: These *Bricks* are laid some length-ways, and some end-ways in the *Wall*, and were called *Lateres Diatoni*. After these 5 *Courses* of *Brick*, other 22 *Courses* of small *square Stone*

Stone (as before described) are laid, which raise the Wall . . . Feet higher; and then 5 more *Courses* of the same *Roman Bricks* are overlaid, beyond which the *Wall* is imperfect, and cap'd with *modern Building*. Note, That in all this Height there is no *Casement* or *Loop-hole*, but one intire and uniform *Wall*, from which we guess the *Wall* to have been built some *Courses* higher after the same Order. The *Bricks* were to be as *Thoroughs*, or as it were, so many new Foundations to that which was to be super-structed, and to bind the two Sides together firmly; for the *Wall* itself is only faced with small square Stone, and the Middle thereof filled with Morter and Pebble.

Vitruvius commends *Brick-Building* before *Stone*, even for the Duration; and therefore to excuse it, he gives a Reason why the *Romans* suffered not *Brick-Buildings* to be made within the City of *Rome*, as a Thing not of Choice, but Necessity. The *Law* (says he) suffers not a *Wall* to be made to the *Streetward* (for so give me Leave to interpret *communi Loco*) above a Foot and a half thick, and *Partition-Walls* the same, lest they should take up too much Room. Now *Brick-Walls* of a Foot and a half thick (unless they were *Diplinthii* or *Triplinthii*) cannot bear up above one Story. And therefore, when a plain *Area*, or Building of one Story, could not receive such a Multitude to dwell in the City, the Houses of Necessity were raised higher, and they had strange Contrivances of out-jetting and overhanging Stories, and *Balconies*, &c. Which Reasons, if rightly considered, are great Mistakes: Our Men at this Day have demonstrated that a firm Building may be raised to many Stories Height upon a Foot and a half thick Wall. The Oversight of the *Romans* was the vast Bigness of their *Brick*; for the lesser the *Brick*, the firmer the Work; there being much greater Firmness in such a vast Multitude of Angles, as must be produced by a *small Brick*, than in a right Line; and this is the Reason of the Strength of *Buttresses*, and *Multangular Towers*, &c.

Those *Bricks* are about 17 *Inches* of our Measure long, and about 11 *Inches* broad, and 2 *Inches* and a *half* thick. This (having caused several of them to be carefully measured) I give in round Numbers, and do find them to agree very well with the Notion of the *Roman Foot*, which the learned Antiquary *Greaves* has left us; *viz.* of its being about *half an Inch less than ours*. They seem to have shrunk in the baking more in the Breadth than in the Length; which is but reasonable, because of its easier yielding that Way; and so for the same Reason, more in Thickness; for we suppose them to have been designed in the Mould for 3 *Roman Inches*. This demonstrates *Pliny's* Measures to be true, where he says, *Genera Laterum tria*; *Didoron, quo utimur, longum Sesequipedale, Latum Pede*; and not those of *Vitruvius*, as they are extant; the Copy of *Vitruvius*, where it describes the Measures of the *Didoron*, being vicious. And, indeed, all that I have yet seen with us in *England* are of *Pliny's* Measures; as at *Leicester*, in the *Roman Ruin* there, called the *Jews Wall*; and at *St. Albans*, as I remember, as well as here with us at *York*: So that the *single Brick-Wall* was only allowed as Standard, *viz.* a Foot and a half thick Wall, or one *Roman Brick*

Brick a Length. And therefore it is but reasonable we should make *Vitruvius's Longum Pede, Latum Semipede*, a Fault of *Vitruvius's Coppiers*.

I shall only add this Remark, That *Proportion*, and a plain *Uniformity*, even in the minutest Parts of Building, is to be observed; as this miserable *Ruin of Roman Workmanship* shews. In our *Gotbick Buildings* there is a total Neglect of the Measure, and Proportion of the *Courses*; as though that was not much material to the *Beauty* of the whole; whereas indeed in Nature's Works it is from the *Symmetry* of the very Grain, whence arises much of the Beauty.

XIV. I have added to my *Roman Curiosities* two intire *Urns*, both of the *bluish Grey Clay*, but of different Forms, with some of the burnt Bones, and two other Vessels of *Red Clay*: The lesser of them is almost in the Form of the *Roman Simpulum*, or *Guttus*, and by the Narrowness of the Neck seems rather to have been a kind of *Lacrymatory*, or Vessel for some kind of *liquid Matter*, rather than *Asbes*; the other was Part of an *Aque-duct*, and is turned in the Form of a *Screw* on the Inside, and has a narrow Neck at one End, to put into the open End of the next; and several of these (each a Foot long and 4 Inches broad) were found thus placed in the *Roman Burying-Place* at *York*, by the River-side, out of *Boutham-Bar*, which our learned Dean, *Dr. Gale*, tells me signifies *Burning* in the *British Language*, and it was indisputably the Place the *Romans* made use of to that End, as appears by the great Number of *Urns* there frequently found, when they dig the *Clay* for *Bricks*. And that it continued the Place of their *Sepulture* after that Custom of *Burning*, introduced in the tyrannous Dictatorship of *Sylla*, was abolished, is evident by a remarkable *Hypogæum* without any *Urns* in it, discovered the last Winter 1696; it was large enough to contain two or three *Corpses*, and was paved with *Bricks* nigh two Inches thick, eight in Breadth and Length, being equilaterally square, upon which was a second *Pavement* of the same *Roman Bricks* to cover the Seams of the lower, and prevent the working up of *Vermin*: But those that covered the *Vault* were the most remarkable that ever I saw, being about two Foot square, and of a proportionable Thickness. I have also a third Sort of *Roman Bricks*, which I discovered in the Ruins of *Kirkstall-Abbey*, two Miles from *Leeds*, which come the nighest those mentioned by *Vitruvius*, being 8 Inches broad, and almost double the Length. I have also two Sorts of *chequer'd Pavements*, one of about 3 Inches square, the other (of those found at *Aldborough*) not above half, or one 4th of an Inch, and of different Colours.

XV. I have procured Part of the *Bottom* (which consisted of several such Pieces for the Conveniency of *Baking*) of an old *Roman Coffin* that was lately dug up in their *Burying-Place* out of *Boutham-Bar* at *York*. It is of the *Red Clay*, but not so fine as the *Urns*, having a greater Quantity of coarse Sand wrought in with the Clay. As to the Form (which is intire as it was at first moulded) it is 14 Inches and a half long, and about 11 broad,

Several Roman Antiquities about York and Leeds; by Mr. Thoresby, n. 234. p. 738.

A Roman Coffin, and other Roman Antiquities and Coins; by Mr. Ralph Thoresby. n. 244. p. 310.

broad at the narrower End, and nigh 12 and a half at the broader. This was the lowest Part for the Feet, and the rest were proportionably broader till it came to the Shoulders: It is an Inch thick besides the Ledges, which are one broad and two thick, and extend from the Bottom of either Side to within 3 Inches of the Top, where it is wholly flat, and somewhat thinner, for the next to lie upon it; which several Parts were thus joined together by some Pin, I presume; for at the End of each Tile is a Hole that would receive a common *Slate-Pin*. These Edges are wrought a little hollow, to receive the Sides, I suppose; and at the Feet are two contrary Notches, to fasten the End-Piece. This Bottom I should conclude to have consisted strictly of 8 such Parts, from a like Character 8 impressed upon the *Clay* by the *Sandapilarius's* Finger before its *baking*, but that I somewhat doubt whether Numeral Figures be of that Antiquity in these *European* Parts. I got also some Scars of broken *Urns*, dug up in Mr. *Giles's* Garden, which are of the finest *Clay* I have seen; with which was found a *Roman Shuttle*, about 3 Inches and a half long, but not *one* broad in the very Middle: The Hollow for the *Licium* being but one 4th of an Inch in the broadest Place, shews that it was either for Silk or very fine Linnen, perhaps their *Asbestinum* or *incombustible Winding-Sheets*. I have also lately procured a *Roman Pottle* from *Aldbrough*, which is of the red *Clay*, but much coarser than the *York Urns*: I take it to be strictly the half of their *Congius*, and comes the nighest Mr. *Greaves's* Computation, containing 3 Pints and a half, the *Winchester Measure*.

Vid. *Sup. Vol.*
I. *Cap. I. Sect.*
XXVII.

I have received 22 old *Roman Coins* from Mr. *Townly* of *Townly*, which were lately found in the Parish of *Burnley* in *Lancashire*. Many of them are *Consular*, or *Family Coins*, one of them, *viz. Q. Cassius*, was 162 Years *ante Christum*, according to *Goltzius's* Method, being strictly the same he places *A. U. C. 589*. That they were the antient *Roman Denarii*, and coined before the Emperors Times (notwithstanding the contrary Sentiments of some learned Men) I think is evident, because there is mostly, instead of the Emperor's Head, the antique Form of the *Caput Urbis*, without Inscription: Besides, *Tacitus* calls these *Bigati* and *Quadrigati*, *Pecuniam Veterum ac diu notam*. Again, others have upon them *ROMA*, which I find not used by any of the Emperors (except those small Pieces upon the Translation of the Empire to *Constantinople*) Again, the Letters in these are often interwoven, as particularly *V—L*, in one I have of *L. Valerius Flaccus*. *A. U. C. CDXCII*, which, according to *Goltzius*, is the 7th Year after the *Romans* first stamp'd Silver Monies: And to mention no more, many are of the *Serrato's* filed in small Notches round the Edge, of which Sort I have some of *Scipio Asiaticus*, &c. and other *Consular* Pieces; but I never saw any of a later Date.

A Roman
Pavement
near Roxby
in Lincoln-
shire; by Mr.
Abr. de la
Pryme, n. 263. p. 563.

XVI. Aug. 1, 1700, I went with Mr. *Place* and Mr. *Nevil* of *Winterton* to *Roxby* (a little Town on the West of the famous *Roman Way* which runs from *Lincoln* to the *Humber* Side) to view a *Roman Pavement* lately discovered there by one *Tho. Smith*, as he was digging to repair a Fence. The

The Clofe or Garth, where this Piece of *Antiquity* is found, is in the Town on the South-West of the Church. We bar'd about a Yard and half Square; in doing which we cast up many Pieces of *Roman Tile*, the *Bone* of an hinder Leg of an Ox or Cow, broken in two, and many Pieces of *Plaster* painted *Red* and *Yellow*, which seem'd to have been the *Cornish* at the Foot of some *Altar*, or else perhaps of some Part of the *Building*; and we observ'd that several great Stones, in their falling (when the Building over this *Pavement* was destroyed) had broken and lodged themselves in the *Pavement*, and there lay until we removed them. The *Pavement* itself look'd exceeding *beautiful* and *pretty*; and yet the *Stones* which compos'd it were nothing but small four-square Bits of *Brick*, *Slate* and *Cauk*, set in curious *Figures* and *Order*, and are only of 3 Colours, *Red*, *Blue*, and *White*. The Material that these small *Stones* is set in, is a Floor of *Lime* and *Sand*, and not *Plaster*. The whole *Pavement* consists of *Circles*, and *quadrangular*, and many uneven *Figures*, with *Rows* of the aforesaid *Stones*; in some of which *Circles* and *Figures* were *Urns*; in others *Flowers*; in others interchangeable *Knots*, according as the Workman pleas'd.

XVII. I have got into my Hands a very large and fair *Roman Altar* of one A Roman Altar; by Dr. M. Lister; n. 145. p. 70.
intire Stone, which was but a very few Years ago discovered upon the South Bank of the River *Tine*, near *Sields*, in the *Bishoprick* of *Durham*. The Stone itself is of a coarse *Rag*, the same with that of the *Pymarids* at *Burrow-Briggs*. It is 4 Foot high, and was ascend'd to by *Steps*, which appeareth in that all the Sides but the *Front* have two square Holes near the Bottom, which let in the *Irons* that join'd it to the *Steps*.

On the Backside, opposite to the *Inscription*, is engraven in *Bass-Relievo* a *Flower-Pot* furnished, I suppose with what pleas'd the Stone-cutter; for these Men need'd not to be more curious than the *Priests* themselves, who were wont to make use of *Herbs* next Hand to adorn the *Altars*; and therefore *Verbena* is put for any kind of Herb: Yet if we will have it resemble any thing with us, I think it most like, if not truly, *Nymphaea*, a known and common River-Plant. On one of the Sides, which is somewhat narrower than the *Front* or *Back*, are engraven in *Bass-Relievo*, the *Cutting-Knife* (*Cesepita*) and the *Ax* (*Securis*). The *Knife* is exactly the same with that on the other *Altar* mentioned above: But the *Ax* is different; for here it is headed with a long and crook'd Point, and there the Head of the *Ax* is divided into 3 Points. On the other Side are engraven, after the same Manner, an *Eure* (*Urceolus*) and a *Ladle*, which serve for a *Sympullum*. This I call rather a *Ladle* than a *Mallet*, it being perfectly *Disb-wise* and hollow in the Middle; although *Camden* is of another Opinion in that elegant *Sculpt* of the *Cumberland-Altar*. And the very same *Uten-sil* I have seen and not'd on the *Ickley-Altar*, which is yet extant at *Middleton-Grange* near that Town. The *Plane* of the Top is cut in the Figure of a *Basin* (*Discus* or *Lanx*) with *Ansa* on each Side, consisting of a Pair of *Links* of a *Chain*, which rest upon, and fall over two *Rowls*; and this was the *Hearth*. The *Front* hath an *Inscription* of 9 Lines in Roman

Fig. 7.

Fig. 8.

Vid. Sup. Sect. IX.

Fig. 9.

Fig. 10.

Fig. 11.

Roman Letters, each *Letter* a very little more than two Inches deep of our Measure, now remaining as in the *Sculpture*, which I would read thus, *Dis Deabusque Matribus pro Salute M. Anrelii Antonini Augusti Imperatoris—Votum Solvit lubens merito ob Reditum.*

The *Deæ Matres* are well interpreted by *Selden*. It is much his Safety and Return, both vowed, should be so separated in the *Inscription*. *Caracalla*, say the Historians, after his *Father's Death at York*, took upon him the Command of the Army *alone*, and the whole Empire; he went *alone* against the Enemy, who were the *Caledonii* inhabiting beyond the *Wall* which his *Father* had built. He made Peace with them, received their Hostages, slighted their fortified Places, and returned. And this seems to be confirmed by the *Inscription*; for undoubtedly upon this last Expedition of him *alone*, without his Brother *Geta* and *Mother*, was this *Altar* erected to him *alone*, at a Place about two *Stations* on this Side the *Wall*. So that the Vow might be as well understood of his Return from this *Expedition*, as for his *Safety* and *Return* to *Rome*; which methinks should be true, or his *Mother* and Brother *Geta* would scarce have been left out, at least so early: For yet the Army declared for them *both*, according to their *Father's Will*.

Further, it seems also to have been erected by those who flattered him, and who were afterwards killed by him; and for this Reason the Persons Names who dedicated it, seem to me to be purposely defaced, the 6th and 7th *Lines* of the *Inscription* being designedly cut away by the Hollowness of them, and there not being the least Sign of any *Letter* remaining; and this, I suppose, might be part of their Disgrace, as it was usual to deface and break the *Statues* and *Monuments* of Persons *executed*, of which this *Monster* made strange Havock.

There is another Reading of Part of the two *first Lines*, which I do not disallow, but that it will agree well enough with the History of *Severus*, though his *Apotheosis*, or solemn *Deification*, was not performed till he came to *Rome*, in the Manner of which *Funeral Pomp Herodian* is very large; it was of that excellent Antiquary Dr. *Johnson* of *Pomfret*. CONSERVATORI. B. PROS. &c. as it follows in mine: Which shews the Height of Flattery of those Times. So that they paid their Vows to the lately *Dead Father*, the *Conservator* of *Britain*, for the *Safety* of the *Son*; and the Story tells us how gladly he would have had him made a *God* long before, even with his own Hand.

Two Roman
Altars in Nor-
thumberland;
by Mr. Ralph
Thoreby. n.
231. p. 663.
Fig. 12.

XVIII. Dr. *Cay* of *Newcastle* has sent me the Copies of two *Roman Altars*. The former of them was taken out of the *Roman Wall* not far from *Collerton*, or *Chollarton**, and may tempt us to believe that the old *Procolitia*, which was the *Station* of the *Cobors prima Batavorum*, was rather *there*, which is an important Place (where the River *Tine* interrupting the Course

† *Prope Collerton Cilurnum. Notitia Dignitatum Imperii; est tamen Procolitia alius Locus à Cilurno.*

Course of the *Wall*, it was but necessary that the *Ford* should be secured by making one of the *Coborts* keep that *Station*; and it is but 2 Miles and a half from *Carrow* where the *Altar* now is in the Possession of Mr. *Forster*) than at *Pruddow*, which is at least 10 Miles Distance from where Mr. *Camden* seemed to fancy it. The other is at *Blenkingsop * Castle* in *Northumberland*, which I take to have been dedicated by *Lucius Anius* to the *Goddeesses Nymphs*, old and young, and particularly to the *Debonair* (if *Urbana* be taken appellatively) *Mansueta Claudia*; for thus I read it, DEABVS NYMPHIS *Veteribus ET Junioribus* MANSVETAE CLAVDIAE VRB anæ, Nuncupavit Hoc *Lucius Ann* IVS; and thereby the Defects in the Stone seem to be supplied with a right Number of Letters in each Vacuity.

Fig. 13.
• Prope Blen-
kenshop &
Widen, Vet-
tiii. Circa hæc
Loca Fontes.
Utrumque
Nomen hoc
indicat.

XIX. Dr. *Lister*, in the Year 1683, exactly designed the *Roman Inscriptions*, Fig. 14, 15, 16, 17, 18, 19, 20, according to the *Originals* now to be seen at *Bath* in *Somersetshire*. The Letters of Fig. 15, 16, 17, are 5 Inches complete.

Some Roman
Inscriptions;
by Dr. M. Li-
ster. n. 155.
p. 457.

Fig. 21. contains the *Inscription* of an *Altar* found near the *Roman Camp*, which is placed within the Angle where the Two Rivers *Medloe* and *Erwin* meet, a little Mile S. W. of *Manchester* in *Lancashire*, and preserved in the Garden of the Worshipful *Edw. Mosley de Holme, Armiger*.

Fig. 14, 15,
16, 17, 18,
19, 20.
Fig. 21.

XX. Oct. 26. 1698, I got a Sight of an *Altar-Piece*, dug up at *Chester* about Three Years since, and is now in the Custody of one Mr. *Prescot*.

A Roman
Altar at
Chester; by
Mr. Edmund
Halley.
n. 222. p. 316.
† Vid. sup.
Vol. II.
Cap. III.

The following *Inscription* thereof is pretty intire, but roughly cut in the *Stone* of the Place †, which is soft and mouldering, nor capable of long Continuance when it is exposed to the Air.

PRO SAL. DOMIN
IM NNINVI
CTISSIMORVM
AVGG. GENIO LOCI
FLAVIVS LONG ____
TRIB. MIL. LEG XX.
LONGINVS FLA
VIVS DOMO
SAMOSATA
V. S.

I suppose VS, there not being Room for INVS.

By the Title of *Domini nostri* given to the *Emperors*, it appears that this *Inscription* was of the *Bas-Empire*, not before *Dioclesian*, nor yet so late as *Theodosius*, it being *Pagan*. The *Stone* itself is about 32 Inches high, 16 in Breadth, and 9 thick; on the one End is engraven, not very curiously, the Resemblance of a *Genius* holding a *Cornu Copie*; on the other is a

Flower-pot somewhat better performed, but a little endamaged by the Softness of the Stone. The Backside, opposite to the *Inscription*, is adorned with a pretty sort of *Fueillage*, designed to fill up the vacant Space. On the Top, in a pretty deep Cavity, is a full Face of a Man, almost such as they paint the *Sun* or *Full-Moon* withal, with a Cap upon his Head, of which as yet I cannot comprehend the Design.

Some Roman
Inscriptions
found near
Durham;
by Mr. Chr.
Hunter.

n. 266. p. 657.

Fig. 22.

XXI. These *Inscriptions* were found near to a Village called *Lancaster*, about 5 Miles North-West from *Durham*, which I am fully persuaded has been the *Longovician* of the *Romans*. This Place has been a very considerable Place in these Parts, and their *Walling-Street* lies through it. It is on the Top of a Hill, which has a Descent on three Sides; towards the West it is overlooked by a high Hill, and almost Eastward from it, about a Quarter of a Mile, stands the present *Lancaster*, a tolerable Country Village, with a pretty Church, which before the *Reformation* was endowed with a *Deanery* and 6 *Prebends*. The Form of this Place has been square, and fortified with a thick strong Stone Wall faced with hewn Stone. Within the Wall are (and have been formerly) nothing but ruinous Heaps of Stones; as also without the Wall too, especially towards the East. It is probable the Buildings within the Wall have been all publick, such as the *Station* for the *Soldiers*, *Temples*, *Palaces*, &c. or (which I am more inclined to think) there has been nothing but the *Lodging* of the *Garison* within the Wall. This I rather suppose, because the *Inscription* of *Gordianus* was not found here, but about a hundred Yards from the Wall towards the East, near which Place the largest Stones are found; and I myself, above a Year ago, found Part of a large *earthen Urn* near this Place, within which I suppose there had been a letter: Such I remember was found at another Village not far from this, which I am persuaded has been another *Colony*. There is no doubt but this *Colony* has been adorned with many beautiful *Palaces*, and other sumptuous Buildings; and perhaps the *Balneum cum Basilica*, mentioned in one of these *Inscriptions*, has been that so long in vain sought for at *Rome*.

Some Roman
Coins; by
Mr. Ralph
Thoresby,

n. 241. p. 208.

Molds for
Coining or
Counterfeit-
ing Roman
Money; by
Mr. Thores-
by, n. 234.
p. 739.

XXII. I have procured some of the *Roman Coins* lately plowed up about *Nottingham*; but they prove common, and most of *Tetricus*, though some also of *Gallienus*, *Victorius*, and *Claudius Gothicus*.

XXIII. Mr. *Clark* (the *Lady Camden's* Lecturer at *Wakefield*) has brought me some very fair *Coins*, or rather *Impressions* upon *Clay*, which he rescued from some Labourers, who in delving in the Fields near *Thorpe on the Hill*, found a considerable Number of them. At first we could not imagine for what Use they were designed; but upon a stricter View it appears plainly, they were for the *coining*, or rather *counterfeiting* of the *Roman Moneys*, that wretched Art it seems being in Vogue 1500 Years ago, for they are indubitably of that Antiquity, and are really very dexterously done. They have round the *Impression* a Rim about half the Thickness of the *Roman Silver*

Silver Penny, in each of which is a little Notch, which being joined to the like Nick in the next, makes a round Orifice to pour in the Metal. Each of these has either two *Heads*, or as many *Reverses*; so that placing one, for Example, with *Alexander Severus's Head* on one Side, and his Mother *Julia Mammæa's* on the other, betwixt two Pieces with *Reverses*, it completes both; so that one with *Heads*, and another with *Reverses*, are placed *alternatim* for a considerable Length, and then all pasted over with an outer Coat of *Clay* to keep the Metal from running out, and a little Ledge on either Side the Orifice, to convey the Metal into the long Row of Holes. They are all of *Emperors* about the same Age, when indeed the *Roman Moneys* were notoriously adulterated, as is observable in any Collection of their *Coins*, though some of them now are so scarce, particularly a *Duodumenianus*, that I question whether this Age can produce one to take a Copy of.

XXIV. The antient *Romans* had three Words, *Scutum*, *Parma*, and *A Roman Clypeus*, for that defensive Weapon we generally *English* a *Shield*; which notwithstanding their different Forms or Matter, their Authors (especially in the Declension of the *Empire*) frequently confound, as, if I mistake not, we do *Shield*, *Buckler*, and *Target*. Of these *Shields* or *Bucklers*, I have one of the *Parma* kind, and rightly so called, *quod è medio in omnes partes fit Par*; whereas the *Scutum* was mostly *oval*, though sometimes *Imbricatum*, with Corners equally broad. It is 15 *Inches* Diameter, whereof a little more than a 3d Part is taken up with the *Umbo*, or protuberant Boss at the Navel, which is made of an even convex Plate, wrought hollow on the Inside, to receive the *Gladiator's* Hand: Upon the Centre of this is a lesser Boss, wherein there seems to have been fixed some kind of *Cuspis*, or sharp offensive Weapon, to be used when they came to fight Hand to Hand; but the Form of this I cannot describe, both my *Shields* being defective in that Point. From the said *Umbo* the *Shield* is 4 *Inches* and a half broad on each Side, in which are 11 circular equidistant *Rows* of brass *Studs* of that Size, that 222 are set in the utmost Circle, which is 4 *Foot* wanting 3 *Inches* (for that is the *Circumference* of the *Buckler*) and so proportionably in the lesser Circles to the Centre of these 11 *Rows* of brazen *Studs*. The inmost Circle is placed upon the *Umbo* itself, the next 8 upon as many circular Plates of *Iron*, each a 3d of an *Inch* broad. The two outermost upon one thicker Plate, an *Inch* broad. In the little Intervals between these circular Plates are plainly discovered certain *cross Laminæ*, that pass on the Back of the other, from the *Umbo* to the exterior Circle; and these *Iron* Plates are also about the 3d part of an *Inch* at the broader End towards the Circumference, but gradually contracted into a narrower Breadth, that they may be brought into the Compass of the *Umbo* at the Centre. The inner Coat next to those *Iron* Plates is made of very thick, hard, strong *Leather*, which cuts bright, somewhat like *Parchment*. Upon that is a second Cover of the same, and on the Outside of this are plaited the *Iron Pins* that run through the *Brass Studs*; for the above-mentioned *Brass Studs* are cast purely for

A Roman
Shield; by
Mr. Thores-
by, n. 241.
p. 205.
Fig. 23.

Ornament upon the Heads of the said *Iron Pins*, the 6th part of an *Inch* long, that none of the *Iron* appears. The next Covert to the plaiting of the said *Nails* (which pass through the circular and cross *Iron Plates*, and both the *Leather Covers*) is a pure Linen Cloth, but discoloured, though perhaps not with Age only, but four Wine and Salt, or some other Liquid wherein it seems to have been steeped. And lastly, upon the said Linen is the outmost Cover, which is of softer *Leather*. All which Coats, that compose the *Shield*, are bound together by two circular Plates of *Iron*, a thin and narrow one towards the Centre, and a thicker and large one, an *Inch* broad at the Circumference, which is curiously nailed with two Rows of very small Tackets, above 400 in Number; the vacant Holes, whence some of the *Nails* are dropped out, are little bigger than to admit the Point of a Pair of small Compasses; both which *Rims* do likewise fasten the *Handle* (the only Part of *Wood*) which has also 6 other *Iron Plates*, about 3 or 4 *Inches* long to secure it.

I lately procured another *Shield*, which differs from this not so much in *Size* (though it is completely a *Foot* larger in the Circumference) as in the *Form*: For whereas this already described is almost *flat*, except the swelling *Umbo*, this is absolutely *concave*, and from the Skirts of the protuberant Boss in the Middle, it rises gradually to the Circumference, which is nigh 3 *Inches* perpendicular from the Centre. This has 14 *Rows* of the like Brass *Studs*, but the *circular Plates* of *Iron* they are fixed in, do not lie upon other *cross Plates*, as the former does, but each from the Centre upon the outer Edge of the other, which occasions its rising in that *concave* manner.

That these were part of the Accoutrement of the *Roman Equites*, rather than either the *Velites* or *Hastati*, I conclude, because that though all in general had *Shields*, yet those of the *Velites*, who were as the *Forlorn Hopes*, seem more slight, and are expressly said to be, *è Ligno Corio superinducto*; those of the *Hastati* are not only said, *è pluribus Lignis & Asserculis constit.* &c. but were also 4 *Foot* long, to cover the whole Body, when stooping; of which kind were likewise those of the *Principes* and *Triarii*. Whereas the Description that the anonymous Author of *Roma Illustrata* with *Fabricius's* Notes, gives in his *Armatura Equitum*, comes the nighest this, *Scutum sive Parmam habebant ex Bovillo Corio, Arte leviter durata*; but then he adds, *eoque mero nulla Materia subjecta*, omitting not only the ornamental Studs, but the *Iron-Work* which *Camillus* first contrived as a Defence against the immense Swords of the *Gauls*.

The Roman
Way called
High-street
in Lincoln-
shire; by Mr.
Abr. de la
Pryme. n.
263. p. 561.

XXV. The *Roman Way* in *Lincolnshire*, which is called all along by the Country People the *High-street*, runs (if I mistake not) almost directly in a strait Line from *Lincoln* to *Humber-side*. It is but slightly mentioned by Mr. *Camden*, as running (*says he*) from *Lincoln* Northwards into the little Village called *Spittle in the Street*, and somewhat further: I shall therefore continue its Course unto *Humber*. This *Street* is cast up on both Sides with incredible Labour to a great Height, and discontinued in many Places, and then

then begun again. I observed, where it runs over nothing but bare Mould and plain *Heath*, that there it consists of nothing but Earth cast up; but where it comes to run through Woods, there it is not only raised with Earth, but also paved with great Stone, set Edge-way, very close to one another, that the Roots of the Trees that had been cut down to make Way for the same, might not spring up again and blind the Road. Which paved Causeway is yet very strong, firm, and visible in many Places of this *Street*, where *Woods* are yet standing on both Sides, as undoubtedly there were in the *Roman Times*, else it had not been paved; and in other Places it is paved where nothing of any *Wood* is now to be seen, though undoubtedly there was when it was made. In one Place I measured the Breadth of the said paved *Street*, and found it just 7 *Yards* broad, *English Measure*.

This *Street* in its Course full North, as aforesaid, runs by the Fields of *Hibberstow* [which perhaps signifies the Place where the *Danish General Hubba* was buried] in which Fields, not far off this *Street*, is the Foundation of many *Roman Buildings* to be seen; as is manifest from their *Tile* there found: And Tradition says, that there hath been a City and Castle there, and there are two Springs, the one called *Julian's Stony Well*, and the other *Castleton Well*; and there are several *old Roman Coins* now and-then found there. This might perhaps be some little *old Roman Town*, by their *Highway Side*, and was perhaps in after Times, before that it was ruined, called *Castletown*, or *Casterton*, from its being built upon, or by some of their *Camps* that might then be in those Fields. About a *Mile* further to the Northward on the West-side of the said *Street*, upon a great Plain or Sheep-walk, there are very visible the *Foundations* of another *old Town*, though now there is neither House, Stone, Rubbish, Tree, Hedge, Fence or Close to be seen belonging thereto. I have counted the *Vestigia* of the Buildings, and found them to amount to about *one hundred* that are yet visible, and the Number of the *Streets* or *Lanes* are 4 or 5, and not far from it Northward is a Place called the *Kirk-Garth*, where the Church is supposed to have stood that belonged to this Town. Tradition calls this Place *Gainstrop*, and I have read in the *Monast. Angl.* of Lands and Tenements herein given *Vol. II.* unto *Newsted Priory*, not far off this Place, in an Island in the River *Ank*, falsely called *Ankham*.

About a *Mile* or two hence the *Street* runs through *Scawby Wood*, where it is all paved, and from thence close by *Broughton Town-End*, by a Hill, *Broughton*, which I should take to be a *Barrow*, and that the Town had its Name from it, *quasi Barrow-Town*, but that it seems to be too excessively great for one. However, I have found Fragments of *Roman Tiles* and *Bricks* there, which with its Situation so near this *Causeway*, make it seem to be of *Roman Origin*. n. 266. p. 677. The *Retfords* were Lords of it several Ages, until that Sir *Henry Retford*, or *Radford*, Knight (with the *Earl of Rutland*, the *Lord Clifford*, the *Lord Clinton*, and others), about the Year 1455, lost it by *Attainder of High-Treason*. One of which *Retfords*, called Sir *Henry*, but whether the foregoing or no, I cannot yet well tell, lay formerly in *Effigy* of white Marble all in Armour, with his Lady by him, in a small Choir in the
North

North Side of the Chancel of the Church of the said Town; but was removed in the Memory of Man out of the same, and laid in an Arch within the Communion-Rails, and their Room and Place taken up to be the Burying-place of the worthy Family of the *Andersons*, now Lords of the Manor (who are descended from Sir *Edm. Anderson*, Knight, Lord Chief Justice of the *Common-Pleas*, in Queen *Elizabeth's* Days, famous for his Uprightness and Love to the Church; whose Ancestors lived at *Flixburrow* in this County) in which is the Effigies, to the Life, of Sir *Edmund Anderson*, Baronet, most curiously cut in white Marble, lying upon a great *Altar-Tomb*, adorned with many *Arms* and *Inscriptions*.

n. 263. p. 563. From thence the *Causeway* all along paved, is continued about a *Mile* further to the Entrance upon *Thornholm-moor*, where there is a Place by the *Street*, called *Bratton-Graves*; and a little East, by *Broughton Woodside*, is a *Spring*, that I discovered some Years ago, that turns Moss into *Stone*; and not far further stand the *Ruins* of the stately *Priory* of *Thornholm*, built by King *Stephen*. Opposite to this *Priory*, about a *quarter* of a *Mile* on the West Side of the *Street*, is a Place called *Stanton*, from the *flying Sands* there, which have over-run and ruined above 100 *Acres* of Land. Amongst these Sands was that great *Roman Pottery* mentioned by Dr. *Lister*. I found there several *Roman Coins*, and Mr. *B. of A.* found a great Piece of *Brass* in the Bottom of one of the *Furnaces* like a *Cross*, which perhaps was Part of a *Grate* to set some *Pots* on while they were baking or drying. Returning back to the *Street*, there are several *Sand-Hills*, somewhat like *Barrows* thereby; on the Top of one of which was erected a great flat *Stone*, now so far sunk in the Earth, that there is not above a *Foot* of it to be seen. Entering then into *Appleby-Lane*, the *Street* leads through the West End of the Town, at which Town are two old *Roman Games* yet practised (though very imperfectly) the one called *Julian's Bower*, and the other *Troy's Walls*. From hence it runs strait on, leaving *Roxby*, a little Town half a *Mile* on the West, and *Winterton*, a pretty neat Town (where the worthy Families of the *Places* and *Nevils* inhabit), and then about 3 or 4 *Miles* further, leaving *Wintringham* about half a *Mile* to the West, the said *Street* falls into *Humber*, and there ends; at which End has been a Town called *Old Wintringham*, and a sort of a *Beach* for *Ships*. All this End of the Country, on the West Side of this *Street*, hath been full of *Romans* in old Time, as may be gathered from their *Moneys*, *Coins*, and the many *Tiles* and *Bricks* that are commonly here found, especially at a *Cliff* called *Winterton-Cliff*, where have been some old *Roman Buildings*; and further, about 2 *Miles* more Westward is *Alkburrow*, which seems to have been a *Roman Town*, not only from its Name, but also from a small *Four-square Camp* or *Entrenchment* there, on the West Side of which is a *Barrow*, called *Countess's Barrow*, or *Countess's Pit*, to this Day, sunk hollow in the Middle.

Vid. Vol. II.
Cap. III. Sect.
XL. vid. sup.
Sect. IX.

A strange
Well, and
some Antiqui-
ties found at
Kirkbythore; by Mr. Tho. Machil, n. 158. p. 555.

XXVI. A strange Well was lately discovered by the Foot of an Horse, which stumbled upon it, in the common Road through *Kirkbythore* in *Westmorland*; it is about 10 Yards from the River *Troot-beck*, and as many from the

the great *Roman* Causeway, which leads to *Carlisle*, and goes betwixt it and a Place called the *Burwens*, being Part of the Ruins of *Whelp Castle* on the East Side of it: Perhaps the Castle-Walls have gone betwixt it and the River, and the Way run through it, as at *Maiden-Castle* on the Top of *Stannemoor*. It hath been covered with a Plank of Wood (I suppose of Oak) about 9 Inches thick, in the Fashion of a Pot-lid, but decayed and macerated to the Colour and Consistence of a *Peat*, or Turf; and above this was Gravel and Pavement about a Yard thick. Instead of *Walls* there were two large Wooden Vessels, one upon another, like Hogsheads or Wine-pipes, with Bung-holes in them about 3 Inches Diameter; and the Plowings for the Heads were fair to be seen. They were made of *Fir* (whencefoever they came) above an Inch thick; each of them in Depth, by a Perpendicular, 6 Foot at the least; at the Heads in Diameter, 2 Foot 8 Inches; in the Middle, 3 Foot 5 $\frac{1}{2}$ Inches. At the Bottom, about 5 Yards deep, were 4 Planks of Wood, laid Quadrangular-wise, supported with a Stone at every Corner, to bear up the Fabrick; and let in Water through the Gravel and Sand, which lay loose in the Bottom about a Yard deeper. The Wood of the Vessels and the Planks were *sound* (though the Cover was *rotten*); because not so much exposed to the Air.

The Workmen flattered themselves with the Hopes of some Treasure, but they only found some old Earthen Vessels, with Pieces of *Urns*, one Piece of a Drinking-Glass, and several *Sandals*. The Earthen Vessels were of very fine Metal (if I may so call it) of a Brick-like Colour, and in several Forms; but the most (and most remarkable) were like a *Bason* or *Poffet-Cup*; the Bowl, *Semiglobular*; the Foot, a *Ring*: Some were in Diameter about 8 Inches, and in Depth on the Inside more than 3 $\frac{1}{2}$, some more, some less, as appear by the *Fragments* which came unto my Hand. They were, for the most part, very finely *imbossed*; but 3 more especially, *viz.* one with a *Vine-branch*, having a Figure in every Turning, and in the first Place a *naked Man* standing alone upon the Left Foot, the other Leg cross, and holding his Left Hand down towards his Back, his Right towards his Belly, with a Branch of Laurel of 3 Sprigs in it, one of which turns up to his Face-wards over the Crook or Bending of his Arm; and at his Feet is a Branch of Laurel, and a Blossom or Flower. In the next is a *Vine-Leaf*, 2 Blossoms at the Bottom, and at the Top 2 *Peacocks* regardant. In the next is a *Victory* (as I take it) *viz.* an Angel or *Genius*, holding in its Right Hand (the Arm stretched out, and the Face looking towards the Man) a Garland of Laurel; in the Left a Sprig of the same, and two Sprigs likewise are at the Foot with Flowers or Blossoms, and one Flower in the Middle betwixt the Garland and one of those Sprigs. In the next is a *Vine-Leaf*, the same as before. In the next is *Victory*, and so by Turns till it ends with a *Vine-Leaf* next the Man; and upon it are also some *Gotb-like* Characters of the lesser Sort, but dim and obscure. Another of these *Pots* is adorned with Circles and Semicircles; in one of these Circles is the Figure of a Man sitting on a *Plinth* or square Stone; in all the rest are fluttering *Genii*. In some of the Semicircles are Lions and Goats (or some such-like Creatures)

Fig. 25. Creatures) here one, and there another, all single and current; and near the Bottom are *Stags* in Course, and *Greybounds* pursuing, with an Inscription (in a *Goth-like* Character of the *greater* Sort) which see Fig. 25. This may be *Paulini*. An *Inscription* with the like Characters is to be seen at *Burrow-Brig*, and published by Dr. *Lister*. And they have been careful in preserving these; for this and some other, having been broke, are crammed (or rather foldered) with Lead. The 3d Sort is yet far more beautiful than any of the rest, being adorned with *Greybounds* very well moulded, and in full Pursuit of *Stags* and *Hinds*, and the *Wild Boar*; upon which I discovered the same *Inscription* as in the other. And though I am not so vain, as to say this relates to our *Coats of Arms*, yet having so near an Affinity with it, both in *Crest* and *Charge* (*a.* the *Stag's Head*; *b.* 3 *Greybounds current*; *c.* *Whelp Castle*), and being found at the Place which we came from (as is said and believed), I cannot but take some Notice of it. There were several other broken *Inscriptions*, and one above the rest upon the Bottom of a plain Dish or Platter (on the Inside of it) writ as in Fig. 26. But whether it stands for *Vespasian Emperor*, or *Domitianus*, or neither of them, I cannot tell.

As to the *Glass*, there was but a very small Fragment of it; I can scarce guess the Figure, but I think it a *Flute-Glass* made like a Tunnel or Spire inverfed: It hath been as thick as a Barley-Corn.

The *Urns* were of a leaden Colour, inclining to black; one had been large, 2 *Inches* thick in the Side of the Pot, but how big I know not, for there was a Sherd only brought to me. The Top was in Diameter, from Outside to Outside, 7 *Inches*, of which the *Roll* is 2 *Inches*, and the *Mouth* 3 *Inches*; the Neck yet straighter, and only $\frac{1}{3}$ of an *Inch* thick. And many such are found at this Town, some of which have *Ears* and *Handles* as thick as my Arm-wrist, and their *Heads* and *Mouths* much of this Bigness, but thicker and stronger. But the other was almost intire and whole, though a very small one; in Height $8\frac{1}{2}$ *Inches*, in Diameter $6\frac{1}{2}$, at the Mouth almost $3\frac{1}{2}$, and in the Neck more than $2\frac{1}{2}$. The Bottom well nigh as big as the Top, excepting the Ring; and the Body in Thickness the 5th Part of an *Inch*, but thicker somewhat at the Top and the Bottom.

Fig. 27. The *Sandals* were some for Men, some for Women, and some for Children, all shaped by their Feet, spreading more to the Outside than to the Inside; and some were very large, and some crooked, as *g.* The Leather was fresh of which they were made, but very tender when it came to be spread upon a *Last*. Each consisted of 3 principal Parts, an Upper-Leather (or rather Heel-piece, with two *Tabs* on each Side) an *Inner Soal*, *a.* long $11\frac{1}{2}$ *Inches*, broad $3\frac{3}{4}$; of 3 or 4 *Soals* stitched together with Leathern Thongs; and an *Outer Soal*, *b.* of 2, stuck full of Nails with little round Heads (so decayed and rotten, that I could scarce discern them to be Iron) plated on the Inside: And to the Upper-Leather (threefold in the Heel-piece, *c.*) is fixed betwixt them, and sowed with Leather, or rather tacked, which the Iron Nails do help to defend. Yet I think some *Womens* (of the better Sort) had no Nails at all, *d.* and of these there is one well worth the Observing,

cles of their *Creed*. And to convince me yet further that they are not utter Strangers to the *Black-Arts* of their Forefathers, I accidentally met with a Gentleman in the Neighbourhood, who shewed me a Book of *Spells* and *magical Receipts*, taken (2 or 3 Days before) in the Pocket of one of our *Moss Troopers*; wherein, among many other *conjuring* Feats, was prescribed a certain Remedy for an *Ague*, by applying a few barbarous Characters to the Body of the Party distempered. These methought were very near akin to *Wormius's* R A M R U N E R, which, he says, differed wholly in *Figure* and *Shape* from the common *Rune*.

But if this Conjecture be not allowable, I have another something (it may be) more plausible. For if, instead of making the 3^d and 4th Letters to be two, **K·K·H·H** we should suppose them to be **X·X·E·E**. the Word will then be *Ryeeburu*; which I take to signify, in the old *Danish* Language, *Cæmeterium*, or *Cadaverum Sepulchrum*. For though the true old *Runic* Word for *Cadaver* be usually written **✠ R I X H r a e**; yet the *H* may, without any Violence to the *Orthography* of that Tongue, be omitted at Pleasure; and then the Difference of spelling the Word, here at *Beaucaastle*, and on some of the ragged *Monuments* in *Denmark*, will not be great. And for the countenancing of this latter Reading, I think the above-mentioned *Chequer-work* may be very available; since in that we have a notable Emblem of the *Tumuli*, or *Burying-places*, of the Antients (Not to mention the early Custom of erecting *Crosses* and *Crucifixes* in *Church-yards*: Which perhaps, being well weighed, might prove another Encouragement to this 2^d Reading). I know the *Chequer* to be the *Arms* of the *Vaux's*, or *de Vallibus*, the old Proprietors of this Part of the North; but that, I presume, will make nothing for our Turn; because this and the other carved Work on the *Cross* must of Necessity be allowed to bear a more antient Date than any of the *Remains* of that Name and Family; which cannot be run up higher than the *Conquest*.

On the *East* we have nothing but a few *Flourishes*, *Draughts* of *Birds*, *Grapes*, and other *Fruits*; all which I take to be no more than the Statuary's Fancy.

On the *South*, *Flourishes* and *Conceits*, as before; and towards the Bottom the following decayed *Inscription*.

✠ · N B · ✠ R M T · ✠

The Defects in this short Piece are sufficient to discourage me from attempting to expound it. But (possibly) it may be read thus:

Gag Ubbo Erlat, i. e.
Latrones Ubbo vicit.

I confess this has no Affinity (at least being thus interpreted) with the foregoing *Inscription*, but may well enough suit with the Manners of

of both antient and modern Inhabitants of this Town and Country.

XXVIII. The Fabrick of the *Font* at *Bridekirk* in *Cumberland* does, I think, fairly enough evince that it is now used to the same Purpose for which it was at first designed: For on the *East* Side of this Stone we have fairly represented a Person in a long *sacerdotal* Habit dipping a Child into the Water, and a *Dove* (the Emblem, no doubt, of the *Holy Ghost*) hovering over the Infant. Now I need not here observe, that the Sacrament of *Baptism* was antiently administred by plunging into the Water, in the *Western* as well as *Eastern* Parts of the *Church*, and that the *Gothick* Word 𐌲𐌿𐌸𐌹𐌸𐌰𐌶𐌰 (*Mark* i. 8. and *Luke* iii. 7. and 12.) the *German* Word *taufen*, the *Danish* 𐀀𐀁𐀂 , and the *Belgick* *doopen*, do as clearly make out that Practice, as the *Greek* Word βαπτίζω . Nor, that they may all seem to be derived from [βαπτίζω] , another Word of the same Language and Signification; and are evidently akin to our *English*, *Dip*, *Deep*, and *Depth*. Indeed our *Saxon* Ancestors expressed the Action of *Baptism* by a Word of a different Import from the rest: For in the fore-mentioned Place of *St. Mark's* Gospel their *Translation* has the Text thus; *Ic eop pullige on wætere. he eop pullaþ on halgum gæpe.* 7. 1. *Ego vos Aquis baptizo; ille vos Spiritu Sancto baptizabit.* Where the Word *pullian*, or *pullizean*, signifies only simply *lavare*: Whence the *Latin* Word *Fullo*, and our *Fuller*, have their Original. But from hence to conclude that the *Saxons* did not use *Dipping* in the Sacrament of *Baptism*, is somewhat too harsh an Argument.

A Runic Inscription on the Font at Bridekirk; by Will. Nicolson. n. 178. p. 1291.

On the *South* Side of the *Stone* we have this *Inscription*:



Now these kind of *Characters* are well enough known (since *Ol. Wormius's* great Industry in making us acquainted with the *Literatura Runica*) to have been chiefly used by the *Pagan* Inhabitants of *Denmark*, *Sweden*, and the other *Northern Kingdoms*; and the *Danes* are said to have swarmed mostly in these Parts of our *Island*. Which two Considerations seem weighty enough to persuade any Man, at first Sight, to conclude that the *Font* is a *Danish Monument*. But then, on the other Hand, we are sufficiently assured, that the *Heathen Saxons* did also make use of these *Rune*; as is plainly evident from the frequent Mention of *Runcwæptizen* and *Runcwæpap* in many of the *Monuments* of that *Nation*, both in *Print* and *Manuscript*, still to be met with. Besides, we must not forget, that both *Danes* and *Saxons* are indebted to this Kingdom for their *Christianity*: And therefore thus far their Pretensions to a *Runic (Christian) Monument* may be thought equal. Indeed some of the Letters (as *Ð*, *3* and *7*) seem purely *Saxon*, being not to be met with among *Wormius's* many *Alphabets*:

K k k 2

And

and the Words themselves (if I mistake them not) come nearer to the antient *Saxon Dialect*, than the *Danish*. However, let the *Inscription* speak for itself.

Er Ekard ban men egroeten, and to dis men red wer Taner men brogten,
i. e.

Here Ekard was converted; and to this Man's Example were the Danes brought.

Who this *Ekard* was, is a Question hard to be answered. The proper Name itself is ordinary enough in the *Northern Histories*, though variously written: And it is certainly a Name of Valour, and all others of the like Termination; such as *Bernbard, Everbard, Gotbard, Reinbard, &c.* So that it may well become a *General*, or other great Officer in the *Danish Army*: And such we have just Reason to believe him to have been, who is here drawn into an Example for the rest of his Countrymen.

Han men egroeten; which rendered *verbatim*, is, *have Men turned*, i. e. *was turned*, is a Phrase to this Day very familiar in most *Dialects* of the antient *Celtick Tongue*, though lost in our *English*. In the *High-dutch* it is especially obvious; as *Man Saget, Man hat gelaght, Man Lobet, &c.* And the *French Impersonals* (*On dit, on fait, &c.*) are of the same Strain, and evident Arguments that the *Teutonick* and *Gaulish Tongues* were near akin.

The Characters † ‡ and * are manifest Abbreviations of several Letters into one; of which Sort we have great Variety of Examples in several of *Wormius's Books*: And such I take the Letter † to be, instead of † and ‡; and not the *Saxon* Ð. I must believe ‡ to be borrowed from the *Saxons*; and † I take to be a Corruption of their † or W. The rest has little of Difficulty in it; only the *Language* of the whole seems a Mixture of the *Danish* and *Saxon Tongues*: But that can be no other than the natural Effect of the two Nations being jumbled together in this Part of the World. Our *Borderers*, to this Day, speak a *Leash* of *Languages* (*British, Saxon, and Danish,*) in one; and it is hard to determine which of those three Nations has the greatest Share in the *Motly Breed*.

An antient Monument at Foulsham in Norfolk; by Sir P. S. n. 189. p. 361.

XXIX. In the Church-yard at *Foulsham* in *Norfolk* there is a *Tomb-stone* with this *Inscription*, which some of the Learned in these Curiosities may perhaps explain.

On one Side

AK COG LEE

At one End

OOO

On the other Side

FDE DESWIA

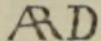
On the other End

BOG

Some Saxon Coins found in Suffolk; by Sir P. S. n. 189. p. 356.

XXX. 1. In *May* 1687. at *Honedon*, nigh *Clare* in *Suffolk*, the *Sexton*, as he was digging a *Grave* in the *Church-yard* deeper than ordinary, met with a *Skull*, and near it many Pieces of *Saxon Money*, which are generally of the same Bigness, viz. of a *Groat*, and about the same Weight: But the

the *Inscriptions* are so *various*, that there are scarce two of them alike. I guess this *Variety* of *Inscriptions* ariseth from the many *Masters of the Mint*, who were appointed to *coin Money* in several *Places*, and who might each of them have a different *Stamp*. For I have observed great *Variety* in *H. III. Coin*; viz.

NICOLE  LVND.
 WILL   LVND.
 WILL   CINT. *Canterbury. quær.*
 RICH   GLOV.

These Names being probably the *Masters of the Mints*, the *Laws* as to the *Mints* being not altered, *1 Hen. VI. Chap. I.* The *King's Council* might assign *Money* to be *coined* in as many *Places* as they would (a).

These *Saxon Monies* were *Denarii*, or *Pennies*, which in *Ethelred's Time* Greaves of the Denar. p. 117. was the 20th Part of the *Silver Ounce Troy*. Five of those *Pennies* made a *Shilling*, and 240 of them made a *Pound*; which is the present Proportion of our *Penny* and *Pound*, though the *intrinſick Value* be about three to one different. There were (they ſay) between 200 and 300 Pieces: If 240, *i. e.* 1*l.* then it would ſeem probable that the *Deceafed* might have ordered ſo many to be buried with him, as a kind of *Expiation* for having privately killed a *Dane* of *ſervile Condition*; for in *Ethelred's Law* there is this Penalty, *Servilis Conditionis Dacum ſi Anglus morte affecerit, integram ſolvito Libram*: If more or leſs was found, it might answer another *Muleſt* enjoined by the *Saxon Laws* for killing or maiming ſome *Perſon* of another *Quality*; or the *Æſtimatio Capitis* might be laid in the *Grave* with the *Perſon* that was killed. However, it is very probable, that the *Money* was buried upon ſome ſuperſtitious Account. *Vid. Fig. 28.*

On ſome of theſe *Monies* there are very odd *Saxon Characters*. Some are diminished in their *Weight* by lying long under *Ground*, and ſeveral of them coloured *green (e)*. The *Reverse* of the 13th is the ſame with the 12th; that of the 14th is written round the *Croſs*, ſo are thoſe of the 18, 19, 20, 21; whereas moſt of them are not ſo; but there are *two Lines* of Letters with *three Croſſes* between them. The little *o* in ſome of them is periodical. The  in the 19th is a very clear Character, and ſtands for a Letter that is not defaced.

In the 20th *Reverse*, [*Sterling, &c.*] P & T paſſim confundi Docti obſervant  pro ,  pro , &c. Ruſpina pro Roſtina, &c. Bochart. *Geogr.* p. 450, 706. Denarium & Sterlingum eundem eſſe Nummum (*Matth. Pariſ. in Hen. III. 13 Solidis & 4 Sterlingis pro Marcâ quâlibet computatis*), *Vox iſta Sterling, utrum formatur à Signo quod imprimebatur iſti Nummo, & Sterlingus ſit quaſi Stellatus; an potius Eaſterlingus denominatus à Populis, qui Eaſterlings dicuntur, ambiguum faciunt Scriptores.* Gronovius *de Seſtertiis*, p. 346. (l.) But I find Gronovius may be corrected in what he writes in the *Addenda* to the ſame *Treaſiſe*, by this *Reverse*; *Dubium non eſt* (ſays he) *ſi Saxonibus Anglis deberetur ea Vox, Sterling in Monumentis*

numentis illorum repertam iri.— Constat inter omnes, ante Normannorum Ingressum in Angliam, non reperiri mentionem hujus Vocabuli; cum ipso Gulielmo primum legi Sterlingos, &c. appellatos; ergo his debetur ea Vox in Anglia. Yet I believe what he writes just before; Denariis autem nomen etiam Sterlinges fuisse, in Continente quâ Normanni imperabant, ostendunt duo Rescripta Pontificum Romanorum in Decreto Gregorii: And he might well have added, That the Normans borrowed of the Franks that Word Sterling, as well as Descriptionem Libræ per Solidos Denariosque. But it may be, when Gronovius writ, no Coin nor Monument of Antiquity was then discovered in England that mentioned Sterling before William I. whose Name brings to Mind, that on his Coin (n.) P is put for W.

Gloss.

Sir H. Spelman takes Sterling and Denarius to be the same; and he directs to the Statute made An. 1302. 31 Edw. I. wherein the Penny is called Sterling, and the Weight of the Sterling is 32 Gr. of dried Wheat (and I have weighed 32 Gr. of Wheat, and they are equal to 24 Grains Troy Weight, which is our Saxon Penny). And An. 1496. 12 Hen. VII. Cap. 5. there is another Statute wherein the Sterling is of the same Weight.

I am credibly informed, some of the Egbert's and Ethelbert's Coin were found amongst them: Those I saw were Ethelstan's, who began his Reign about the Year 925. Edmund Etbeling, his Brother (for I take the Edmunds to be his), who began his Reign 940. Edred, another Brother, who began his Reign 946.

Remarks; by
W. W. Ib.
p. 361.

2. (a) This Law was in Force till Henry VII. who first, that I can find, quartered the Arms of England with France in his common Silver Coins, on their Reverse: This his Successors have since followed, before they writ Civit. London; Civitas Cantuarie; Villa Calestæ. The want of knowing this Custom, has caused some learned Men to mistake some Coins of Edw. IV. with Civitas Norwic. on the Reverse, for Medals stamped in Memory of Ket's Insurrection, by Edw. VI. Golden Medals, in Memory of great Actions, are of antient Use amongst us; witness that Golden Coin of Edw. III. where a Shield, with the Arms of England and France over a Ship, is stamped, to shew his Title to the Kingdom of France, which he then claimed; yet this can hardly be shewn in Silver Coins, which then passed for current Money; that seems to have been peculiar to the Greeks and Romans, except some Instances of these two last Ages. The single Exception of Edw. III. who quartered England and France in his Money, doth not weaken my Assertion, since it was extraordinary, as a more publick Proclamation of the Justice of that Title which he set on Foot against Philip de Valois.

(b) This Reverse [n. 1.] is to be read PENE PHEO; i. e. Penny-Money, a Duplication usual amongst the Saxons; so afterwards Sterling Money. Febo, or Feob, is a common Word for Money. St. Mark xii. 41. þa sæt ye bælen ongen pæne tolycamol, 7eƷeah hu ꝥ ꝥolc- hyƷa peoh. Then sat Jesus over-against the Treasury, and saw the People put in Money.

(c) LAND

(c) LAND WEHO [n. 2.] This was coined in Memory of a Land-Tax, raised by *Ethelstan* to support his Wars against the *Danes* and *Scots*; against whom, especially the *Scots*, he was always *victorious*. This is the only *Ethelstan*, who was ever King of *England*, who beat the *Danes* at *Sandwich*, in *An.* 852.

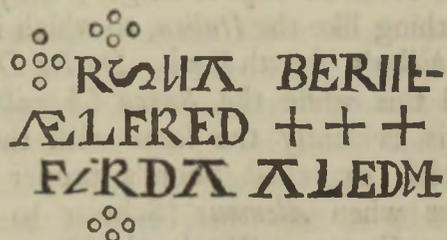
The *Variety* of *Letters* in these *Reverses* is remarkable: The last Word in these two *Reverses* is manifestly to be read alike, yet the Form of the Letter is vastly different. This *Variety* arose from the Multitude of *Mints*, which did not all tie themselves up to one *Stamp*, nor to the same *Letters*.

(d) This I should read [n. 4.] *REGIA MONETA*, to distinguish it from the *Bishop's* or *Abbot's*, for it was coined at *Canterbury*; A, I take to be a *Mint-Master's* Mark.

(e) Though these *Coins*, as far as I can judge, are as good *Silver* as any current with us, if not better; yet since what *Alloy* is in them is of *Brass*, I am apt to think, that the *acid Steams* in a long Series of Ages arising from the *human Bodies*, might corrode so far into the Metal, as to raise some little *Verdegris* upon the Surface of the *Coins*; to which that *Greenness* is to be imputed.

(f) Probably this *Albericus* [n. 7.] was a Nobleman, and they might have had the *Jus Monetæ*, as well as *Bishops* and *Abbots*; but I must confess I cannot make that out clearly. H before G is an usual Transposition; so *H Clotharius*, *H Ludowicus*.

(g) This I read *IVE MONETA* [n. 8.], or *Ive-Money*, that is, *Money* coined at *St. Ives* in *Huntingdonshire*. The *H*, as also **H**, both used for *M*, are remarkable. *Bouteroüe*, in his *Disquisitions* on the old *French Monies*, gives us some *Gallick Epitaphs* from which he draws an *Alphabet* of the old *Gauls*. In that *H*, **H**, are used for *M*; so that possibly the *Britons* might likewise use them. It is manifest they are not *Saxon Letters*; and I see no Absurdity to allow the *Saxons* to have borrowed them from the *Britons*, and to have used them amongst their own *Capitals*. There is a *Coin* in *Tab.* 3. *Coin* 14. of the *Collection* prefixed before *Elfred's Life*, which has two other of those *Gallick Letters* of which *Bouteroüe* has given us an *Alphabet*. The *Coin* is,



 RUM BERIE

 ÆLFRED +++

 FARDAN LEDME

The **o** and **e** are *S* and *F* in his *Alphabet*; and I am apt to think that that *Inversion* of *Letters* in these *Saxon Monies*, as **U** for *M*, **J** for

for F , took its Rise from them; for in this *Alphabet* we have Δ and for ∇ D; ∞ S and Z for S: However, this will evince, in some measure, the Practice of such *Inversions*, which made some learned Men take them for *Runic*, *Gotbic*, or indeed for any *Characters* with which they were little acquainted.

(b) [n. 9.] This, and the *Reverse* of 11, are to be read alike, though they were *coined* at different Places; as appears from the *Variety* of the *Letters*.

(i) F which is used here [n. 16.] for M, is frequently used in that *Collection* of *Saxon Coins* prefixed to *Alfred's Life*.

(k) This *Gotæ Monæ*, or God's Money [n. 17.], was the *Peter-pence* which was collected yearly, and sent to *Rome*. *Ina*, one of the Kings of the *Mercians*, first gave it; thence it was constantly paid afterwards, though now-and-then intermitted in the Heat of the *Danish Wars*. I suppose this *Coin* came out of an *Ecclesiastical Mint*.

(l) The true Original of *Sterling* is *Starry*. The common People observing the *Crosses* upon the *Coins*, which looked like so many *Stars*, called them *Sterlings*, *Starry Pieces*. *Ling* is an *Adjective* Termination in the *Saxon Language*, so in time the Word became *Substantive*, and was used promiscuously for *Penny*.

(m) The 19 and 21 *Reverses* are to be read alike, though possibly they might be made from different *Stamps*. The *Letters* in both (for neither are very clear) will mutually explain each other. I read it $\text{M} \text{F}$ HECT^1 HONE , or *Malmsbury Money*: The t , which is an intire Letter, seems to have been taken from the square B, or B .

(n) This P was the old *Saxon p*, or *W*; so it was *Willem*, not *Pillem*. The *Saxon Character*, which was full and plain, gave Rise to that small beautiful Character which we usually call the *Roman Letter*. The antient *Romans*, for ought that yet appears to the contrary, wrote all with one uniform *Character*, sometimes greater, and sometimes less, of the same Figure with the *Great Letters* in our *Alphabet*. This they took from the *Greeks*; and it is usual in all the *Alphabets* of the *Oriental Nations*. The 3 *Inscriptions* in *Gruter* (pag. 185. 3. p. 652. 2. p. 182. 7.) only prove that they had our small t , p , b , h ; for we have no Hints in our *MSS* of any others. After them succeed the *Francick* or *Merovingian Character*, intirely left off in transcribing Books after *Charlemagne*. The *Notaries* kept it longer; only by making it longer they brought it to something like the *Italica*, to which it possibly gave Rise. The Specimen in *Mabillon's* fourth Book, *De Re Diplomatica*, will put this past Doubt. All this while the *Saxon Character* was used in *England*, whose *Alphabet* is evidently the same with the small *Roman*, except some *Letters* which expressed Sounds proper to their *Language*; as f , p , e : Wherefore when *Alcumus* (Scholar to *Egbert*, Archbishop of *York*) went over into *France* to *Charles the Great*, and afterwards sent for Books out of *Egbert's Library*, as may be gathered from *William of Malmsbury*, he introduced that fine Way of *Writing*, which immediately took Place with all but the *publick Notaries*. *Mabillon* owns the Thing, in Effect, tho' he dissembles the Original: *Primâ Stirpe extinctâ, Carolus M.*
Literas

Literas expolire cepit, aut certe jam tantisper expolitum Scripturæ Genus à Merovingico in *Elegantiores Formam commutavit, quæ in eandem Formam evasit, quæ hætenus Minuti Romani Characteris Nomen retinet* (Lib. I. Cap. 11. Num. 10.) And if this Change was not wrought in a Moment, because the *Transcribers*, used to the old *Merovingian Hand*, conformed to the new as much as they could, yet that wore off by Degrees; so *Mabillon*, quæ [*Carolina Scriptura*] *principio nonnihil Merovingici Characteris habebat intermistum; at subinde Politor effecta, in eandem formam, &c.* *Mabillon* acknowledges that *Alcuin* introduced the modern Punctuation into the *French MSS and Records*, which he learned from the *Saxons*, particularly [.] for a full *Period*, as is manifest to all that shall look into the *Saxon MSS*, or printed Books in Imitation of them.

Besides, all our *Latin MSS* in *England*, till some time after the *Conquest*, were writ in the *Saxon Character*. So *Archbishop Parker* published *Asserius Menevensis*: and there are several *Latin MSS* in the *University Library* of *Cambridge*, written in the *Saxon Character*. And it is no Wonder that those *Letters* which expressed Sounds not used in the *Roman Tongue*, should be left out by the *French Transcribers*, who at the same time might use *Saxon Copies*; so that it is not strange *Vessius* should be mistaken, when he thought Ω and Φ were from the *Greek*, and Θ , who did not consider them to be both *Runick Letters*, which were introduced upon a particular Occasion by *Chilperic*, who took them from the *Visigoths* in *Spain*, as *Wormius* (*de Literatura Runica*) has probably proved from *Gregorius Turo-nensis*, and a *Constitution* of the same *Chilperic* printed in *Goldastus*: Yet I will not deny but *Theodore*, or some other of those *Greeks*, who in that Age had so great Intercourse with *England*, might introduce some *Greek Letters* to express those Sounds which they had not in their own *Language*: From hence they were carried into *France*, with the rest of the *Saxon Alphabet*, and so into *Italy*; which *Mabillon* also in effect acknowledges, when he says, *Hanc tamen Scripturæ Formam non Franci à Romanis, qui Longobardicis passim Elementis tunc utebantur, sed à Francis Romani accepisse videntur.*

3. Amongst the few *Coins* which I purchased of the *Sexton* of *Honedon*, I find these 3 not mentioned by *Sir P. S. vid. Fig. 29.*

*An Addition
by Mr. Sam.
Dale. n. 203.*

p. 874.

*A Piece of
Saxon Anti-
quity found
in Somers-
shire; by Dr.
W. Musgrave.*

n. 247. p. 441.

Fig. 30.

XXXI. 1. There was a curious Piece of *Antiquity* lately found at *Asbel-ney* in *Somersetshire*, the Place where King *Alfred* built, as *Milton* affirms, a *Fortress*; but, according to *William of Malmsbury*, a *Monastery*, in Memory (as some have thought) of his Deliverance, obscure Retreat to that Place, and Concealment in it from the *Danes*. The Work is so very fine, that some have questioned its true Age; but in all Probability it did belong to that great King. The Edge is thin, as far as the *Letters*. The *Letters* are on a Plane, rising obliquely. All within the inner *Pyramidal Line* is on a Plane equidistant from the *Reverse*. The Representation (in that upper Plane) seems to be of some Person in a Chair. It is in *Enamel*, covered over with a *Crystal*, which is secured in its Place by the little Leaves com-

ing over its Edges. In the *Reserve* are Flowers engraved. The whole Piece may be of the Weight of 3 *Guineas*. The *Crystal* and the *Enamel* excepted, it is all of pure *Gold*. This perhaps was an *Amulet* of King *Alfred's*.

By Dr. Geor. Hicks. n. 260. p. 464. 2. This curious Piece of *Saxon Antiquity* is in the Possession of *Nathanael Palmer, Esq;* of *Fairfield* in *Somersetshire*. The Air, the Shape of the Face, and the two united *Scepters* in each Hand of it, made me at first think that probably it might be that of our *Blessed Lord*; but having since seen a Picture of *St. Luke*, in a most ancient *Latin MS* of the *Gospels*, all written in *Capitals*, with such-like *Scepters* in each Hand, I am inclined to think that this was the common Way in those Times of drawing and representing *Saints* among the *Saxons*, and that the Picture in King *Alfred's Antiquity* (for so I now call it) might be the Picture of his Patron *St. Cuttbert*, whom he and his Mother both in one Night dreamed they saw and heard speak the same Words, in which he told him he should conquer the *Danes*, and be a great King, and bid him be of good Courage. This Vision of *St. Cuttbert* happened to him after he was beaten by the *Danes*, and had retired in great Distress into *Atbelny*, where this *Antiquity* was found; and he was so affected with it, that he afterwards used to tell it all his Life long, and ascribe his Success over the *Danes* to the Merits of *St. Cuttbert*. And as the King used to commemorate the *Vision* he and his Mother had of him, so it is very likely he ordered this Picture to be made of him, to hang down by a String upon his Breast, for a constant Memorial of the *Saint* who appeared to him, to bid him give the *Danes* Battle in a Time of great Despair, when he looked on himself as conquered, and thought his Kingdom almost lost. That he caused the Picture to be made, is plain from the *Saxon Inscription*.

William of
Majmsbury.

AELFRED ME [HETIGEWYR[AN.

Aelfredus me jussit fabricari.

And that it was made to hang down upon his Breast, is plain from the *Cone* or *Apex* of the *Figure*. And that the *Original* is a true and *genuine Piece of Antiquity*, is also clear beyond all reasonable Doubt, not only from the Place where it was found, the Place of King *Alfred's* Retreat from the *Danes*, which he *fortified* in Time of War, and where he built a *Monastery* in time of Peace; but also from the *Inscription*, which is all, except *two* in *Roman* or *Gallo-Italick Letters*, which the King, who was bred at the *English School* in *Rome*, preferred before those of the *Saxon Dialect*; and when he came to be King, as *Ingulph* testifies, he brought them into Use. Some I hear have suspected this *Antiquity*, because of its extraordinary Artifice, which they think too fine for that Age: But it is not to be doubted, but that King *Alfred*, who was so great a Prince, could easily procure the best Artists of that Age from all Parts of the *Christian World*, by the Correspondence and Interest which he had at *Rome*.

XXXII. July

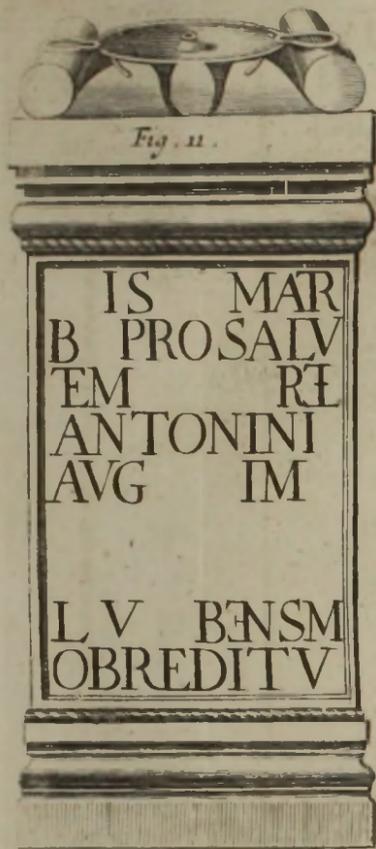


Fig. 11.



Fig. 12.

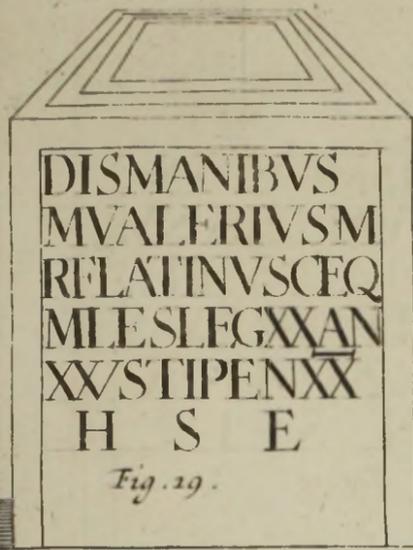


Fig. 19.

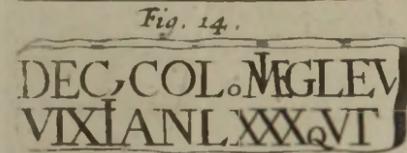


Fig. 14.

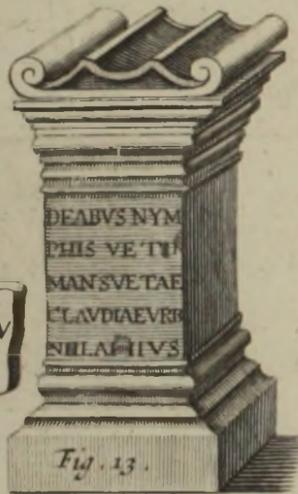


Fig. 13.



Fig. 15.

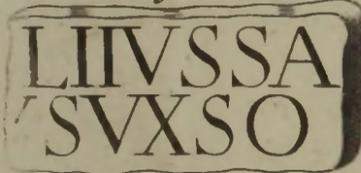


Fig. 16.

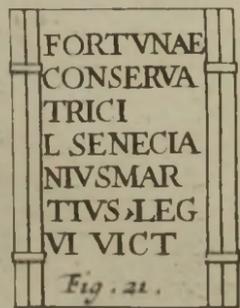


Fig. 21.

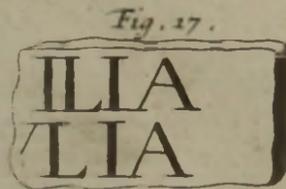


Fig. 17.

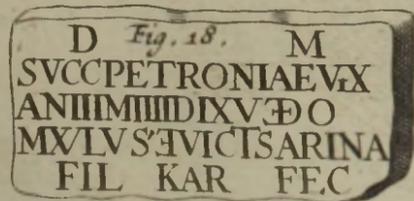


Fig. 18.

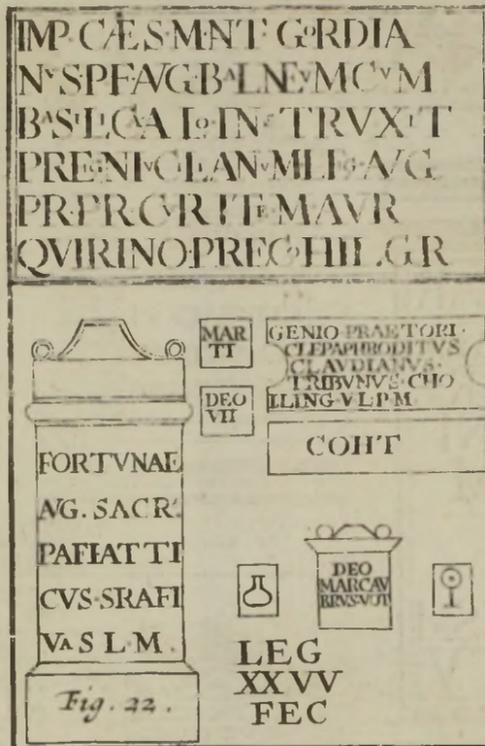


Fig. 22.

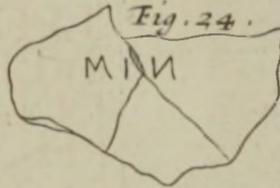


Fig. 24.

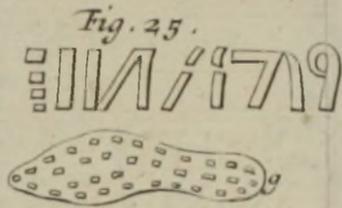


Fig. 25.

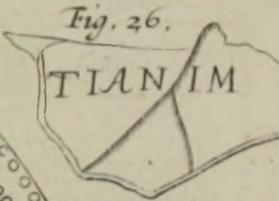


Fig. 26.

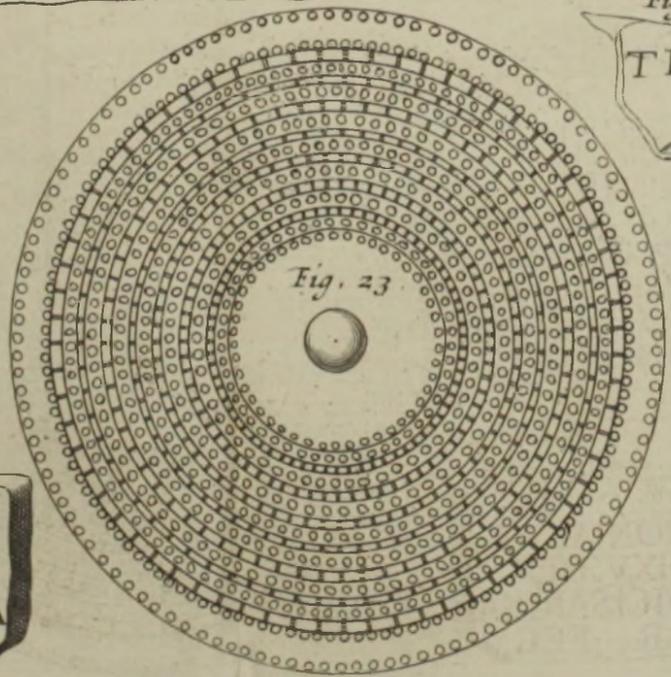


Fig. 23.



Fig. 27.

Part 2, Vol. 3, Plate 2.

Pag. 442.

Fig. 28.

- Revers
- I ADELSTAN RE + { P NE (b)
+ + +
FEHO
 - II ADELSTAN RE + { LAND (c)
+ + +
EHO
 - 3 ^{wt 23 grains} ADELSTAN RE + { STEF
+ + +
ANVS
 - 4 ^{24 gr.} ADELSTAN RE + { AREM (d)
+ + +
ONETA
 - 5 ^{21 gr.} EADMVND RE + { ENEE
+ + +
DICTVS
 - 6 ^{16 gr.} EADMVND RE + { MAN
+ + +
ANO
 - 7 ^{19 gr.} EADHVND RE + { ALB (f)
+ + +
ERHGH
 - 8 EADMVND RE + { IVEH
+ + +
NETA (g)
 - 9 EADMVN RE + { HTIL (h)
+ + +
HAH
 - 10 ^{24 gr.} EADMVND RE + { MERA
+ + +
ONETA
 - 11 EADMVN RE + { LITIL
+ + +
WAN
 - 12 EADMVND RE + { MAN
+ + +
MANO

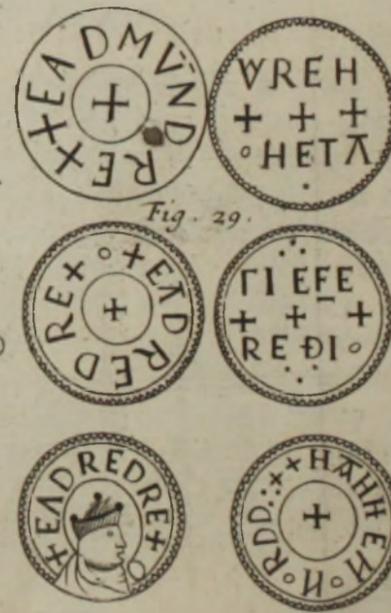


Fig. 29.

- 13 EADMVND RE +
- 14 EADHVND REPT +
Edmundi facies
REIHGRHZIOH
- 15 EADMVND RE + { ERH
O + O
HO
- 16 ^{24 gr.} EADHVND REX { INGEL
+ + +
GARH
- 17 ^{25 gr.} EADHVND RE + { GOTAE
+ + +
HOIE
- 18 + EADRED RE + ^{21 gr.}
Edredi facies
FREDRED MONETA +
- 19 + EADRED RE +
Edredi facies (m)
MANEEH INNO +
- 20 + EADRED
Edredi facies
ZPERLINL UONE
- 21 + EADRED REX ^{24 gr.}
Edredi facies (m)
IIAHECHINONE



Fig. 30.

The

The

Conte

1

The Roman Abacus out of Marcus Velserus

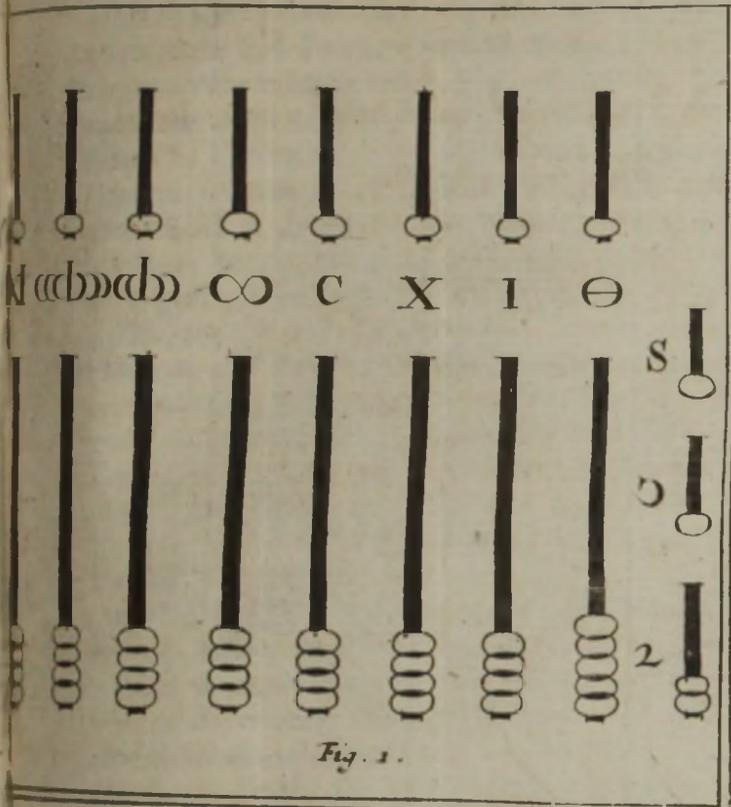
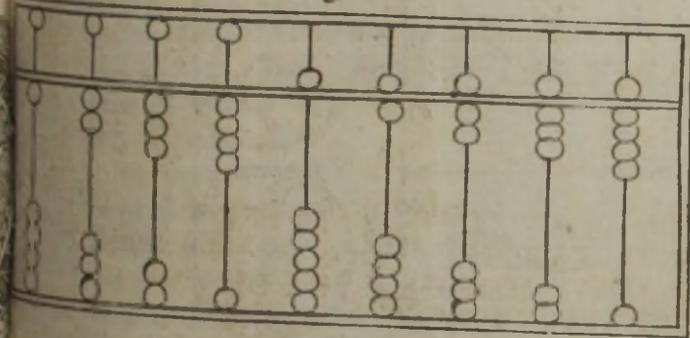


Fig. 1.

The Chinese Abacus from the Chinese Dictionary containing 9 places or Degrees.



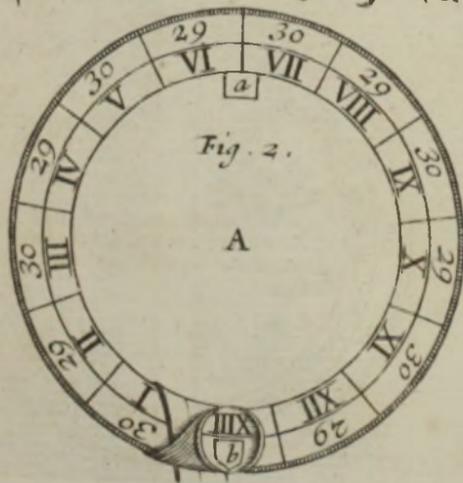
一 二 三 四 五 六 七 八 九

yě lh' san sui v' lö ğie pã kièu xě xěyě xě lh' xě san xěv
 1 11 111 四 五 六 七 八 九 十 十一 十二 十三 十四 十五
 I II III IV V VI VII VIII VIII X XI X II X III XV
 lh'xè lh' xě sanxè san xě sui xě v' xě lö xě ğie xě pãc xě
 11 111 1111 1111 11111 11111 11111 11111 11111 11111 11111 11111 11111
 XX XX XXX XXX XXXX L LX LXX LXXX
 pè pè lh' pè san pè sui pè ğien lh' ğien san ğien van san van
 1111 11111 111111 1111111 1111111 1111111 1111111 1111111 1111111 1111111 1111111 1111111 1111111
 100 100 200 300 400 1000 2000 3000 10000 30000
 ğien lö pè pã xě lö nièn v' yuè xě san ğè
 千 六 百 八 十 六 年 五 月 十 一 日 (正 E)
 CIO DC LXXX VI annus V mensis XIII Die

nièn v' ğièn ta sièn ğièn pã chī tam jo van tièn yuèn yeú
 年 五 十 六 年 五 月 十 一 日 正
 年 五 十 六 年 五 月 十 一 日 正

Fig. 1.

nièn v' ğièn ta sièn ğièn pã chī tam jo van tièn yuèn yeú
 年 五 十 六 年 五 月 十 一 日 正
 年 五 十 六 年 五 月 十 一 日 正



I. O. M
 DIS. DE ABVS QVE
 HOSPITALIBVS PE
 NATIBVS QOB COM
 SRVAT'AMSALVTIEM
 SVAM. SVORVM Q
 PAEL. MARCIAN
 VS PRÆF. COH
 ARAM. SAC. F. NC. D

Fig. 5.

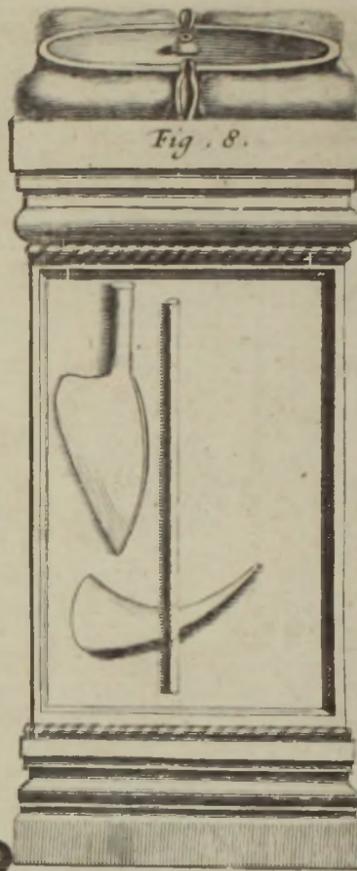


Fig. 8.



Fig. 9.

Fig. 6.
 --A
 --AE' AN
 --S' SEC' Y
 --ENE M
 --I' ANO
 --CONGI

Fig. 4.
 AVE
 VIX
 EAΛ
 T'VO
 ΠΛΛ



Fig. 7.

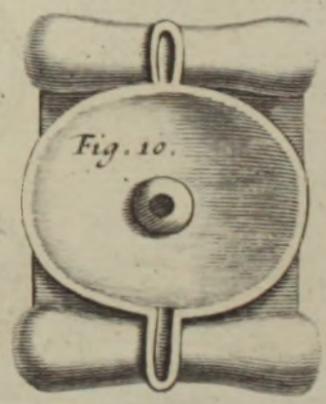
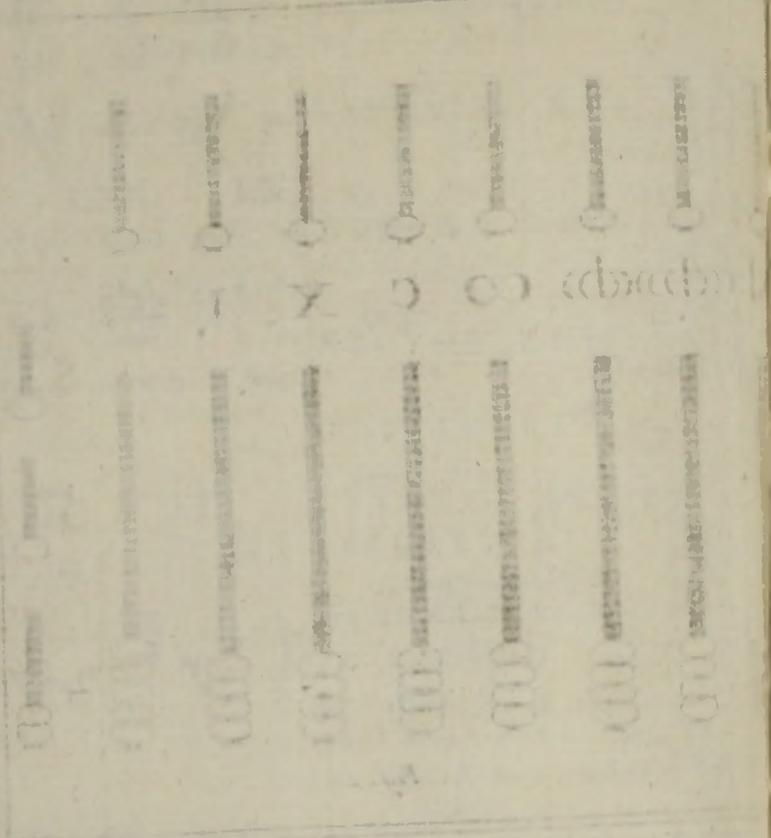


Fig. 10.

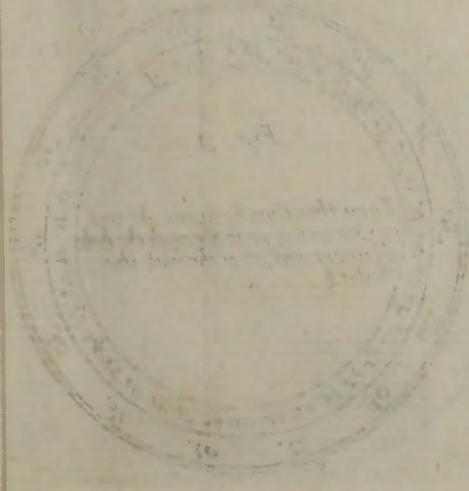
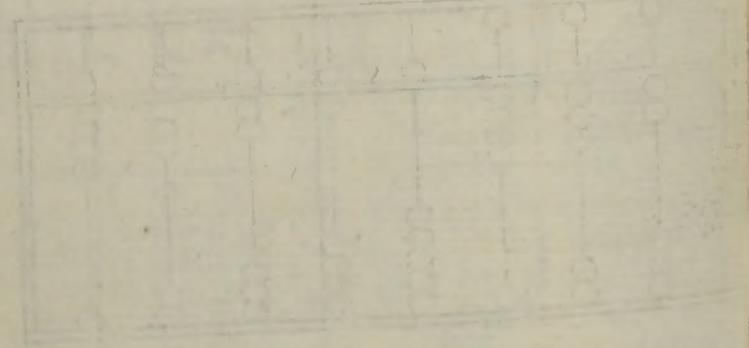
Table 2. The 3-Plan
 The numbers are out of their places

Handwritten notes and diagrams on the left side of the page, including a vertical list of numbers (I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII) and various symbols and lines.



Handwritten notes and diagrams on the left side of the page, including a vertical list of numbers (I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII) and various symbols and lines.

Change letters from the alphabet
 into a new order



Handwritten text at the bottom of the page, possibly a signature or a title.

XXXII. July 11. 1685, We *Olivier Estienne*, an Advocate in Parliament, subdelegated by Monseigneur *de Marillac*, Counsellor of State in Ordinary, having the Conduct of the Works that are making upon the River of *Eure*, below the Village of *Passy*, do certify, that upon the Petition of Messire *Robert*, Prevost of *Cocherel*, Knight and Lord of the Manor of the Upper and Lower *Cocherel*, we having with us several Witnesses, did come to the said Town, and from thence to a Piece of Land called *Les Hautberges*: Where being come, the said Lord of the Manor of *Cocherel* did demonstrate unto us, that, having Occasion for a considerable Quantity of Freestone, he had caused two great Stones, which appeared in this Place above Ground only as two Limits or Bounds, the one about a Foot, the other about 8 or 9 Inches, to be further uncovered, and that they had been found to be 6 Foot high, and about a Foot and a half thick; marked in the Figure of the Sepulchre *A* and *B*; the Breadth of the one, marked *A*, of 3 Foot, and the other, marked *B*, of 2 Foot and an half, set End-ways by one another; and they had further observed, that it was an ancient Sepulchre, shut only on 3 Sides, viz. at one End, at the Head, by the two Stones already mentioned, on the Right Side by a Stone placed Edge-ways upon its Thickness, of about 14 Inches, and being above 5 Foot and a half long, and about 3 Foot broad, touching in a right Angle. The Stone marked *B* at the Head; and at the Feet another Stone was set, marked *D*, of the same Thickness as the precedent, and about 4 Foot Square: All these Stones were cemented together with Morter made of the Chalk or Marle taken out of the same Hole, mingled with little Stones or Gravel.

That in this Sepulchre were found the Bones of about 20 Bodies of Men of the ordinary Stature, between 5 Foot and a half, and 6 Foot, except 2 Youths of about 15 or 16 Years old: All these Bodies lay extended North and South, the Arms along the Bodies, and the Heads all placed along the two Stones *A*, *B*. In the right Angle there were 2 Bodies separated from 2 others by the Stone *E*, of about a Foot thick, 4 Foot broad, and 5 Foot and a half long, that lay in the Manner of a Tomb-stone upon the two Bodies underneath. All these Heads had very fair found Teeth in them, and the Cranium and other Bones of the Head, were much stronger and thicker than those of ordinary Heads; which argues them to have been of strong well constituted Men; amongst them all there was not any Woman's Head.

In proceeding still to examine the Sepulchre, we did observe, that at the same Distance from the Superficies of the Earth, and from those Bodies thus buried, there were 3 little Earthen Pots, of about 4 Inches Diameter, and between 4 and 5 Inches high, of a black Earth as soft as Wax, which could not be separated from the other Earth without breaking them; and the Pieces, being come into the open Air, turned of a greyish Colour, and grew hard: These Pots were full of Wood-coals and Ashes, which were not much examined.



The Verbal
Process upon
the Discovery
of an ancient
Sepulchre
found in
France; com-
municated by
Mr. Justell.
n. 185. p. 221.

Fig. 31.

All these large Stones of the *Sepulchre* were rough, and had not been cut, but seemed to have been fetched from a neighbouring *Quarry*, which is about 400 *Foot* off, upon the same Hill.

We observed besides, that in the Place where were laid the two Heads of the Bodies that lay upon the *Tomb-stone E*, there were found two Stones; the one whereof was about 6 *Inches* long, and some 15 *Lines* broad in its broadest Place, and about 4 *Lines* thick; framed like the Head of a *Pike*, very sharp and cutting at both Ends and on the Sides; it was a *yellow Flint*, of which the best Firelock-stones are made, being almost as hard as an *Agat*. The other Stone, which was likewise under one of these Heads, was shaped like the Head of an *Ax*, about 4 *Inches* long, and 3 *Inches* broad, having a Hole at the narrowest End, and about 6 *Lines* thick, very sharp, and of a greenish Stone, spotted with white Spots, as hard as *Agat*: The *French Lapidaries* call it *Pierre de Jade*, for the *Nephritick Stone*.

Under the two Heads, which were under the *Tomb-stone E*, there were also found two other Stones; the one much of the same Nature with that first described, but something longer, and the sharp End a little dulled. The other was likewise in the Shape of an *Ax-Head*, very sharpe and cutting, of about 3 *Inches* long, and 2½ broad, and 6 *Lines* thick, with a Hole in it at the narrow End: The Stone was of a dark-green Colour, which the *Lapidaries* call *Oriental Serpentine*.

On the left Side of the *Sepulchre*, which was open, there were 16 Bodies in the same Situation as the first placed *North* and *South*, their Heads along the great Stone *A*, and the Arms extended along the Bodies, the Bones all entire, though they appeared very ancient; and after two Days lying in the Air fell all to Dust.

All the Bones of these Heads, as has been said before, were very thick; there was one that had been pierced by some Blow, and Nature had repaired the Wound; within, the Hole was round, as having been made by some sharp round Weapon, which argued likewise the wounded to have been a Soldier. Under every one of these Heads there was a little Stone; two were round, one of a reddish Colour, of about an *Inch* thick, having a Hole at each End, which lessened and grew narrower towards the Middle; another of Chestnut-Colour, and about the Bigness of a Chestnut, made in the Shape of a Coat-button, with a Hole clean through it, but roughly polished and hard, seeming on one Side to have suffered by the Fire.

There were likewise two other little Stones, which according to Probability were under the Heads of the young Bodies; whereof one was about 2 *Inches* long, and 8 *Lines* broad, and 2 *Lines* thick, pretty sharp at the broader End, and having a Hole at the narrow End: It is thought to be of the same *Pierre de Jade*, green and white, but it is nothing near so hard as the first. The other Stone was about 17 *Lines* long, 8 broad, and 2 *Lines* thick, somewhat sharp at the broad End, and having 2 Holes at the narrow End, the one bigger than the other: It is thought to be of a *white Marble* or *Alabaster*.

There were moreover found under these Heads three Stones, whereof two were of a *grey Pebble*, such as we find by the Sea-side, shaped like *Axes Heads*, sharp and polished, about 4 or 5 *Inches* long, and 4 broad at the broadest End, about $1\frac{1}{2}$ *Inch* at the narrowest, and in the Middle about an *Inch* thick. These Stones were by their narrow End to be put into a Piece of *Stag's Horn* fitted to receive them, as appeared by several Pieces found in this *Sepulchre*, which had an oval Hollow at the End to receive one of these Stones: These Pieces were about 6 *Inches* long, and had a Hole at the other End by which they might be fastened to a longer Stick. The third Stone was of the Shape of the precedent, but of a *black Pebble* like a *Flint*, of which this Country is very full; and it was besides remarked, that the Pieces of *Stag's Horn* were worn at the End, and polished upon some Stone, but not cut with Iron.

Under all the other Heads there were 10 little Stones, like *black Flint*, one under each Head, cut all in the same Shape, smooth on one Side, and sharp on the other; it is thought they might use them as *Knives*.

There was likewise found in the same Place, under one of the Heads, a Stone, which within was of *black Flint*, having the Outside of a white Substance, as that Sort of Stone uses to be: This had two Eminences like Teeth, which we took to be natural, and not artificial. All these Stones, thus placed under their Heads, shewed that they had them in great Esteem.

Amongst these dead Bodies have been also found some Bones sharpened, to put at the End of a Stick, or at the End of an Arrow; one was of the smaller Bone of a *Horse's Leg*, and the other was made of the sharp End of the *Andouilleres* of a *Stag's Horn*.

Amongst all these Stones there has been found no sort of *Inscription*, *Sculpture* or *Character*, either in *Relievo* or otherwise, which might oblige us to think that these Men had any Knowledge of *Christianity*, but rather that they had some *idolatrous Superstition*, as these Stones seemed to indicate. Wherefore we thought fit to declare to the said Lord of the Manor of *Cocherel*, that he might without Scruple use these Stones for what he thought fit.

Since the Expedition of the present *verbal Process*, there having been further Digging on the Left-side of this *Sepulchre*, it has been discovered that the Bottom of the *Sepulchre* was raised, and not so deep by a *Foot* and a half as that Part where the Bodies were buried. And it is perceivable, that in this Place several Bodies have been burnt whose *Ashes* and *burnt Bones* have been thrown confusedly into this Hole: And it is observable, that all along the *Sepulchre*, there is a Vein of *Coals* and *Ashes* which runs about 2 *Foot* below the Superficies of the Earth, and all these *Ashes* and *Bones* are under this Bed of *Coals* and *Ashes*, which are so salt and pungent, that they make one sneeze; and when these *Bones* are handled, they produce a Tingling in one's Fingers Ends, as if one had handled the sharpest *Salt-Petre*.

It seems difficult how to reconcile the two Ceremonies of *Burying* and *Burning*, except that we should say there has been a Fight in this Place between the

Gauls

Gauls and some *barbarous Nation* who had invaded them; that the *Gauls* have burnt their Dead, and sacrificed to the *Manes* of them their Prisoners taken in War, whom they buried with the Ceremonies proper to those *Barbarians*, the Thickness of whose *Skulls* shew that they went bare-headed, and their *Arms* shew that they had not the Use either of *Iron* or *Brass* to make *Arms* of, but used such as Nature afforded first, as some *Indian Nations* do now.

The Figures of several Antiquities; by n. 175. p. 1159.

Fig. 32, 33, 34, 35, 36, 37, 38, 39.

By n. 176. p. 1201. Fig. 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61.

XXXIII. 1. Fig. 32. A Ring of Corinthian Brass, with a Vizard of Silenus in a Sardonyx.

33. An Amulet of the Gnosticks, cut in a Chalcedonian, the Names of certain *Æones* or Intelligences.

34. A Tesseræ of Crystal, having on one Side XIII, on the other IΔ.

35. A Fortune and a half Diana, in an Onyx.

36. An ancient Picture of the Virgin, in a Chalcedonian.

37. A Cameus, with a Mixture of several Gods.

38. An Onyx.

39. A Glass Lachrymatory.

2. Fig. 40, 41, 42, 43, 44, 45, Res Turpiculæ, or Priapi, worn by Roman Children against Fascination.

46, An Egyptian Brass Serapis, or Teraphim.

47, A Brass Stilus Scriptorius.

48, 49, Old Roman Keys of Brass, one being a Ring to wear on a Woman's Finger.

50, An Iron Die, or Alea.

51, A flat Iron Die, or Talus; upon the narrow Sides are 6.

52, A Roman Iron Ring.

53. An old Roman Brass Ring, marked XXXV, for a Slave to wear.

54, A Brass Roman Ear-Ring.

55, A Brass Lunula, or Meniscus.

56, A Brass Fibula.

57, 58, 59, 60, 61, ancient Pastes, or opaque Enamels of divers Colours, for Pavements taken up at *Baiæ*.

An uncommon Inscription on a very great Basis of a Pillar lately dug up at Rome; by M. Adrian Auzout. n. 183. p. 172.

XXXIV. This Inscription was copied from the Stone by M. Adrian Auzout, and sent by him to M. Justel. It is threefold upon 3 Sides of the Basis, as follows:

P. SVFENATI. P. F. PAL. MYRONI
 EQVITI. ROMANO. DECV
 RIALI. SCRIBARVM. AEDILI
 VM. CVRVLIVM. LVPERCO. LAVRENTI
 LAVINATI. FRETRACO. NEAPOLI. ANTI
 NOITON. ET. EVNOSTIDON. DE
 CVRIONI. III, VIRO. ALBA
 NI. LONGANI. BOVILLEN
 SES. DECVRIONES OBME
 RITAEIVS. L. D. D. D.

P. SVFE

P. SVFENATI. P. F.
 PAL. SEVERO. SEMPRO
 NIANO. DECVRIALI
 SCRIBARVM. AEDILIVM. CVRV
 LIVM. FRETRACO. NEAPOLI. EV
 NOSTIDON. DECVRIONI. ET
 SACERDOTI. APOLLI
 NIS. ALBANI. LONGA
 NI. BOVILLENSES. DE
 CVRIONES. OB. MERI
 TA. SVFENATIS. HER
 METIS. PATRIS. EIVS
 L. D. D. D.

P. SVFENATI. P. F.---
 MIRONI.
 EQVITI. ROMANO. DEC---
 ALI. SCRIBARVM. AED---
 CVRV LIVM. LVPERCO---
 TILAVINATI. FRETRAC---
 APOLI. ANTINOITON---
 NOSTIDON. DECVR---
 III. VIRO. ALBANI---
 GANI. BOVILLEN---
 MVNICIPES. OB.
 EIVS. L.--- D.---

2. Bene nosti *Classem Ægyptiacam* sive *Cataplum Alexandrinum* ante-
 quam *Portus Ostiæ* esset extractus, singulis Annis appulisse *Putcolos*, unde
 demum *Fru mentum Romam* deferebatur. Postquam vero *Augustus*, &
Claudius Cæsares & postea *Nero Ostiæ* Portum aperuerunt, jam *Annona* non
 tantum *Puteolos*, sed & longe maxima sui parte *Ostium* appetebat. Constat
 autem tempore *Tiberii* pulsos *Româ* fuisse *Judeos* & *Ægyptios*; unde
 factum est ut ab *Ostia* per *Agrum Laurentem* deportaretur *Fru mentum Ari-*
tiam & *Albam Longam* usque ad *Bovillas*, ad *Decimum* nempe ab *Urbe*
Lapidem; neque enim longius progredi permittebatur. A *Bovillis* enim
Romam per *Institores Romanos* deferebatur. Neque enim *Ægyptiis* aut
Judeis in *Urbe* habitare aut *Horrea* habere erat licitum. *Menforibus* vero
 & *Venditoribus Fru menti Ostiæ*, & passim alibi, præfuisse *Decuriones*, & hoc
 quoque ex *Jure* constat. Sed vero omnibus istis minoribus *Decurionibus*,
 qui in singulis *Locis* & *Urbibus Fru menti Curam* haberent, præfuisse alium
 Decu-

Explained by
 Dr. Vossius.
 Ibid. p. 174.

Decurionem, qui vicem *Præfæti Annonæ* obiret, & in omnibus istis Inferiorum *Decurionum* Collegiis Primum teneret Locum; id manifestè ex hac patet *Inscriptione*, ubi Minores *Decuriones Bovillani* Honorem faciunt *Equiti Romano & Palatino*, qui *Decurio* seu *Curialis & Fretriacus* in omnibus esset Locis & Urbibus, à quibus & per quas *Annona Ægyptiaca Romam* debebatur. *Decuriones* vero pro motos fuisse ad Honorem *Sacerdotii* ita ut simul *Flamines, Luperci, Epulones Jovis, & Parasiti* fierent *Apollinis*; & hoc quoque multis constat Exemplis. Omne verò dubium tollit, quod in hac *Inscriptione* *Eques ille Romanus* vocetur *Antinoiton & Eunostidon Decurio*. *Antinoi* enim Urbs præcipua tum temporis *Ægypti Superioris* erat Civitas, unde per multas Fossas Frumentum deferebatur ad *Mareotin Lacum*, qui ad *Eunosti* Portum exit in Mare. Ab hoc Portu dicti *Eunostidæ* Curatores Frumenti *Ægyptiaci*; unde demum confectus de Dec. *Eunostus* Rei Frumentariæ Inspector, qui huic præsideret Portui.

An ancient
Sepulchre
near Rome;
by ----
n. 185. p. 227.

XXXV. In an Inundation of the *Tiber*, An. 1686, the Water having pierced a strong thick Wall, which joined to a great Country Palace about 2 Miles from *Rome*, and passing under the same, broke out at a Corner of an *Aqueduct* by the said House, where there was found a small Vault of an oval Figure, in which there was a Stone *Sepulchre* pretty large, with the following *Inscription*, P. M. R. C. cum *Uxore* . . . and more which could not be discerned: By this same there was a great earthen *Urn* shut up very close, which being opened, there came out a strong Smoak, that it made the Man that was by it almost giddy: The Smell was like *Bitumen*, but being quickly dispersed, they found in the Bottom of the said *Urn* an earthen Pot made up as a Lamp, full of a *Materia Oleosa*, which by Degrees, as the cold Air got into it, grew hard. Several Persons suppose this to be one of those *perpetual Lamps* that the Ancients mention.

An Etruscan
Inscription;
by Mr. Octavian
Pulley.

XXXVI. I here send you an *Inscription* on an old *Urn* in the *Etruscan* Language; the Character seems to be not much unlike the *Runick*. Vid. Fig. 62.

n. 228. p. 539.
Fig. 62.
The Catacombs at
Rome; by
Mr. J. Monro.
n. 205. p. 643.

XXXVII. The *Catacombs* at *Rome* are a narrow *Gallery*, dug and carried a vast way under Ground, with an infinite Number of others going off it on all Hands, and an infinite Number of little Rooms going off the Principal and them too. Those commonly shewed Strangers are those of *San Sebastiano*, those of *San Lorenzo*, those of *Sant Agnese*, and the others in the Fields a little off of *Sant Agnese*. They take their Names from the Churches in their Neighbourhood, and seem to divide the Circumference of the City without the Walls between them, extending their *Galleries* every-where under, and a vast way from it; so that all the Ground under, and for many Miles about it, is said to be hollow. I have also seen those at *Naples*, and, as they say, there are *Catacombs* in the Neighbourhood of all the great Towns of that Part of *Italy*.

Some Authors will have them made by the *Primitive Christians*; adding, That in the Times of *Persecution* they lived, held their Assemblies, and laid up the Bodies of their Martyrs and Confessors in them. This is the Account that prevails at *Rome*, and consequent to it there are Men kept constantly at work in them. As soon as those Labourers discover a *Repository*, with any of the Marks of a *Saint* about it, Intimation is given to the *Cardinal Treasurer*, who immediately sends Men of Probity and Reputation to the Place; where they find a Palm painted or engraven, or the Cypher Xp, which is commonly read *pro Christo*, or a small round Projection in the Side of the *Gallery*, a little below the *Repository*. What is within it is carried to the Palace. Many of these Projections we have seen open, with Pieces of the Phials in them; the Glass indeed was tintured, and it is pretended, that in these Phials was conserved the Blood of the *Martyrs*, which was thus laid up nigh their Bodies, towards their Head, to distinguish them from those of the others that were not called to the Honour of laying down their Lives for the Faith of the Gospel. After the Labourers have surveyed a *Gallery*, they do up the Entry that leads into it: Thus most of them are shut; nor are more left open than what is necessary to keep up the Trade of shewing them to Strangers. But to this Opinion it may be justly excepted, that allowing the *Catacombs* to be proper for the End for which they are presumed to be made, and that the *Christians* of that Age were in a Capacity of making that Convenience for themselves to live and assemble in below Ground, at a Time when it was so very unsafe to appear above it; yet to suppose that a Work of that Vastness and Importance could be carried on without the Knowledge of the Government, is to suppose the Government asleep, and that that was actually done under its Nose, that must necessarily have alarmed it, had it been attempted on the Frontiers of the Empire.

Another Sort of Authors represent them as a Work of that Vastness, that the *Christians* in the persecuting Times had not Number enough to carry it on; but then most unadvisedly confound them with the *Puticuli* in *Festus Pompeius*, where at the same Time that the antient *Romans* used to burn the Bodies of their *Dead*, the Custom was, to avoid Expence, to throw those of the *Slaves* to rot. The *Roman Christians*, say they, observing at length the great Veneration that certain Places gained by the Presence of *Relicks*, resolved to provide a Stock for themselves: Entering therefore the *Catacombs*, they made in some of them what *Cyphers*, what *Inscriptions*, what *Painting* they thought fit, and then shut them up; intending to open them again upon a Dream, or some other important Incident. The few that were in the Secret of this Artifice either dying, or as the *Monks*, who were the only Men that seem to have Heads adapted to a Thought of this Quality, were subject to many Removes, being transported to other Places, the Contrivance came to be forgot, and those *Galleries* continued shut, till Chance, the Parent often of great Discoveries, opened them at last. Thus they conclude the Remains of the vilest Part of Mankind are trump'd up in the Church for the Bodies of the most eminent *Confessors* and *Martyrs*.

But surely either the *Catacombs* are not that great Work they are represented to be, nor to be found every-where about the City, or it was very improper in *Festus Pompeius* to call them by the little Name of *Puticuli*, and to confine them to one Place only, that I mean unknown now without the *Esquilin-Gate*. The true Notion of the *Puticuli* is this; Holes dug perpendicularly in the Ground, to throw Bodies indifferently, and without any Decency in; and this was the Conduct of the antient *Romans* with respect to their *Slaves*, as implying Simplicity, and the Care to avoid a greater Expence. After the same manner, when the *Persecutors* spilt the Blood of so many *Martyrs*, they used to dig Holes perpendicularly in the Ground, and to throw the Bodies promiscuously in them: And of this the Memory is still conserved, Churches being built in the Places where the Holes were made, and little *Monuments* erected over the Holes themselves, to which the Name of *Putei* is continued to this Day. But what is all this to the *Catacombs*, where *Repositories* are cut, in the Face of a long *Gallery*, one over another, sometimes to the Number of seven, in which Bodies were singly laid, and handsomely done up again, so that nothing could offend the View of those that went in, especially with the little Rooms, of the Fashion of *Chapels*, that have all the Appearances of being the *Sepulchres* of People of Distinction? And if they were kept in better Repair, they would be, without Dispute, the noblest *Burying-places* this Day in the World.

As often as they fall under my Consideration, I cannot forbear thinking they were made for this End by the antient *Romans*, and made in Consequence of those two antient Opinions, that the *Shadows* hate the Light, and love to hover about the Place where the Bodies are laid: They appear so easy and decent a Resting-place for the one, without the least Fear of being ever disturbed, and at the same time there is provided a noble and vast Convenience, full of Variety, for the others to solace themselves freely, and with Pleasure in.

I think it will not be denied, that laying up the Bodies in *Caves* was the original Way of disposing of the *Dead*: This was that of the *Phœnicians*; and as they were the Men that with their Colonies peopled the *Western Parts* of the World, it is more than probable they carried it along with them whithersoever they went. Afterwards, as Men grew great and powerful, they erected noble and magnificent *Monuments* for themselves above Ground; at length others of inferior Degree imitated them, all leaving Room enough, and excluding the Light. But then *Interring*, as we do now, in the open Air, or in the Temples, was never the Manner till *Christianity* brought it in. Of the Whole we have many Instances, and *Il Signior Abbate Bencini*, *Bibliothecary* of the *Propaganda*, a Gentleman of good antient Learning, assured me, in the Conversation I had with him on this Argument, that on the great Roads in most Parts of *Italy* little *Catacombs* have been, and are still found under Ground, and that it was the Custom to build little Houses over them. And as to the Marks of a *Martyr*, he added, that they do not conclude much; that the so famed Cypher Xp was in Use among the Antients long before *Christianity* began, and that it was composed of the

two *Greek Letters* XP, under which something *mystical* was comprehended; but that he met with no other Author that gave Account what the *Mystery* was.

Thus, after a Multitude of Thoughts about the *Catacombs*, I am forced to take up with this; so natural it is, arising from the sole Theory of the Place, and falls in so appositely with the Religion and Practice of the Antients, among whom the *Dii Manes* were the *Tutelary Gods* of the Country, and DM at the Head of an *Inscription* argues the *Moles*, the *Sepulchre*, the *Monument*, &c. were in the primary Intention made for, and dedicated to the *Soul*. Upon the same Maxims, in foreign Expeditions, when a Hero died or was killed, as the Body was liable to a quick Corruption, and for that Reason unfit to be transported intire, they fell on the Expedient of *Burning*, in order to bring Home the *Ashes*, to oblige the *Manes* to follow, that so the Country might not be deprived of the Benefit of its *Tutelage*. This I humbly conceive was the Original of *Burning*, which by Degrees became more and more universal, till at last the Pomp and Magnificence of it reconciled it to all that were able to go the Length of the Expence. As for the Prejudice of the *Silence* of the *antient Authors* in this Matter, it is easily removed, and to be regretted at the same time that the Authors of all Ages too much neglect the Customs of their own Time. Writing for the Satisfaction of their Contemporaries, they think it impertinent to trouble them with the Account of what they see transacted every Day. By this means the antient Customs, with the Time and Reasons of their Disuse, are lost with respect to us, and ours with the same Circumstances may come to be so with relation to Posterity.

Upon the whole Matter, the *Catacombs*, I humbly conceive, were the *Burying-places* of the antient *Romans*; at length the Manner of *Burning*, which they received from the *Grecians*, coming by Degrees to prevail universally, they fell under a total Neglect. This is the State in which the *primitive Christians* must be supposed to have found them. And therefore here they laid up the Bodies of their Dead; and perhaps when the *Persecution* was hot, concealed themselves, and kept little separate Assemblies in their Chambers. At last the Empire turning *Christians*, they fell again into the old State of Neglect, in which they continued till upon the Reading of I have forgot what Author that makes mention of them, they came to be looked into, and searched.

What I have writ relates to the *Catacombs* of *Rome*, those of *Naples* are a quite other Thing.

XXXVIII. I set out from *Venice* [in 1675] with those Gallies which carried their Ambassador that went for the *Port*. We touched at most of the considerable Towns of *Istria* and *Dalmatia* by the Way. In *Istria* we saw *Pola*, an antient Republick. There remains yet an *Amphitheatre* intire: It is of two Orders of *Tuscan Pillars*, placed one over another, and the lower Pillars stand on *Pedestals*, which is not ordinary; for commonly they have nothing but their *Bases* to support them. There is, besides a

*Observations
on a Voyage
from Venice
to Smyrna;
by Mr. Fr. Ver-
non. n. 124.
p. 575.*

Temple dedicated to *Rome* and *Augustus*, a *Triumphal Arch*, built by a Lady of the Family of the *Sergii*, in Honour of some of her Kindred, which commanded in those Countries; besides several *Inscriptions* and *antient Monuments* which are in divers Parts of the Town.

In *Dalmatia* I saw *Zabara*, which is now the *Metropolis* of the Country. It was antiently called *Jadera*. It is now very well fortified, being encompassed on 3 Sides with the Sea, and that Part which is toward the Land extremely advantaged by all the Contrivances of Art, having a *Castle* and a *Rampart* of very lofty *Bastions* to guide it. I found here several *antient Inscriptions*. We passed in Sight of *Zebenico*, and saw 3 *Forts*, which belong to the Town, *St. Nicolo*, *St. Gioggi*, and *La Fortezza Vecchia*. That which is most worth seeing in *Dalmatia*, is *Spalato*; where is *Dioclesian's Palace*, a vast and stupendous Fabrick, in which he made his Residence, when he retreated from the Empire. It is as big as the whole Town; for the whole Town is patched up of its Ruins, and is said by some to take its Name from it. The Building is massive; there is within it an intire Temple of *Jupiter*, eight-square, with noble *Porphyry Pillars* and *Cornice*, worth any body's Admiration. There is a Court before it, adorned with *Ægyptian Pillars* of that Stone called *Pyropoicilos*, and a *Temple* under it now dedicated to *St. Lucia*; and up and down the Town several Fragments of *Antiquity*, with *Inscriptions* and other Things worth taking notice of.

Four Miles from *Spalato* is *Salona*, which shews the Ruins of a great Town. About as much farther from *Salona* stands *Cliffa*, upon a rocky Hill, an eminent *Fortress* of the *Venetians*, which is here the *Frontier* against the *Turk*; from whence they repulsed him in their late Wars with great Honour. I was at *Lefina*, where is nothing very remarkable; but *Biondi*, that hath written our *English History*, was of it. *Trau* is antient, and hath good Marks of its being so. Here I spoke with Dr. *Stasileo*, who put out that *Fragment* of *Petronius Arbitr*; and I saw his *Manuscript*.

I was in the Harbour of *Ragusa*, but not in the Town. From hence we past the *Gulf* of *Budua*, and saw the Mountains of *Antivari*, the Plain of *Durazzo* and *Apollonia*, and came to *Saffino*, a small Island, from whence we could see the Town of *Valona*, and the Mountains *Acroceraunii*, which are very near, and are now called Mountains of *Chimæra*.

I staid a Fortnight in *Corfu*, and had Time to view the Gardens of *Alcinous*, that is, the Place where they are supposed to have been, now called *Chryfida*, a most delicious Situation; the antient Port, now called *Νικηθάλωσις*, and several Foundations of antient Fabricks. In *Zante* I saw but little of *Antiquity*: What is modern is very flourishing, and the Island rich and plentiful.

I went from *Zante* to *Patras*, a Town in *Achaia*, of good Note among the Antients. Near it is a great Mountain, mentioned by *Homer*, by the Name of *Petra Olenia*. In the Town are several massive *Ruins*, which few there know how to give an Account of. There are the *Remains* of a large Church, dedicated to *St. Andrea*, who, they say, was martyred there. This is the first Town I saw on the Continent of *Greece*.

The

The Plain about it is very fruitful, full of Springs and Rivulets, finely wooded with *Olive Trees*, *Cypresses*, *Orange* and *Lemon Trees*. The *Citrons* here are counted amongst the best of the *Turkish* Empire, and are sent for Presents to *Constantinople*. So are all their Fruits in very good Esteem.

In *Athens* I have spent two Months. Next to *Rome* I judge it the most worthy to be seen for *Antiquities* of any I have yet been at. The *Temple* of *Minerva* is as intire as the *Rotunda*. I was three times in it, and took all the Dimensions with what Exactness I could; but it is difficult, because the *Castle* of *Athens*, in which it stands, is a *Garison*, and the *Turks* are jealous, and brutishly barbarous, if they take Notice that any measure it. The *Length* of the *Cella*, or *Body* of the *Temple*,

Without-side is 168 { *Feet* } These Measures you may rely on as exact
The *Breadth* — 71 { *English* } to $\frac{1}{2}$ a *Foot*.

The *Portico* of the *Doric* Order, which runs round it, hath 8 *Pillars* in Front, 17 on the Sides; the *Length* of the *Portico* is 230 *Feet English*; the *Fuste* or *Shaft* of the *Pillars* is $19\frac{1}{2}$ *Feet* in Circumference; the *Inter-columnium*, $1\frac{1}{4}$ of the *Diameter* of the *Pillars*.

The *Temple* of *Theseus* is likewise intire, but it is much less, though built after the same Model. The *Length* of its *Cella* is but 73 *Feet*, the *Breadth* 26. The whole *Length* of the *Portico*, which goes round it, 123 *Feet*. It is a *Doric* Building, as is that of *Minerva*. Both of them are of *white Marble*.

About the *Cornice*, on the Outside of the *Temple* of *Minerva*, is a *Basso Relievo* of Men on Horseback, others in Chariots; and a whole Procession of People going to a Sacrifice, of very curious *Sculpture*. On the Front is the History of the *Birth* of *Minerva*.

In the *Temple* of *Theseus*, on the Front within-side the *Portico*, at the West-end, is the *Battle* of the *Centaur*s; and at the East-end seems to be a Continuation of that History. But there are several *Figures* of Women, which seem to be *Pirithous's* *Bride*, and those other Ladies which were at the *Wedding*. On the Out-side the *Portico*, in the Spaces between the *Triglyphi*, are several of the Prowesses of *Theseus*, most in *Wrestling* with several Persons, in which he excelled: All his Postures and Looks are expressed with great Art. Others are *Monsters*, which he is made encountering with, as the *Bull* of *Marathon*, the *Bear* of *Calydon*, &c.

There is a *Temple* of *Hercules*, a round *Fabrick*, only of 6 *Feet* Diameter, but neat *Architecture*. The *Pillars* are of the *Corinthian* Order, which support an *Architrave* and *Frise*, wherein are done in *Relievo* the *Labours* of *Hercules*. The Top is but one Stone, wrought like a *Shield*, with a Flower on the Out-side, which rises like a *Plume* of *Feathers*.

There is yet standing the *Tower* of *Andronicus* *Cirrhestes*, which is an *Octagon* with the *Figures* of 8 *Winds*, which are large, and of good Workmanship; and the *Names* of the *Winds* remain legible in fair *Greek* Characters (where a *House*, which is built against it on one Side, does not hinder), as ἀπυλιότης, εἰς, βορέας, σκίρων, (εἰς, each *Wind* placed against its

its

its Quarter in the Heavens; and the Roof is made of little Planks of *Marble*, broad at Bottom, and which meet all in a Point at Top, and make an obtuse *Pyramid* of some 32 or 36 Sides. There is a delicate *Temple* of the *Ionic Order* in the *Castle*, whether of *Pandrosos*, or whom, I cannot tell; but the Work was most fine, and all the Ornaments most accurately engraven.

The *Length* of this *Temple* was 67 } *Feet*.
 The *Breadth* — — — 38 }

The *Pillars* which remain of a *Portico* of the Emperor *Adrian*, are very stately and noble: They are of the *Corinthian Order*, and above 52 *Feet* in *Height*, and $19\frac{1}{2}$ in *Circumference*: They are *Cannellate*; and there are now standing 17 of them, with part of their *Cornice* on the Top. The Building to which they belonged I measured the *Area* of, as near as I could conjecture, and found it near 1000 *Feet* in *Length*, and about 680 in *Breadth*.

Without the Town, the *Bridge* over the *Ilissus* hath 3 *Arches* of solid Stone-work; the middlemost is near 20 *Feet* broad. There is the *Stadium* yet to be seen, whose *Length* I measured, and found it 630 *Feet*, near to what the precise Measure of a *Stadium* ought to be, viz. 625.

Towards the Southern Wall of the *Castle* there are the Remains of the *Theatre* of *Bacchus*, with the *Portico* of *Eumenes*, which is near it; the *Semidiameter*, which is the right Sign of the Semicircle which makes the *Theatre*, is about 150 *Feet*. The whole Body of the *Scene* 256. *M. de la Gailliotiere*, in that Book he hath written of *Athens*, hath made a Cut of a *Theatre*, which he calls that of *Bacchus*, which is a mere Fancy and Invention of his own, nothing like the natural one, which, by the Plan he has drawn of the Town, I judge he did not know.

Thebes is a large Town, but I found few *Antiquities* in it, excepting some *Inscriptions* and *Fragments* of the old *Wall*, and one *Gate*, which, they say, was left by *Alexander*, when he demolished the rest. It is about 50 *Miles* distant from *Athens*, as I judge.

Corinth is two Days Journey distant; the *Castle*, or *'Ανεκβενδο*, is standing, which is very large. The Main of the Town is demolished, and the Houses which now remain are scattered, and at a great Distance from one another. So is *Argos*, which to go round would be some 4 or 5 *Miles*, as the Houses now stand; but if they stood together, they would scarce exceed a good Village. *Napolo della Rumilia* is a large Town, and full of Inhabitants, and the *Basha* of the *Morea* resides there: It is but a very few Leagues distant from *Argos*.

Sparta is quite forsaken; and *Mestra* is the Town which is inhabited, 4 *Miles* distant from it. But one sees great *Ruins* thereabout; almost all the *Walls*, several *Towers* and Foundations of *Temples* with *Pillars* and *Chapiters* demolished: A *Theatre* pretty intire. It might have been antiently some 5 *Miles* in Compass, and about a *Quarter* of a *Mile* distant from the River *Eurotas*. The Plain of *Sparta* and of *Laconia* is very fruitful, and long, and well watered. It will be about 80 *Miles* in *Length*, as I judge.

The

The Mountains on the West-side of it very high, the highest I have yet seen in *Greece*; the *Maniotes* inhabit them. But the Plain of *Calamatta*, which antiently was that of *Messene*, seems rather richer.

Corone is very abundant in *Olives*. *Navarrino*, which is esteemed the antient *Pylos*, hath a very strong *Castle* fortified by the *Turks*, and is the best *Port* in all the *Morea*. *Alpheus* is much the best *River*, and the deepest, and with great Reason extolled by all the antient Poets, and chosen for the Seat of the *Olympic Games*, for it is very pleasant. The Plains of *Elis* are very goodly and large, fit to breathe Horses in, and for Hunting; but not so fruitful as those of *Argos* and *Messene*, which are all richer. The best Woods I saw in *Peloponnesus* are those of *Achaia*, abounding with *Pines* and *wild Pear*, the *Ilex* and *Esculus-Trees*, and, where there runs Water, with *Plane-Trees*.

Arcadia is a very goodly *Champaign*, and full of *Cattle*; but is all encompassed with *Hills*, which are very rough and unhewn. *Lepanto* is very pleasantly seated on the *Gulf*, which runs up as far as *Corinth*; and without the *Town* is one of the finest *Fountains* I saw in *Greece*, very rich in *Veins of Water*, and shaded with huge *Plane-Trees*; not inferior in any thing to the *Spring of Castalia* on *Mount Parnassus*, which runs through *Delphos*, except in this, that one was chosen by the *Muses*, and the other not, and poetical Fancies have given *Immortality* to the one, and never mentioned the other.

Delphos itself is very strangely situated on a rugged *Hill*, to which you have an *Ascent* of some 2 or 3 *Leagues*; and yet that is not a *Quarter* of the *Way* to come to the *Pike of Parnassus*, on the *Side* of which *Hill* it stands. It seems very barren to the *Eye*; but the *Fruits* are very good where there are any. The *Wines* are excellent, and the *Plants* and *Simples* which are found there very fragrant, and of great *Efficacy*.

About *Lebadia*, and all through *Bœotia*, the Plains are very fertile, and make Amends for the Barrenness of the *Hills* which encompass them; but in *Winter* they are apt to be overflowed for that Reason, and to be turned into *Lakes*; which renders the *Bœotian Air* very thick, and so were their *Sculls* too, if the Antients may be believed concerning them; tho' *Pindar*, who was one that sublimated *Poetry* to the highest *Exaltation*, and is much fancied and imitated in our Age, as he was much admired in his own, was born there; and *Amphion*, who was said to be so divine in his *Music*, that he ravished the very *Stones*, had Skill enough to intice them to make up the *Walls of Thebes*. So that not every thing that is born in a dull Air, is dull. These *Vales* I found much planted with *Cotton*, and *Sesamum*, and *Cumin*, of which they make great *Profit* and a great *Trade* at *Thebes* and *Lebadia*.

I went from *Thebes* into the *Island of Eubœa*, or *Negropont*, and saw the *Euripus*, which ebbs and flows much after the Nature of our *Tides*; only the *Moon*, and sometimes *Winds*, make it irregular. The *Channel* which runs between the *Town*, and a *Castle* which stands in an *Island* over-against it, is some 50 *Feet* broad, and there are 3 *Mills* on it, which shew all the *Changes* and *Varieties* that happen in the *Current*. Near the *Euripus*,

Vide Vol. II.

Cap. II.

Sect. VIII.

pus,

pus, and opposite to the Town, they shew a *Port*, which, they say, was *Aulis*; and it is not improbable, for it must be thereabouts. Between *Negropont* and *Athens* is a high Hill, called *Αγιομακισσι*, formerly very dangerous, but now guarded by *Albaneses*: It is Part of Mount *Parnasse*; and near it, on the Left-hand, lies Mount *Pentelicus*, from whence the *Athenians* antiently fetched their Stone, and now there is a Convent of *Calloiers* there, one of the richest of all *Greece*.

In going from *Athens* by Sea, I embarked in a Port which lies just by *Munichia*: That which they call *Porto Pyrao* lies behind it, a Mile distant, which is a large Port, able to contain 500 Vessels. There are the Ruins of the Town yet remaining, and of the *Walls*, which joined it to the City of *Athens*. I sailed by *Porto Phalero*, the antient Haven of *Athens*, which is rather a Road than a Port. I saw an Island called *Φαλλει*, where the *Athenians* had antiently *Mines*. I went ashore on the Promontory of *Sunium*, to view the *Remains* of the Temple of *Minerva*, which stood on it. Hence I sailed among the Isles of the *Archipelago*, *Macronesia*, *Thermea*, *Serphanto*, *Siphanto*, till I came to *Melo*. From *Melo* I sailed through the *Cyclades* to come to *Smyrna*. I passed by *Andros*, *Tenos*, *Mycone*, *Delos*, *Naxia* and *Paros* I saw at a Distance. We sailed near the Northern Cape of *Sio*, and the Southern of *Mitylene* or *Lesbos*, and so came into the Gulph of *Smyrna*. Within this Gulph stands *Burla*, near some small Islands, which is judged to be the antient *Clazomenæ*; *Foja*, which is the same with the antient *Phocæa*: Near this the River *Hermus* discharges itself into this Gulf.

A Voyage from England to Constantinople; by Dr. Thomas Smith. v. 230. p. 527. XXXIX. Aug. 3. 1668, we went on board the *Bezant* Yacht for the *Downs*, where we arrived the next Day in the Afternoon, and went on board the *Leopard* Frigate, Capt. O Bryan Commander, appointed to carry Sir Daniel Harvey, his Majesty's Ambassador, to the Port of the Ottoman Emperor at Constantinople.

Aug. 9. We sailed from the *Downs*, but were forced to an Anchor S. W. of the *South Foreland*: We carried a *Flag* upon our *Main-Top* after we came out of the *Downs*.

15. The Wind in the Afternoon at N. E. brought us by 7 of the Clock to the *Nefs*.

16. We were in the Morning athwart *St. Helen's Point* in the Isle of *Wight*.

17. In the Morning we got to the West of *Portland*; but about Noon, sailing over part of the *Race of Portland*, where we met with a tumbling Sea, we anchored at N. W. Part in the *Bay*, over-against the Point that looks towards *Weymouth*. We went ashore in the *Island*, which seems to be but one continued *Rock*, the *Soil* in several Places not being above 5 or 6 Inches deep, as I found by digging a Hole with my Knife; yet the Corn flourishing enough. The *Castle* consists of a double Fortification; we could not observe above 5 *Guns* mounted. They told us, that in the *Island* there was but one *Church* and 4 Villages. We weighed at 12 of the Clock at Night; but 18. the Wind blowing fiercely at W. we could not weather

ther the *Star Point* that Night. The Moon, upon its first emerging above the Horizon, seemed to have a Colour like burnt Brick, the Sky very cloudy; but some Rain falling, as she advanced higher and higher, she appeared more and more fiery.

19. We weathered the *Star Point* by Noon; and the 29th we got into *Plymouth Sound*. The *Citadel* is built upon a Rock, with large *Counter-scarps* and *Bastions*.

20. We weighed out of *Plymouth Sound*, and made the *Lizard*, a Promontory in *Cornwall*, before Night: The *Manacles*, several Rocks so called, we discerned very distinctly, it being then Low-Ebb, as also the *Land's-End*. The Wind blew fresh; and we observed the Waves in the Night-time, as if they had been liquid Fire, but palish.

25. We were full open with the *Bay of Biscay*. Several *Gulls* were hovering over the Surface of the Water, to catch Fish, which swam by in vast Shoals, at above 50 *Leagues* Distance from any Land. At other times I have seen several *Birds* floating upon the Water, which being driven by some Tempest from the Coast of *Spain* and *Portugal*, have been tired in their Flight, and so drowned. This happens frequently in the *Great Ocean*, where they meet with no Land to fly to in several *Hundred Leagues*; and sometimes even in the *Mediterranean*, in the Mid-Seas between the *Christian* and *Barbary Shores*. In blowing Weather, among other *Birds* flying cross, we saw a *Hawk* making to our Ship, then under good and swift Sail, which perched upon the *Round-Top* of the *Main-Mast*; which one of the Seamen espying, he presently run up the Shrouds, and brought down the *Hawk*, which made no Attempt to fly away, being quite spent.

27. We found ourselves, by our *Observations*, in the *Lat.* of 42 *Deg.* 17 *Min.* the Weather being excessive hot.

28. Dreadful Lightnings in the Clouds towards the Evening; after which great Dews fell; the Weather extreme hot.

30. This Morning we were surpris'd to see ourselves within 4 or 5 *Leagues* of the Shore, when we thought that we had been above 20. In the Afternoon we weathered the westernmost Isle of the *Burlings*; on the greatest of which, being, as we guessed, above *half a Mile* in Length, the *Portuguese* have built a *Fort*, to hinder the *Barbary* Pirates from Careening their Ships there, or taking in fresh Water. The Land of it very high. By it lie several Rocks. The other Islands are distant about a *League*: I told 5 of them; the greatest of which last lie somewhat inward to the Shore. For two Nights together, about this time (28 and 29) the Sky being very hazy, the Sun set in a Colour as *deep as Blood*, which was very astonishing. We were then in the *Lat.* of 40 *Deg.*

31. Betimes in the Morning we sailed by the *Rock of Lisbon*.

Sept. 1. In the Morning we made *Cape St. Vincent*. All along the Coasts, at the Distance of about 2 or 3 *Leagues*, are several *Watch-Towers* built to give Notice of *Pirates*.

5. In the Morning we weathered the Point of *Cadiz*, and came to an Anchor in the Bay of *Bulls*, about *half a League* from the great *Porgos*; and

in the Afternoon went on Shore. We were entertained by the *English Consul*, and carried by him to view the *Fortifications*, which are esteemed to be as regular as any in *Christendom*, built in the same Place where the Town had been attacked formerly by the *English*, under the Conduct of the Earl of *Essex*, in the Reign of Queen *Elizabeth*. Plays are usually here, as in other Parts of *Spain*, acted on a *Sunday*.

9. We sailed from *Cadiz*.

10. This Afternoon we were forced to anchor, not far from Cape *Spartel*, or *Sprat*, as the Seamen call it, not being able to weather the Point.

11. This Day we came to an Anchor in *Tangier Bay*.

Tangier lies within the Entrance into the *Strait* of the *Mediterranean*, in the *Latitude* of about 35 Deg. 36 Min. It is situated in the Bottom of a Bay, and is built on the Side of a Hill, overlooking the Sea, encompassed with high *Walls* to the Land-ward, and commanded by a strong *Castle*: The Heats would be very troublesome, but for the *Sea-breezes*, which cool and fan the Air. In the *Castle* I met with a *Roman Monument*, erected to the Honour of *P. Besius*, a great Officer and Soldier in *Trajan's* Time, who, among his other Titles, is there stiled, PRO. FIG. MAURITANIAE TINGITANAE [which since has been taken away, and presented to the University of *Oxon*, by Sir *Hugh Cholmondley*]. The *English* have two Churches here (though they only make use of one, the other being reserved against all Accidents), both of them very neat and convenient, though not to be compared with the *Church* of the *Portuguese*, retained still (according to the Articles of Agreement when the King of *Portugal* made over the right Title, and gave the Possession of *Tangier* to the Crown of *England*) by *Canons Regulars* belonging to it, which is very stately, and adorned with rich *Images*, and supported by *Marble Pillars*. Towards one End of the *English Church*, just by the *Vestuary*, which had been formerly a *Turkish Mosque*, and afterwards the *Chapel* of a Convent of *Dominicans*, is a *Monumental Stone Table*, with *Arabic Characters*, containing an Account of the Houses, Lands, and other Revenues belonging to it, set up in the 743d Year of the *Hegira*, that is, of *Christ* 1341. The *Mole* is in good Forwardness, they having gained above 200 Yards in the Sea, in order to the making a good and safe Harbour for Ships to ride in, which lie open to Wind and Waves, the outward Side to the Sea-ward somewhat sloping. *Old Tangier* lies at some little Distance, where they find very frequently, in Digging, several Pieces of *Roman Coin*.

13. We weighed out of *Tangier*, and turned into the *Strait*, though against the Winds. The Distance between *Gibraltar* (which gives Name to the *Straits*, and is joined to the Continent of *Spain* by a narrow *Isthmus*) and *Ceuta*, a well-built and strongly fortified Town, lying under the Hill *Alybe*, called so by the *Greeks*, which the Seamen commonly call, as do some *Spanish Writers*, *Apes Hill*, from the great Number of *Apes* which used formerly to haunt there (at which Places *Hercules* is feigned to have set up his *Pillars*), may be about six *Leagues*; though both Lands lying very high (for we saw the Clouds much below them) it does not appear

pear

pear in the Middle of the Current, out of a tall Ship, scarce half so broad.

15. A great Mist all the Sea over, so that we could scarce see three Lengths of the Ship, which began to vanish in the Afternoon; and then we descried the Cape of *Malaga*, at about 4 Leagues Distance, and came to an Anchor that Night. This City lies under an high Hill, and is the Seat of a Bishop, who is at this Time a natural Son of King *Philip IV.* of the Order of *St. Dominic*. Here the Merchants told us, that it had not rained for 7 Months together, except a Day or two for an Hour; and that the *Algerines*, who were then breaking with us, had not been able to have set a Fleet to Sea, if they had not been furnished with *Masts* from *England*. I only make a Query, Whether *Jews* or *Englishmen* were the Freighters?

16. The next Morning we weighed from *Malaga Road*, the Weather very hot. In the Evening, the Sea being quiet, we saw a great Number of *Tortoises* swimming above Water, several *Bottle-noses*, Fish of about 3 Yards long, and very thick, and *Hawks* flying over to the *Barbary Coast*. The Hills of *Granada* were seen plainly by us, though at a great Distance.

21. We passed by *Cape de Gata*; but the *Levant Wind* still blowing, having continued almost in that Point for above 2 Months, as we computed from what they told us at *Tangier*, we could make but little Progress in our Voyage.

25. Between 3 and 4 of the Clock in the Morning the *Tornado's* began to blow, and the Wind violent for the Time, with such continued Flashes of *Lightning* for several Hours, as that the whole Sky seemed to be on Fire, intermixed with terrible Claps of *Thunder*; after which followed great Showers of *Rain*.

28. We were athwart *Orlando's Gap*, within 2 Leagues of the Shore, the Wind now still, but a swelling Sea coming from the Westward; which is usual before a Wind, which drives the Waters before it. On *Michaelmas Day* we were up with the Island *Ivica* or *Ivise*, as the Mariners call it. The next Day at Noon we made the Island *Majorca*, situate over-against the Kingdom of *Valentia*, and came to an Anchor in a Bay of the City. In the Afternoon the Boat was sent on Shore, but the *Vice-Roy* would not give us a *Prattick*, not bringing a Patent from *Malaga*.

Oct. 1. The Secretary was sent with the King's Pass to the *Vice-Roy* to demand *Prattick*, who presently summoned the Officers of the *Sanità*. After long Debates and Delays they consented, and came to the *Mole* to receive him; he went directly to the Governor, to acquaint him, that we were ready to salute the City with what Number of *Guns* he pleased, if he would engage, upon his Honour, to give us as many. He replied, that he would give us 3 for 5; and wondered that we, being but a single Ship, should make such a Demand. The Secretary told him, that we were to be treated as an *Admiral*, having a *Flag* on our *Main-Top*, and that the Governor of *Malaga* had done it: To this he said, that *Majorca* was a Kingdom, and that he was the King's Representative, and that by reason

of the Miscarriage of his Predecessor, when *Monf. de Beaufort*, the *French Admiral*, was there, he had received strict Orders from *Madrid* not to do the like. The Secretary replied, that we had an Ambassador on Board, and had as strict Orders, and should answer as severely for the Breach of them. His last Answer was, That we might, with our *Sails loose*, keep before the Town till we had furnished ourselves with what we wanted. Upon receiving this Message, the *Ambassador* dispatched away one *Joseph Gabriel Cortez*, a *Spaniard*, but employed by the *English Merchants* trading to that Island, then on Board our Ship, to acquaint him, That when we were ready to go away, we would *loose* our *Sails*, and not before. We landed within the *Mole*; the Walk upon it is about 4 or 5 *Yards* broad; at the Extremity of which is a very large and stately Gate, which leads into the City. We went into the *Great Church*, somewhat wider than *Westminster Abbey*, but darkish within: The Portal very magnificent, adorned with several *Marble Statues* in *Niches*, one over another. The *High Altar* very plain, and unadorned: But others extraordinary rich and glorious. Not far from the City, are several Mills to grind their *Olives*, *Oil* being the great Commodity of the Island.

2. The next Morning we weighed, without taking any kind of Notice of the Town, sailing all along in Sight of the Island, which presented us with a pleasant and delightful Prospect; the Valleys, lying under the Hills, fruitful of Wine and Corn. The whole Island is judged to be about 60 *Leagues* in Compass, and in Length about 15. To the S. S. E. lie several little Islands, called the *Cabreras*; between which and *Majorca* we steered.

4. We were athwart *Port Maon* in *Minorca*, a fine level Country, having but one Hill in it.

5. We descried the Main-land of *Provence*.

6. We were over-against the Islands *Hieres*, and the High-land of *Thoulon*.

9. We were over-against the westernmost Parts of the *Alps*, which we distinctly saw at about 20 *Leagues* Distance, and appeared far higher than the Hills of *Granada*.

12. We came, in the Morning, to an Anchor over-against the *Mole*, and not far from the *Lantern* in *Genoa*. Having obtained *Prattick* of the *Maestri della Sanità*, after a little Demur about the *Salute*, the Senate being assembled, and some of them protesting upon their Honours, and ready to produce their Registers, that they never *saluted* the Ship wherein was an *Ambassador* of *France* or *Spain*, as not taking any Notice of the Person who did bear that Character, till they had first Intimation, that the Ship was arrived in their Port by its *saluting* the Town, it was agreed, that the Ship should *salute* the Town with 11 *Guns*, which they were to *answer*, as they did, with an equal Number: And, after a little Pause, they *saluted* the *Ambassador* with 19 more, which were *answered* with as many. After this, the *Duke* and *Senate* sent the Master of the Ceremonies to wait upon the *Ambassador*; who, going away, returned soon after with a Present of *Calves*,
Fowl,

Fowl, Wine, Sweet-meats, &c. and acquainted his Lordship, that they had deputed 6 of their Gentlemen to compliment him, and wait upon him; which Civility he thought fit to refuse, desiring to be *Incognito*. But however, going ashore, he was welcomed by the *Illustrissimi Signori*, the *Durazo's* two Brothers, the Elder of which had been *Ambassador* for the *Republick* in the Court of *England*, and the other at *Constantinople*, and by them carried to see the *Villas* out of Town. The Figure of *Genoa* is semi-circular, beginning from the *Lantern* westward, lying under an high Hill, upon the Rising of which the several Houses, built of *Marble*, afford a very fine Prospect, and add much to the Beauty and Glory of the Place. *Strada Nuova* perchance is the most stately Street in the whole World. The *New Church* of the *Anunciata*, built by the *Lomellini*, for curious *Painting*, rich *Altars*, and Exactness of *Architecture*, is incomparable. The *Steps* which lead up to it are so many, and of so large a Compass, being semi-circular, that they may contain about 1000 upon them at the same Time. The *Duome* also, and the *Church* of the *Theatines*, are very stately and curious.

14. In the Evening we set Sail from *Genoa*.

18. In the Morning we made the Island *Gorgonia*, about 9 *Leagues* from *Livorne*, a little round Island, with a Castle on the Top.

19. In the Morning we came to Anchor in *Livorne Road*, about a *Mile* from the Town. The *Road* is large and secure, especially to the Northward. The *Ambassador* kept on Board, the Governor refusing to salute the Ship first, though he had formerly saluted the *French*; pretending that every Convoy might carry a *Flag*; and alledging, that his Master, the *Grand Duke*, was as great and absolute as the *Republick* of *Genoa*, and that they had rather throw themselves upon the King of *England*, than do a Thing which might prove of such an ill Consequence. Sir *John Finch* his Majesty's *Resident*, together with Sir *Thomas Baines*, came from *Florence* to compliment the *Ambassador*, and immediately dispatched away a Courier to the *Grand Duke* about the *Salute*, who referred the whole Affair to the Governor; and he making a Protest, that he was ready to pay all the Respect which was due to the *Ambassador's* Character and Quality, upon the forementioned Pretensions, six Days after our Arrival, absolutely refused to salute the Ship first.

Livorne is the great Magazine of Trade for the *Levant*, being a *free Port*; Merchants of all Countries residing here, *Armenians* especially, and *Jews*, which latter enjoy great Privileges, without wearing any distinct *Mark* in their Hats or Habits, whereby they may be known. They are allowed the publick Exercise of their Religion: Their Synagogue large and handsome. The *Port* inward has a *Mole* for the *Duke's Gallies* and other small Vessels to ride in; the Entrance of which is chained up every Night. Hard by is the *Statue* of *Duke Ferdinand*, in *Marble*, raised upon an high *Pedestal*; under which are four *Slaves*, in *Brass*, in different Postures, very large, and above the ordinary Proportion, but done with exquisite and admirable Art. Two *Castles* to Sea-ward, well fortified; the

the Town *Walls* very high, and the four *Gates* strongly guarded: Below which is a *Ditch* of about 15 or 20 *Yards* over, and very deep. No Stranger is allowed to view the *Works*, nor Soldier permitted to come out of the *Castles*. About 4000 *Slaves* are there, as the Merchants told us, who are locked up in the *Bagno* every Night. The *Piazza*, where the Merchants meet, is adorned with *marble Pillars*, which sustain the *Portico's*; at the East End of which is the *Great Church*, whose Roof appears very glorious, having several *Circles* richly gilded, and painted with curious *Figures*. The broad Street is paved between two and three *Yards* on each Side with *Free-stone*.

27. In the Afternoon we weighed out of *Livorne Road*.

29. We were forced back by contrary Winds.

30. We weighed a second Time.

Nov. 5. At Evening we saw the *Eruptions* of Fire from *Stromboli*, which lies to the North-west of *Sicily*. Sometimes it flamed very bright, as a Bacon, at other Times there appeared only a glowing kind of *Light*, like that of an ordinary Star when the Air is thick and hazy. They say, that it flames most in rainy Weather.

6. In the Morning we were up within a *League* of it, and plainly perceived it to smoke. It is of a round Figure, and, as we gathered, may be about 3 or 4 *Miles* in Compass. Not far from it lie scattered several other Islands, called by the Antients *Æolix* and *Vulcanix*; among which are *Lipara*, a long flattish Island, and *Vulcannello*, which smokes most. This Afternoon we came to an Anchor in 8 Fathom Water, in the *Phare* of *Messina*, in the Mid-stream between *Scylla* and *Charibdis*; a violent Current setting against us, and the Wind not high enough, so as to be able to stem it. The Breadth of the Strait from *Messina* to *Rhegium* may be about a *League*. The Land is very high on the *Calabrian* Side, where are very steep Rocks, and great Depth of Water, above 150 *Fathom*, as they told us; but on the *Sicilian* Side, near the *Charibdis*, shoal Water, and usually an Eddy. On the Sandy Banks stands the *Phare*, or *Watch-Tower*. Several *Currents* meeting in this narrow Passage, cause a great *Ripling*, and the Waters are sometimes carried N. and sometimes S. The great Danger is, lest the *Current* drive the Ship on either Side. We have had no *Lightening* for seven or eight Nights together.

7. We sailed by *Ætna*, now called *Mongibel*, where the Sea widens 10 or 11 *Leagues* over. Now we see plainly the *Smoke* briskly issuing out of the *Crater*, the *Limbus* of which was all black. The uppermost Part of the Mountain was covered with *Snow*, except some Streaks of *Asbes*, as we judge, which lies as it were in a Gutter, spread here and there.

13. We were up with Cape *Modona*, the southernmost Cape of the *Morea*, and sailed by *Coron*. The Land very high, the Hills of *Arcadia* lying Eastward from us: The Weather excessive hot at this Time, as it is in *England* at *Midsummer*.

14. In the Evening we sailed between the Island of *Cerigo* and the *Mainland* of *Greece*, it being about 3 *Leagues* over to *Cape Angelo*.

15. We entered the *Arches*, and steered through the *North Chanel*, leaving *Melo* and *Antimelo* on the *Starboard Quarter*, at some *Leagues* Distance.

16. Betimes in the Morning we were athwart *Negropont*, and sailed between it and *Andros*. The *Bocca* lies S. W. and N. E.

17. We sailed by *Chios*, or *Scio*, which is very mountainous towards the Middle. It is about 4 *Leagues* distant from *Cape Caraboroun*, or the Cape of the *Black Nose*, as the *Turkish* Word signifies, which the Seamen, in their usual Way of corrupting Names, call *Cape Jobbernoale*, the *Corineum* of the Antients, a Promontory of the famous Mountain *Mimas*, which runs along the Southern Side of the Bay of *Smyrna*.

18. We got into the Bay of *Smyrna*, and came to an Anchor without the Castle, not far from *St. Jacomo's Point*, as the Seamen call it, or rather *Sangiac Point*. In the Evening we heard a great Howling of *Jacalls* upon the Hills.

20. The *Consul* with the *Nation*, accompanied with his *Drugger-Men* and *Janizaries*, in their Habits, together with several *French*, *Dutch* and *Genoese* Merchants, residing in that famous *Emporium*, came to the Village near the Castle, who there expected us with *Horses*. Upon our going Ashore the *Leopard* fired 51 Guns. We made about 140 *Horse*; and immediately upon our setting forth we rode, for about 3 *Miles* together, under the Hill, to the S. W. of *Smyrna*, the Places adjoining set thick with *Olive*, *Fig*, and *Almond* Trees. Afterwards we clambered over some rocky Ascents, but the *Horses* of the Country being sure-footed, we were in no Danger of falling. Some little Way we were forced to ride on the Sea-shore, and soon after came to the *Jews Burying-place*, whose *Monuments* lie flat upon the Ground. As soon as we entered into the City, we found the Streets full of *Greeks*, *Armenians*, *Turks*, and *Jews*, whom Curiosity had drawn together to see and observe our *Cavalcade*; the *English* Ships, which were in the Bay, firing their Guns as we passed near the Shore: And after 3 *Hours* riding the *Ambassador* was brought to the *Consul's* House, where Lodgings were provided for him.

Dec. 8. We took our Leave of *Smyrna*, being accompanied by the *Consul* and Merchants on Board the *London Merchant*, Capt. *John Hill* Commander, the *Leopard* being ordered to go no farther than *Smyrna*, it being feared in *England*, that if she had sailed up to *Constantinople*, the *Turks* might have pressed her for their Service in *Candia*, which they were then besieging.

20. We sailed between *Scio* and *Mitylene*.

21. We passed by *Lemnos*, and were up with the Island *Tenedos*, a fine Champaign Country, only with one Hill toward the Middle of it. The Castle to the N. E. Part of the Isle; over-against which lie three small Islands in strait Line. Here we came to an Anchor. We saw the Ruins of *Troas* at a Distance.

22. We

22. We entered the *Hellepont*, which may be about 2 *Leagues* and an *half* over. The *Castles* built upon the opposite Points of Land, about 11 or 12 *Years* before, after the great Defeat given the *Turkish Armata*, at the *Dardanels*, by the *Venetians*; Cape *Janizary* on the *Asian Side*; which, with the *Philæum*, makes a tolerable good Bay for ordinary Vessels. The *Narrowest Strait* of the *Hellepont* is at the two other *Castles*, Distance about 6 *Leagues*, where it may be about a *quarter* of a *Mile* wide. These the *Christians* call the *Dardanelli*; at which are situate the Towns *Sestus* and *Abydus*, famous in *Greek Poesy*. These *Castles* we *saluted* with our *Guns* and *Trumpets*, as we did the first; but each, whether out of *Pride*, or out of *Covetousness* to save the *Grand Signior's Powder*, returned us no more than 2 *Guns*. The *Wind* blowing very fair, we sailed into the *Propontis*.

23. We passed by *St. Stephano's Point*, where we had a full View of the *S. E. Angle* of *Constantinople*, which, being situated upon several *Hills* to a mighty Advantage, what with the *Cypress Trees* intermixed, and what with the *gilded Spires* of the *Mosques*, yielded us a very diverting and glorious Prospect. Passing by the *Seraglio Point*, which we *saluted* by a Discharge of several *Guns*, in the *Mid-Stream*, between it and *Tophana*, we came to an *Anchor*.

26. On *St. Stephen's Day* the *Ambassador* landed at *Galata* (having before been visited by the *Earl of Winchelsea*, and the *Merchants* residing there), and was received there by the *Chiaus Bashi* and the *Vairvod* of *Galata*, the *Janizaries* and *Chiaususes* attending, and was waited upon by them to his *Palace*. And soon after the *Kaimacam*, or *Governor* of *Constantinople*, sent an *Officer* to compliment him upon his *Arrival*, the *Grand Signior* being then at *Larissa* in *Thessaly*.

Jan. 2. The *Ambassadors*, old and new, went over to *Constantinople*, that *Morning* being assigned by the *Kaimacam* to give them *Audience*; the *Chiaus Bashi*, and other *Officers*, attending at the *Water-side* to receive them, *Horses* being brought thither for them and their *Followers* to mount. This *Kaimacam Jusuph*, a little old Man, had formerly been a *Page* of the *Chamber*, and *Chief Falconer*, and afterward *Basha* of *Silistria*. He entertained the *Ambassadors*, and their *Company*, with *Perfumes*, *Coffee*, and *Sherbet*, and distributed about 15 *Kostans*, or *Vests*, among them: After about an *Hours Stay* they took their *Leave*.

Being upon the *Coasts* of *Greece*, about *Aug.* or *Sept.* 1671, in the *Lat.* of 35 *Deg.* 33 *Min.* we found by our *Azimuth-Compass*, that we had *Westerly Variation* there 5 *Deg.* 22 *Min.*

The *Variety* of *Colours* of the *Sea-Water* at several times chiefly depends upon the *Wind* and *Weather*, and the *Reflexion* of *Light* upon it. Its usual and most natural *Colour* is a *deep Green*; but in cloudy and rainy *Weather*, the *Surface* of the *Water* appears *blackish*. Sometimes the *Water* is of a perfect *Azure Colour*, as we have observed for several *Weeks* in the *Mediterranean*. The *Sun* shining bright upon the *Water*, sometimes the upper *Part* of the *Wave* appears *purplish*, sometimes *reddish*, though in *Shallows*, perchance, it may receive this latter *Tincture* also from the *Sands* which

which lie under it. When the Wind has freshened, and the Ship has been under full Sail, I have observed the Waves, at the Head and at the Sides of the Ship, to appear with a *pale kind of Brighiness*; which I ascribe rather to the *Saline Particles* of the *Sea-Water*, which were then put into a violent Agitation, than to the *Spawn of Fish*, as some of our Company imagined.

Sailing toward the West of *Portland*, we saw several *Porpus's* playing with their Heads above Water; which I mention only, because the Seamen look upon them as Fore-runners of a Storm; the Wind soon after blowing very hard at N. by E. and afterwards arriving at *Constantinople*, the Wind blowing a stiff Gale at North, I observed, with a pleasant kind of Astonishment, good part of the *Propontis*, that is, from *Seraglio Point* toward the Islands, which lie against the *Bay of Nicomedia*, Eastward and South-East from us, as far as we could see, covered as it were with *Porpus's*, which appeared every where in great abundance. So that I am very apt to believe, that *Julius Solinus* is to be understood of *Porpus's*, and not of *Dol-*^{Polyhistor.}
Cap. 12.
phins, now properly so called, though that be his Word, speaking of the *Bosphorus* and *Propontis*: *Hæc profunda Delphinus plurimos habent*: And soon after, *ante omnia nihil Velocius habent Maria, sic ut plerumque transvolent vela Navium*. And I could not hear that any *Dolphins* are caught in those Seas by the *Greeks*, whose Poverty, added to the Love which their Nation has for *Fish*, and the Advantage arising thence, upon the Account of their solemn *Fasts* and *Abstinenes* from all *Flesh*, even to a wonderful Strictness and Scrupulosity, has made them excellent Fishermen.

2. *Constantinople*, formerly *Byzantium*, was by *Constantine the Great* Historical Ob-
called so after his own Name; who being mightily pleased with the beau-^{servations re-}
tiful and advantageous Situation of the Place between two Seas, and de-^{lating to Con-}
fended by narrow Straits on both Sides, removed the *Seat* of the *Empire* by Dr. Tho.
hither, and laid the Foundation of its future Splendor and Greatness. It was Smith. n. 152.
also by a special *Edict*, or Law, of the same Emperor, which he caused to p. 335.
be engraven on a *Marble Pillar*, placed near his own Statue on Horseback, Euseb. de Vita
in one of the *Piazza's* of his new-built City, called *Strategium*, where the Sol-^{Constantini.}
diers used to muster, as in the *Campus Martius*, called *Second* or *New Rome*, Socrat.
in Emulation of *Old Rome*, which he designed and endeavoured this should
equal in all things. Accordingly he endowed it with the same *Privileges*
and *Immunities*, and established the same Number of *Magistrates* and Or-
ders of People, and divided the whole Extent of it into 14 *Precincts* or
Regions, according to the Division of *Rome*. And the *Greek Writers* were
as elegant and extravagant in their Commendations of it; but the usual Ti-
tle in their ordinary Discourses and Writings, when they had Occasion to
mention it without any Flourish, was, ἡ βασιλεύουσα, or ἡ βασιλις: that is, the
Imperial City, to the same Sense with that of *Sidonius Apollinaris*; In Panegy.

*Salve, Sceptrorum Columen, Regina Orientis
Orbis, Roma, tui.*

Hæresi. 69.
Sect. 2.

The Country about it was afterwards called *Romania* in a limited and restrained Sense (for that *Romania* was antiently the same with *Orbis Romanus*, seems clear from *Epiphanus*), and the People *Ῥωμαῖοι*. But I suppose this was done till about the Middle Times of the Empire, when it began to decline. The *Greeks* still retain the Name: For if you ask any of the *Greeks*, born upon the Continent of *Thrace*, what Countryman he is? he answers forthwith, *Ῥωμαῖος*, *Romios*; for so they pronounce it. The *Turks* in like manner call a *Greek Christian* *Urum Gracur*, or the *Roman Infidel*, as they will call sometimes the *Emperor of Germany*, *Urumler Padisha*, or the *Emperor of the Romans*. Hence it was that the latter *Grecian Emperors* stiled themselves *Βασιλεῖς Ῥωμαίων*, Kings of the *Romans*; that is, such as were born in *Romania*, and the other Countries, which made up the *Eastern Division* of the *Empire*. Though perchance by this flourishing Title they pretended a Right to the Government of the *West*: Upon which vain Presumption they assumed also the Title of *Κοσμοκράτορες*, or *Emperors of the World*, as if they had been the true Successors of *Augustus*, and the *Western Emperors* Usurpers, whom they called, by way of Contempt and Indignation, *Ῥῆγες*, *Reges*, as *Luitprandus* informs us, in the Account of his Embassy to *Nicephorus Phocas*, and afforded the People of *Italy* no other Title than that of *Longobards*, or *Lombards*. The present *Greeks* call all the *Western Christians* *Λατίνοι* or *Φραγγοί*, *Latins* or *Franks*; the *Turks* only make use of the latter, when they speak civilly of us, and calling *Christianity* *Phrenkistan*, in the present *Greek* *Φραγγία*. The *Turks* now as proudly call *Constantinople* *Alempena*, or the *Refuge of the World*; where indeed seems to be a Medley of all or most Nations of 3 Parts of it, and of all Religions; which are allowed to be publicly profess'd and exercised every where throughout the *Empire*, except the *Persian*. For they look upon it as a Corruption of, and Deviation from the Rules and Doctrine of *Mahomet*, their great false Prophet; and therefore absolutely forbid it as repugnant to, and destructive of the Doctrine of Life and Salvation, as they speak. And accordingly they condemn with all imaginable Fury the Professors of it, who pretend to follow *Ali*, as *Seetaries* and *Apostates*, and entertain worse Opinions of them than of *Christians* or *Jews*, or *Infidels*. The *Persians* are not behind-hand with them in their Hatred and Disrespect, deriding them as gross and stupid, and looking upon them as little less than barbarous; Interest and Zeal for their several Tenets heightening their Differences so much, that in Time of War they destroy one another's *Moschs*. I remember that there was a great Discourse in *Constantinople* among the *Turks* concerning an impudent hot-headed *Persian*, who publicly, in the *New Mosch* built by the *Mother* of the present *Emperor*, asserted, That *Ali* was equal to *Mahomet*. But it seems he very luckily made his Escape out of their Hands; at which the *Priests*, and the more zealous *Turks*, were very much scandalized.

The *Greeks* have 26 *Churches* within the Walls of the City, besides 6 in *Galata*, of which I have given an Account elsewhere. They have also 2 *Churches* at *Scutari*, 1 at *Kadikui* or *Chalcedon*. So at *Staurosis*, *Chingilkui*,

gilkui, and several other Villages upon the *Asian* Shore of the *Bosphorus*, as at *BeskiTash*, *Ortakui*, *Chorouch Chesme*, which *Church* is dedicated to *St. Michael the Archangel*, *Jenikui* or *Neochorion*, *Therapia*, *Bujukdere*, and other Villages on the *European* Side. They have also a *Church* at *Haskut*, where is their *Burying-place*, and another near the *Bagno*, dedicated to *Saint Parasceve*. And at *Tatoula*, about a Mile from *Pera*, upon a Hill, which from the Name of the *Church* is thence called by the *Greeks* and *Franks*, *St. Demetrius's Hill*. Next to the *Holy Virgin*, *St. Demetrius* and *St. George* have most *Churches* dedicated to them.

The *Armenians* have not, if I remember aright, above 7 *Churches*; they being few in Number in Comparison of the *Greeks*.

The *Jews* may have in the City and Places adjacent between 20 and 30 *Synagogues*, this being the greatest Shelter of that accursed and contemptible People in the *Grand Signior's* Dominions, next to *Caire* and *Saloniki*; and I believe there may be about 20 or 30,000 Families of them. They are of great Use and Service to the *Turks*, upon account of their Brokage and Merchandize, and Industry in several Mechanical Trades. All these I look upon as Natives, or Slaves rather, each paying Money for his Head every Year. These *Jews* indeed very wisely collect this Tax among themselves, and, according to an Agreement made with the *Testerdar*, or *Treasurer*, pay a certain Sum in gros for their whole Nation residing there; by which Piece of Cunning they are great Gainers, and spare the Poor among them, less able to pay, by a Contribution of the Rich to make up the Sum. The *English* and *Dutch* *Embassadors* have their *Chapels* in their Palaces common to their respective Nations.

The *Churches* and *Chapels* of the *Western Christians* of the *Roman Communion* in *Galata*, are,

St. Peter's, belonging to the *Dominicans*, where is the famous Piece of *Madonna di Constantinopoli*, as the *Italians* call it, or of the *Blessed Virgin*, holding the *holy Child Jesus* in her Arms; which they pretend to be drawn by the Hand of *St. Luke*, celebrated by some of the latter *Ecclesiastical* Writers to have been a famous Painter. Out of Respect to this idle Tradition, the credulous and superstitious *Latins* and *Greeks* of the *Roman Communion* shew great Veneration to it, which otherwise hath little in it of Proportion, Art, or Beauty, to derive any Reputation upon the Designer, or upon his Work.

St. Francis, belonging to the *Conventual* Friers of the Order of *St. Francis*: The Ground of this, by the wise Conduct and Intercession of Cavalier *Molino*, the *Venetian Bailo*, after the Surrendry of *Candia*, upon the Peace made by the *Republick* with the *Grand Signior*, was procured to be restored, and a handsome *Church* rebuilt with the large Contributions of Money sent out of *Christendom*.

St. Benedict, belonging to the *Jesuits*, where is a rich Altar, curiously adorned with several Figures in *Mosaick*. This *Convent* was purchased for them by their great Benefactor *Henry IV.* of *France*.

St. Mary, belonging to the *Observantines*, or *Zoccollanti*, a Branch of the Order of St. Francis, so called from their going in *Zoccoli*, or *Wooden Clogs*.

The *Capuchins* have a little *Chapel* dedicated to St. George, hard by the *French Ambassador's Palace*.

St. Anne, a *Chapel* frequented by the *Pierots*.

St. Paul and St. Anthony were both taken away some Years since from the *Christians*, and turned into *Moschs*: The former of which is now known by the Name of *Arab Giamefi*, or the *Mosch* of the *Arabians*. Our Interpreters mentioned also to me the *Church* of St. John, which the *Turks* have seized upon for their Use; St. George, which the *Jews* are possessed of; and St. Sebastian, which was used to be visited chiefly on *Holy-Days*.

The North Wind blows for the most part at *Constantinople*, which must be ascribed to its Nearness to the *Euxine Sea*, which bears that Point from it. So that for want of Southerly Winds, Ships have been forced to lie a Month or Two sometimes near the Mouth of the *Hellepont*. This was taken notice of long since by *Eunapius*, in the Life of *Ædesius*, who ascribes the seldom blowing of the South Wind to the Situation of the Mountains; whereas it is checked and over powered by the Exuberance of the Vapours continually sent forth from the *Black and Great Sea*, as the *Greeks* call it in Comparison of the *Mediterranean*.

Condini de
Orig. Con-
stantinop.

The *Hellepont* is about 40 Miles in Length; and at the *Castles* of *Sestos* and *Abydos* the Strait may be about three Quarters of an *English Mile* over, or less.

The Length of the *Propontis* is about 150 Miles; both Shores may be seen in the Middle of it. In it are,

Cyzicus, an Island near the *Asian Shore*, to which it is joined by Two Bridges. It still retains its antient Name *Κυζικος*, and is the Seat of a Bishop; being inhabited by a considerable Number of *Greeks*.

Proconnesus, not far from the former; now, as for some Centuries past, called *Marmora*, from the excellent Quarries of *Marble* there found, the *Marmor Cyzenicum* also being famous in the Time of *Pliny*.

Besbycus, now called by the *Greeks* *Καλιμυρο*, or the *Good Haven*, not far from the Entrance into the Bay of *Montanea*, to the N. by E. The *Turks* call it *Imramle*.

There are several Islands over-against the Bay of *Nicomedia*, formerly called *Sinus Astacenus*, according to *Strabo*, about 6 or 7 Leagues from *Constantinople*.

Prote, so called, because they approach first to it, coming from *Constantinople*; to the South of this *Prencipe* and *Pytis*, which I take to be the same with *Pyrgos*, that lies inmost toward the Bay; *Chalcitis*, in modern Greek, *Chalce* or *Chalcis*; *Oxia* and *Platy*, to the North-West.

The *Seraglio* is at the extreme Point of the North-East Angle of *Constantinople*, where formerly stood *Old Byzantium*, within which, toward the Haven, is a stately *Kiosk*, or Summer-house, from whence the *Grand Signior* usually takes Barge when he passes into *Asia*, or diverts himself upon
the

the *Bosphorus*, at which Time the *Bostangi Bashi*, who hath the principal Care of the Emperor's Palace, and hath the Command of the *Bosphorus*, sits at the Helm, and steers.

The 7 Towers are the South-East Extremity.

The only Suburbs are to the North-West, along the Haven Side; for above the Hill, where the 3 Walls begin, lies an open Champaign Country, except that here and there, at considerable Distances, Farm-houses are scattered.

The Haven runs in from the West, and so opens East.

At the East end of *Galata* is *Tophana*, where they cast their Great Guns.

Pera and *Galata* have about 6 Gates to the Sea-ward. The whole Tract of Ground was antiently, before the Times of the Emperor *Valentinian*, who inclosed and fortified *Galata* with Walls and Towers, styled Περαια, or *Regio Peræa*, being *περαν τῆς πόλεως*, on the other Side of the City towards the North, which is the Reason of its Name, seated on higher Hills, and whose Ascent is most steep and difficult.

Our modern Geographers, such as *Mercator* and *Ortelius*, who herein follow *Ptolemy*, place *Constantinople* in the Lat. of 43 Deg. and 5 Min. the *Arabian* and *Persian* Astronomers, as *Abulfeda*, *Nassir Eddin*, *Ulugh Beigh*, and so the *πείχιμοι κανόνες* of *Chrysooccus*, translated out of the *Persian* Tables, place it more Northerly in 45 Deg. but by latter and better Observation it is found, that they have erred in assigning the Lat. of this City, as of several other Places. To salve these Differences, there is no just Ground of Pretence to say, that the Poles are moveable, and have changed their Situation since their Time; whereas it may better be imputed to their Want of due Care, or to their taking Things upon Trust, from the Reports of Travellers and Seamen, not having been upon the Places themselves; which is certainly to be said for *Ptolemy*, whose Observations, as to Places more remote from *Alexandria*, are far from being accurate and true. The learned Mr. *John Greaves* took the Height of the Pole at *Constantinople*, with a brass Sextant of above 4 Feet Radius, and found it to be but 41 Deg. 6 Min. But by the Observation we made in our Court-yard at *Pera*, with a very good Quadrant, we found it but 40 Deg. and 58 Min.

Vid. Vol. I.
Cap. VII.
Sect. XXV.

There is no Space between the *Propontis* and the Walls of the City, except just at the *Seraglio Point*, which may be 200 Paces in Length; where they have raised, on a Platform, a Battery for great Guns; but from the Point to the End of the Haven West, the Space to the Gates is unequal; in some Places about 20 Paces broad, in others 3 or 4 times as many more.

The Distance between *Constantinople* and *Chalcedon*, upon the opposite *Bitynian* Shore, may be about 3 or 4 Miles.

In the Walls are engraven the Names of several Emperors, who reigned about the Declension of the *Grecian* Empire, as *Theophilus*, *Michael*, *Basilus*, *Constantinus Porphyrogenitus*, by whose Care, and at whose Expence, the several Breaches, caused in them by Sea, or by Earthquakes, were repaired.

Kumkapi,

Kumkapi, or the *Sand-gate*, lies toward the *Propontis*: This the *Greeks* call in their vulgar Language, *Κονδοσκάλι*, *Contoscalium*, or the *little Scale*, or *Landing-place*. Here formerly was an Arfenal for Galleys, and other small Vessels, it being a convenient Passage over Sea. Over this Gate was anciently engraven a curious Inscription still preserved in that excellent Collection published by *Gruterus*.

Jedicula Kapi, or the Gate of the 7 Towers, so called from its Nearness to that *Acropolis*, is that, I guess, which the *Greeks* formerly called *Χρυσή*, or the *Golden Gate*, and by some late *Latin Writers* *Chrysea*; in *Luitprandus*, *Carea*, by a Mistake either of the Transcriber or Printer, for *Aurea*; for so certainly it must be mended. Over this Gate was this Inscription:

*Hæc loca Theodosius Decorat post fata Tyranni,
Aurea Secla gerit, qui Portam construit Auro.*

cited by *Sirmond*, in his Notes upon *Sidonius*. This Gate is in the 12th Region, and was also called *ωραι*, from its beautiful and curious Structure.

The *Gun-gate*, formerly called *Roman-gate*, not because it leads towards the Continent of *Romania* of *Thrace*, but from *St. Romanus*, where the last Christian Emperor was killed at the Assault, which the *Turks* made to force their Way into the City by it.

Near *Adrianople-gate*, is a fair large Mosch, called *Ali-bassa*, upon a Hill accounted the highest in the City.

The Distance between Tower and Tower in the upper Wall to the Landward may be about 90 of my Paces; the Space between that and the second Wall about 18 Paces over.

The Palace where the Lions, Leopards, and such like wild Creatures are kept (where I saw also several Jackals) was formerly, as the *Greeks* told me, a Christian Church dedicated to *Παναγία*, or the Blessed Virgin, where this Verse is still legible.

Κατὰ Σκυθῶν ἔπνδσας θερμὸν ἐν μάχαις.

There is no Tide or Running-back of the Water on any Side of the *Bosphorus* into the *Black-sea*, as some have imagined, whose Mistake might possibly arise hence, that the Wind being at North, and blowing hard, the Current sets more violently at such Times against the several Head Lands, jetting out into the Chanel, which admits of several Turnings, and so the Waters are forced back to some little Distance; or else because when the South Wind freshens and grows boisterous, it makes a high rolling Sea in *Propontis* and *Bosphorus*, and being contrary to the Current, gives a Check to it; so that it becomes less sensible, and is easily stemmed. Where it is narrowest, the Distance seems to the Eye to be scarce a Mile over from one Shore to another; where broadest, not much above a Mile and a half, unless

less where it runs into the deep Bays, which, by Reason of their Shallow-ness, only harbour Boats.

The Chanel certainly is natural, and not cut by Art, as some have idly fancied, not considering how the *Euxine Sea* should discharge itself otherwise of those great Quantities of Waters poured into it by the *Ister* and *Tanais*, now called *Don*, and the other Rivers, whereby it becomes less salt, even very sensibly to the Taste, than several Parts of the *Mediterranean*.

The Fish, by a strange kind of Instinct, pass in vast Shoals twice a Year, Autumn and Spring, through the *Bosphorus*, that is, out of one Sea into another; of which the *Greeks*, who live several Months of the Year upon them, take great Numbers, and supply the Markets at easy Rates; the Cormorants, and other ravenous Water-fowl, which the *Turks* will not suffer to be destroyed, or otherwise molested, preying also upon them.

The Weather in some Months is very inconstant, great Heats and Colds happening the same Day upon the Change of the Wind.

The Winters at *Constantinople* are sometimes extraordinary severe. I have heard it related by several old *Greeks*, as a thing most certain, that the *Bosphorus* was frozen over in the Time of *Achmed*, and that a Hare was coursed over it. It happened thus: That, upon a Thaw, huge Cakes of Ice came floating down the *Danube* into the *Black-Sea*, and were driven by the Current into the *Bosphorus*, where, upon the Return of the Frost, they were fixed so hard, that it became passable. In the Year 1669. there was Ice in the Haven, to the great Amazement of the *Turks*; and some were so frightened at this unusual Accident, that they looked upon it as a dismal Prodigy, and concluded that the World would be at an End that Year.

The *Aguglia* or *Obelisk* in the *Hippodrome*, is betwixt 50 and 60 Feet high.

The Historical Pillar in *Basso Relievo*, raised in Honour of the Emperors *Arcadius* and *Honorius*, may be in Height about 147 Feet.

Alexius Comnenus lies buried in the Patriarchal Church against the Wall, and his Daughter *Anna Comnena*, the Historian, who lived about the Year of Christ 1117. They pretend to shew there the Reliques of *St. Anastasia*, who suffered *Martyrdom* under the Emperor *Valerianus*, and of *St. Euphemia*, Virgin and Martyr, who lost her Life most gloriously, for Christ's holy Religion, at *Chalcedon*, under *Dioclesian*.

In *Sancta Sophia* there are Pillars so great, that a Man can scarce fathom them at twice. At the End of the Gallery, that joins the other Two, each about 30 of my Paces wide, there is a Piece of transparent Marble Two or Three Inches thick. In the North Gallery, upon the Pavement, is a reddish Sort of marble Stone, brought, as the *Turks* and *Christians* relate, from *Palestine*, on which they fable, that the Blessed Virgin used to wash the Linen of our Saviour.

I observed but one Step from the Body of the Church to the *Bema*, or Place where the Altar formerly stood.

The

The great Mosch at *Chafim-Bassa*, on *Pera* Side to the West, was formerly a Church dedicated to *St. Theodosia*.

Giangbir, a Mosch so called, upon a Hill at *Fondaclee* near *Tophana*.

In *Constantinople* there are several narrow Streets of Trade, closed up with Sheds and Pent-houses; which I suppose were in Use before the *Greeks* lost their Empire, and are the same with the *σκαπασοι και φρακτοι δ'εջμοι* in *Chrysaloras's* Epistle. But besides these Places, several Trades have their distinct Quarters. The Streets are raised, for the most part, on each Side, for the greater Convenience.

Not far from *Suleimania* is the House of the Aga or General of the *Janizaries*, which so often changes its Masters.

Pompey's Pillar, as the *Franks* erroneously call it, is of the *Corinthian* Order, curiously wrought, about 18 Foot in Height, and 3 in Diameter.

Beshiktash, a Village within Two or Three Miles of *Constantinople*, towards the *Bosphorus*, where lies buried the famous Pirate *Ariadin*, whom the Christian Writers call *Barbarossa*, who built here a handsome Mosch, having Two Rows of Pillars at the Entrance. The Captain *Bassa* usually, before he puts to Sea with his *Armata* or *Galleys*, visits the Tomb of this fortunate Robber, who had made several Thousand Christian Slaves, and makes his Prayers at the neighbouring Church for the good Success of his Expedition.

They reckon in the City above 100 publick Baths, every Street almost affording one. They are esteemed Works of great Piety and Charity, there being a continual Use of them, not upon the Account of Religion, but of Health and Cleanliness: For their Diet being for the most part hot spiced Meats in Winter, and crude Fruits in the Summer; their Liquor, Fountain-water, or Coffee; to which we may add their lazy kind of Life (for Walking is never used by them for Digestion, or otherwise in the way of Diversion), frequent Bathing becomes necessary.

There are several Receptacles of Water under Ground, and one particularly under the Church of *Sancta Sophia*, as I was informed; but I did not think it worth my Curiosity to descend into it. These were of great Use to the poor *Greeks* in the last fatal Siege; but the *Turks* are so secure, that they do not think that they deserve either Cost or Pains to keep the Waters sweet, or the Cisterns in repair.

The Aquæducts, which answer to those glorious Aquæducts near *Pyrgos*, and convey the Water to the great Cistern near Sultan *Selim's* Mosch, are in that Part of *Constantinople* which lies between the Moschs of *Mahomet the Great* and *Sha-zade*.

The *Turks* began to besiege *Constantinople* on the 5th of *April*, and took it the 29th of *May*, on *Whitsun-Tuesday* Morning, 1453. or as the *Turks* reckon, in the Year 857. of the *Hegira*, or Flight of *Mahomet*, the 22d Day of the First *Jomad*.

The Chapel where *Ejub Sultan* is interred, at whose Head and Feet I observed great Wax-candles, is inclosed with Latten Wire-grates, for the better Accommodation of such religious *Turks* as to come to pay their
Respect

Respect to the Memory of this great *Mussulman Saint*. In the Middle of the *Area* there is raised a Building sustained by excellent *Marble Pillars*, ascended by two several Pair of Stairs, where the *new Emperor* is inaugurated, and where he usually goes in *Biram* Time.

3. *Montanea*, formerly called *Nicopolis*, according to *Bellonius*, or rather *Cios*, the Bay hence called *Sinus Cianus*, lies in the Bottom of a Bay about 80 Miles from *Constantinople*, and is the *Scale* or Land-place for *Prusa*, from which it may be about 12 Miles; in the middle Way to which is the Village *Mouffanpoula*.

Prusa, now called, by the *Turks*, *Bursia*, the chief City of *Bythynia*, is seated at the Foot partly, and partly upon the Rising of the Mount *Olympus*, which is one of the highest Hills of the *Lesser Asia*. Its Top is covered with *Snow* for 9 or 10 Months of the Year, several Streams of Water flowing down the Hills continually, accounted very *unwholsome* from the *Snow* mixed with it. In the upper Part of the City, to the North-West, lies the *Seraglio*, which is walled round; but the Emperors not residing here since their Acquists in *Thrace*, or scarce making Visits to this Imperial City; and none of their Sons living here of late, according to the former Policy of the *Turkish* Emperors, who did not permit their Sons when grown up to be near them, but sent them to some honourable Employment, accompanied with a *Bassa* and *Cadi*, to instruct them in the Arts of War and Government, it lies now neglected and despoiled of all its Ornaments.

An Account of Prusa in Bithynia, and the Observations in Turkey continued; by Dr. Tho. Smith. n. 155. p. 431.

In this Part also are the *Sepulchres* of *Osman*, the Founder of the Family which now reigns, and his Son *Urchan*, who took the City, near a *Mosque*, formerly a Christian Church, dedicated to *St. John*, and where was formerly a *Convent* of Religious, built by *Constantinus Iconomachus*, where I saw the Figure of a *Cross* still remaining upon the Wall. Here hangs up a Drum of a vast Bigness, such as they carry upon the Backs of *Camels*, and I suppose is one of those which they used in taking of the Place.

In the lower Part, near the Bottom of the Hill, *Morad II.* the Father of *Mahomet the Great*, lies buried, near whereunto was formerly the *metropolitan Church* of the *holy Apostles*. The *Bezesten*, or *Exchange*, seems to be much better and larger than the great one at *Constantinople*; as are several *Caravanseras* built for the Use and Accommodation of Merchants and Travellers.

Without the City, toward the East, is the *Mosque* and *Sepulchre* of the Emperor *Bajazid the First*, whom the *Turks* call *Jilderim*, or *Lightning*, and the *Greek Writers* $\Delta\alpha\iota\tau\alpha$. Not far from hence is the *Mosque* of *Mahomet the First*, and his *Sepulchre*. Toward the West, upon the Side of the Hill, is the *Mosque* of *Morad the First*, whom they call *Gazi*, or the *Conqueror*, near which he lies buried. There are in the whole about 124 *Mosques*, several of which were formerly Christian Churches, and between 50 and 60 *Cbanes*. The *Castles* built by *Osman*, when he besieged the City, are slighted and unfortified, the one to the North, the other to the South-West.

At *Cbeckenhe*, about a *Mile* and an *half* out of *Town*, are the *Hot-Baths*, much frequented both by *Christians* and *Turks*. They are made very convenient to *bathe* in; and are covered over, that they may be used in all *Weathers*. Among others there is a large round *Basin*, where they usually divert themselves by *Swimming*.

What *Opinions* the *Turks* have of our *blessed Saviour* and the *Christian Religion*, I shall briefly shew, as they lie dispersed in several *Chapters* of their *Alcoran*, according to which they frame their *Discourse* whensoever either their *Zeal* or *Curiosity* puts them upon this *Topick*. For *Mahomet*, upon his setting up to be the *Author* of a *new Religion*, finding such a considerable *Part* of the *World* professing the *Doctrine* of *Christ*, with all the *Mysteries* of *Faith* therein contained, was cast upon a *Necessity* of saying something both concerning *Him* and *It*. By which it will appear, how great the *Power* of *Truth* is above *Imposture* and *Subtily*, and that as the *Devils* in the *Possessed* confessed, though against their *Wills*, *Christ* to be the *Son of God*, so this *Demoniack*, in the midst of all his *Forgeries* and *Lies*, and ridiculous and childish *Narratives*, not being able to contradict the universal *Belief* of the *Christians* of that and the preceding *Ages*, founded on the *History* of the *Gospel*, hath been forced to give *Testimony* to several *Particulars* of it.

They confess, that *Christ* was born of a pure spotless *Virgin*, the *Virgin Mary*, chosen by *God*, and sanctified above all *Women* in the *World*; and that the *Angel Gabriel* was dispatched out of *Heaven* to acquaint her with the *News* of it. That such a kind of miraculous and supernatural *Birth* never happened to any besides, and that *Christ* was conceived by the *Holy Ghost*, and that he wrought mighty *Miracles*, for instance, That he cleansed *Lepers*, gave *Sight* to the *Blind*, restored *sick* Persons to their *Health*, and raised the *Dead*. That he is a great *Prophet*, sent by *God* to convert *Men* from the *Vanity* and *Error* of their false *Worship* to the *Knowledge* of the *true God*, to preach *Righteousness*, and to correct and restore the *Imperfection* and *Miscarriages* of *Human Nature*. That he was of a most *holy* and *exemplary Life*. That he was the *true Word* of *God*, the *Apostle*, or *Ambassador* of *God*. That his *Gospel* was revealed to him from *Heaven*, and that he is in *Heaven*, standing nigh to the *Throne* of *God*. They blaspheme indeed, with a *Brutishness* and *Stupidity* only befitting *Turks*, the *Mysteries* of the *Holy Trinity*, and of the *Divinity* of our *blessed Saviour*, and deny that he was *put to Death*, and say that another in his *Shape* was *crucified* by the *Jews*, and that he himself was assumed into *Heaven* in his *Body* without *dying* at all; and consequently they will not own, that he satisfied *divine Justice* for the *Sins* of the *World*: So great an *Affinity* is there between the *Herefy* of *Socinus* and professed *Mahometanism*.

I could never yet see any *Turkish Translation* of the *Alcoran*; they cry up the *Elegance* of the *Style*, which being *Enthusiastick* and high-flown, by *Reason* also of the *Tinkling* of the *Periods*, is very delightful to their *Ears*, who seem to be affected with *Rhyme* mightily. Though, I suppose, it is upon a more *politick Account* that they are so averse, as to the *translating*

flating it into their vulgar Language, not out of Respect to the Sacredness of the Original only, whose full commanding Expressions they think cannot be *translated* without a great Diminution to the Sense, but to keep it in greater Veneration among the People, who might be apt to slight and disesteem it, should it become thus common amongst them. It is enough that the *Priests* and *learned Men* explain the difficult Passages of it to the People, and write Commentaries for the Use of the more curious and inquisitive. The *Persians*, on the contrary, think it no Disparagement to the *Arabic*, or Profanation of the Sense, to *translate* this cursed Book into their own Language; and Copies are frequent among them.

The *Grand Signior's Women* are usually the choicest Beauties of the *Christian* Spoils, presented by the *Bassa's* or *Tartars*. The present *Sultana*, the Mother of the young Prince *Mustapha*, is a *Candiot*; the *Valide*, or Emperor's Mother, a *Russian*, the Daughter of a poor Priest, who with her Relations were seized upon by the *Tartars*, in an Incurfion which they made into the *Muscovites* Country. She being received into the *Seraglio*, by her beautiful Complexion, and cunning Behaviour, gained the Heart and Affection of Sultan *Ibrahim* (a Man wholly addicted to soft Pleasures, and who seldom cared to be long absent from the Womens Apartment, but chose to spend his Time among them). Having the good Fortune to be the Mother of Prince *Mahomet*, the eldest Son of his Father, who now reigns, she had all the Honours that could possibly be done her, and was the beloved *Hazaki*, or Chief Concubine. During this Height of Splendor and Glory, the Court removing from *Constantinople* to *Adrianople*, distant about 120 Miles, as she was passing in great State, attended with her Guards through the Streets of the City, in a Coach much like our Carriage-Waggons, but that they are latticed to let in the Air (for no one must presume to stare, or scarce look upon the Women, much less must they themselves suffer their Faces to be seen in this jealous Country), she out of Curiosity looking through the Holes, saw a poor Christian Slave in a Shop where Sugar and such-like Wares were sold. Upon her Return she sent one of her *Eunuchs* to inquire for the Person, and to ask him several Questions about his Country, Relations, Friends, and the Time when, and how long he had been a Slave: His Answers were so particular and satisfactory, that she was soon convinced of the Truth and Certainty of her Apprehensions, when she first cast her Eyes upon him, that he was her Brother, and accordingly it proved so. Whereupon acquainting the Emperor with it, she immediately redeemed him from his Patron, and having made the poor Wretch turn *Turk*, got him considerably preferred.

The *Bassa's* for the most part are the Sons of *Christians*, taken into the *Seraglio*, near the Emperor's Person, and so are preferred to considerable Governments, or else they raise themselves by their Conduct and Valour. *Mahomet Bassa*, in the Time of *Achmet*, whose eldest Daughter he married, was the first natural *Turk* that was made *Chief Vizir*, having before been *Captain Bassa*. The *Chief Vizir*, *Mahomet Kupriuli* (who settled the Empire in the Minority of this Emperor, when it was ready to be shaken in

Pieces, and dissolved by several powerful Factions in the State, and by the Mutinies and Discontents of the *Janizaries* and *Spahi's*, who drove different Ways) was an *Albanese* by Birth, the Son of a *Greek* Priest, whom, out of the Height of his Zeal for *Mahomet*, he made turn *Turk* in his old Age, and converted the *Christian Church* in the Village where he was born, into a *Mosque*. This Man also forbid the *Dervises* to dance in a Ring, and turn round, which before was their solemn Practise at Set Times before the People, which they would do so long, till they were giddy by this swift circular Motion, and fell down in a Swoon, and then oftentimes, upon their Recovery from such Trances, they pretended to *Revelation*. The Church-men are not very kind to his Memory, looking upon him as a Man of little or no Religion; and they give out, that if he had lived, he would have forbid their calling to Prayers from the Spires of their *Mosques*, and hanging out Lamps; both which they look upon as solemn and essential to the Exercise of Religion, but he, as the Effect of Bigotry and Superstition.

They have a mighty Honour and Esteem for *Physicians*, for though they are of Opinion, that they cannot with all their Art prolong Life, the Period and Term of it being fatal and absolutely determined by God, yet they often consult them upon any violent Sickness or Pain, in order to make the Time allotted them in the World more pleasant and easy. It is extraordinary rare, that a *natural Turk* makes Physick his Profession and Study. They who practised it among them, when I was in *Turky*, were for the most part *Greeks* and *Jews*, who know nothing of chymical Medicines, but follow the usual Methods which they learned in *Italy* and *Spain*, the former having studied in *Padua*, and the latter in *Salamanca*, where they passed for good *Catholicks*; and I remember I met with a certain *Jew Physician*, who had been a *Capuchin* in *Portugal*. During the tedious Siege of *Candia*, the *Vizir*, what with Melancholy, and what with the ill Air of the Camp, finding himself much indisposed, sent for a *Christian Physician*, Signior *Massalim*, a Subject of the Republick of *Venice*, but married to a *Greek Woman*, to come speedily to him, and made him a Present of about 1000 *Dollars*, in order to fit himself for the Voyage, and bear the Expence of it. By this worthy Gentleman's Care, he recovered his Health, and would not permit him to depart till after the Surrendry of that City, which might be about 7 Months after his Arrival there, treating him in the mean while with all imaginable Respect. During our short Stay at *Bursia*, one of our *Janizaries* accidentally discoursing with a *Turk* about us, whom they knew to be *Franks*, told him, that there was a Physician in the Company who had been lately at the Grand Signior's Court at *Salonoki*, with the *English Ambassador*, and was now upon his Return from *Constantinople* to *Smyrna*, where he lived. This presently took Vent, and the *Turks* thought that they had got a Man among them that could cure all Diseases infallibly; for several came immediately to find us out on behalf of themselves or their sick Friends; and one of the most considerable Men upon the Place desired the *Doctor* to go to his House, to
visit

visit one of his Women sick in Bed ; who being permitted to feel her naked Pulse (for usually they throw a Piece of fine Silk or Curle over their Womens Wrists at such Times), soon discovered by that, and other Symptoms and Indications of her Distemper, that *opening a Vein* would presently give her Ease, and recover her ; which he did accordingly, for which he received an embroidered Handkerchief instead of a Fee, and gained the Reputation of having done a mighty Cure.

They have little of ingenious or solid *Learning* among them ; their chief Study, next to the *Alcoran*, being *Metaphysical* Niceties about the Attributes of God, or else the Maintenance of odd speculative Notions and Tenets, derived down to them from some of their famed Masters and holy Men, whom they pretend to follow. Their Knowledge of the *Motion of the Heavens*, for which the *Arabians* and other *Eastern Nations* have been so deservedly famous, as their *Astronomical Tables* of the *Longitude* and *Latitude* of the *fixed Stars*, and of the *Appulse* of the *Moon* to them, fully evince, is now very mean, and is chiefly studied for the Use of *Judiciary Astrology*. The great Instrument they make use of is an *Astrolabe*, with which they make very imperfect *Observations*, having no such thing as a *Quadrant* or *Sextant*, much less a *Telescope*, or any mechanical Engine, to direct and assist them in their Calculation.

Their Skill in *Geography* is as inconsiderable : I remember I heard the *Captain Bassa*, whom they stile *Admiral* of the *Black* and *White Seas*, meaning the *Euxine* and *Mediterranean*, ask this silly Question, Whether *England* was out of the *Straits* ? And, at another Time, the *Caimacan* or *Governor* of *Constantinople*, hearing that *England* was an Island, desired to know how many Miles it was about, in order, we supposed, to make an Estimate of our King's Greatness and Strength by the Extent and Compass of it.

One of the great *Astrologers* of *Constantinople* having heard that I had a Pair of *Globes* in my Chamber, made me a Visit on purpose to see their Contrivance, being introduced by a worthy Gentleman of our own Nation. After the first Ceremonies were over, I took my *Terrestrial Globe*, and rectified it to the Position of the Place, and pointed to the several *Circles* both without and upon it, and told him in short the several Uses of them ; then shewed him how *Constantinople* beared from *Candia* (at that Time besieged), *Cair*, *Aleppo*, *Mecca*, and other chief Places of the Empire, with the other Parts of the World ; at which he was mightily surpris'd to see the whole Earth and Sea represented in that Figure, and in so narrow a Compass, and pleas'd himself with turning the Globe round several times together. Afterwards I set before him the *Celestial Globe*, and rectified that, and shewed him how all the noted *Constellations* were exactly described, and how they moved regularly upon their *Poles*, as in the *Heavens* ; some rising and others setting ; some always above the *Horizon*, and others always under, in an *oblique Sphere*, and particularly what Stars would rise that Night with us at such an Hour. The Man seem'd to be ravish'd with the Curiosity of it, turning this Globe also several times together

gether with his Finger, and taking a mighty Pleasure in viewing the Motion of it; and yet this silly Animal past for a *Conjurer* among the *Turks*, and was looked upon as one that could foretel the Events of Battles, and the Fates of Empires, and the End of the World.

They have no Genius for *Sea-Voyages*, and consequently are very raw and unexperienced in the Art of *Navigation*, scarce venturing to sail out of Sight of Land. I speak of the *natural Turks*, who trade either into the *Black Sea*, or some Part of the *Morea*, or between *Constantinople* and *Alexandria*, and not of the Pirates of *Barbary*, who are for the most part *Renagadoes*, and learn their Skill in *Christendom*, which they exercise so much to the Terror and Damage of it. A *Turkish Compass* consists but of 8 *Points*, the 4 *Cardinal* and 4 *Collateral*; they being at a mighty Loss how to sail by a Side-Wind, when, by hauling their Sails *sharp*, they might lie their *Course*, and much more when they are in the *Wind's Eye*, not knowing how to make *Tacks* and *Boords*, but choose rather to make haste into some neighbouring *Port* till the Wind blows *fair*.

They trouble not themselves with reading the *History* of other *Nations*, or of antient Times, much less with the Study of *Chronology*, without which *History* is very lame and imperfect; which is the Cause of those ridiculous and childish Mistakes which pass current and uncontradicted among them. For instance, they make *Job* one of *Solomon's Judges*, and (*Iscauder*) *Alexander the Great*, *Captain General* of his Army. They number *Philip of Macedon* among the *Ancestors* of our *blessed Saviour*, and believe that *Sampson*, *Jonas*, and *St. George* were his Contemporaries. In this they are more excusable than their false Prophet *Mahomet*, who, in his *Alcoran*, has perverted several *historical* Notices in the Writings of the *Old Testament*, and is guilty of vile and absurd *Pseudo-Chronisms*. To remedy this Defect, of which he was very conscious, and the better to understand the State of *Christendom*, and the particular Kingdoms and Republicks of it, the late *great and wise Vizir Achmet* made his Interpreter *Panagiotti*, a learned *Greek*, at leisure Hours, even at the Siege of *Candia*, as well as other Times, read several antient *Histories* to him, and render them *extempore* into the *Turkish* Language, and particularly *Bleau's Atlas*, with which he was mightily pleased, and made great use of, and truly gained the Reputation of a solid and judicious *Statesman*, as well as *Soldier*, among the *Christian* Ministers, who in the ordinary Course of their Negotiations applied themselves to him.

Though their *Year* be according to the *Course* of the *Moon*, and so the *Turkish Months* run round the *Civil Year* in a Circle of 33 *Years*, and a few odd *Days*, yet they celebrate the *Neuruz*, which signifies, in the *Persian* Tongue, the *New Year*, the 21st of *March* (on which Day the *Vernal Equinox* was fixed by the *Greeks*, and other *Oriental Christians*, in the Time of the Emperor *Constantine*, who made no Provision for *αποσηνησις ισημεριων* or *Procession*, which in Process of Time the Inequality between the *Civil* and *Astronomical Year* must necessarily produce) at which Time the *Cadies* and other *annual Magistrates* and *Farmers* of the *Customs* take place, and reckon to that *Day Twelve-Month* again. In

In their *civil* Department and Behaviour one towards another, the *Left Hand* is the more worthy and honourable Place, except among their *Ecclesiasticks*; and the Reason they alledge is, because they *write* from the *Right Hand*, and the *Sword* is worn on the *Left Side*, and so is more at his Disposal who walks on that Hand. The *Chief Vizir* accordingly in the *Divan* sits on the *Left Hand* of the *Musti*, each maintaining their Right of Precedence according to this Way of Decision.

In their *Mosques* they sit without any Distinction of Degrees.

Some of the more zealous *Turks* cause to be engraven on their *Scimiters* and *Bucklers* a *Sentence* out of the 61st *Surat*, which is concerning *Fighting*, or *Battle Array*, and contains Encouragement to *fight in the Way and Path of God*, as the Impostor words it; for which he assures them, besides Assistance from Heaven, to help them to get the Victory over their Enemies, and that *God* will *pardon their Sins*, and bring them to *Paradise*. Thus spirited with Zeal, a *Turk* lays about him with Fury when he is a Fighting, and seems ambitious of *dying*, to gain the Delights of *Paradise*, at least indifferent whether he *dies* or *lives*.

The *Turks* are, as to their *Temper*, serious, or rather inclining to Morosity, seldom Laughing, which is accounted an Argument of great Vanity and Lightness. They perform the Exercises which they use in the Way of Diversion, as Shooting and Hunting, with a great deal of Gravity, as if they designed them more for Health than for Pleasure, and this too but seldom. The better and richer Sort, who have nothing to do, sit all Day at home, lolling upon a *Sofa*, or *raised Place* in their Rooms, and taking *Tobacco*, which their Slaves fill and light for them; and if they retire in the Summer or Autumn for a Week or Fortnight, to some convenient Fountain in a Wood, with their Women, it is chiefly to enjoy the Refreshments of the cool Air. In Times of *Triumph*, indeed, for some great Success obtained against the *Christians*, when the Shops are open for three Nights together, and hung with *Lights* as well as the *Spires* of the *Mosques* in curious *Figures*, they are guilty of extravagant Mirth, running up and down the Streets in Companies, and sometimes Singing and Dancing after their rude way; but this Fit being over, they soon return to their former *Melancholy*. In the *Coffee-Houses*, where they use to resort to tittle, there is usually one hired by the Owners, to read either an idle *Book of Tales*, which they admire as Wit, or filthy obscene Stories; with which they seem wonderfully affected and pleased, few of them being able to read. These are the *Schools* which they frequent for their Information; though in Times of War, when Things went ill with them, their Discourses would be of ill Government; and the *Grand Signior* himself, and his Chief Ministers, could not escape their Censures; which manifestly tending to Sedition, and to the heightening of their Discontents by their mutual Complaints, and by this free venting of their Grievances during the War at *Candia*, the wise *Vizir*, seeing the evil Consequences that would follow, if such Meetings and Discourses were any longer tolerated, commanded that all the publick *Coffee-Houses* should be shut up in *Constantinople*, and several other great Cities of the Empire, where the Malecontents used to rendez-

rendezvous themselves, and find Fault upon every ill Success and Miscarriage, with the Administration of Affairs.

That *Custom* of the *Turks* to salute the *Emperor*, or the *Vizir Bassa's*, with loud Acclamations and Wishes of Health and long Life, when they appear first in their Houses, or any publick Place, is derived from the *Greeks*, who took it from the *Romans*. This was done, by them in a kind of singing Tone; whence *Luitprandus*, Bishop of *Cremona*, tells us, That in a certain *Procession* (παραγωγίς) at which he was present, they sang to the *Emperor Nicephorus* πολλά ἔτη, that is, *Many Years* (which *Codinus*, who lived just about the taking of *Constantinople* by the *Turks*, expresses by τὸ ψάλλειν τὸ πολυχρόνιον, or by τὸ πολυχρόνιζειν, and the *Wish*, or *Salute*, by πολυχρόνισμα) and at Dinner the *Greeks* then present wished with a loud Voice to the *Emperor* and *Bardas*, ut Deus Annos Multiplicet, as he translates the *Greek*.

The *Turkish Coin* in itself is pitiful and inconsiderable, which I ascribe not only to their want of *Bullion*, but to their little Skill in Matters relating to the *Mint*. Hence it comes to pass, that *Zecchines* and *Hungars* for *Gold*, and *Spanish Dollars* and *Zallots* for *Silver*, stamp'd in *Christendom*, pass current among them; most of the great Payments being made in them, they not caring, either through Ignorance or Sloth, to follow the Example of the *Indian* or *Persian Emperors*, who usually melt down the *Christian Money*, imported by the Merchants into their several Countries, and give it a new *Stamp*. The most usual Pieces are the *Sberiphi* of *Gold*, somewhat less in Value than a *Venetian Zecchine*; and *Aspers*, ten of which are equal to Sixpence *English*; and some few *Three-Asper* Pieces. A *Mangur* is an ugly old *Copper Piece*, eight of which make but one *Asper*; and is not I think a *Turkish Coin*, but rather *Greek*. They have no *Arms* upon their *Coins*, only *Letters* embossed on both Sides, containing the *Emperor's Name*, or some short Sentence out of the *Alcoran*.

The *Turks* look upon *Earthquakes* as ominous, as the *Vulgar* do upon *Eclipses*, not understanding the Philosophy of them. During my Stay in *Constantinople*, which was above two Years, there happened but one, which was *Oct. 26. 1669.* about 6 o'Clock in the *Morning*, a stark *Calm* preceding. It lasted very near a *Minute*, and we at *Pera* and *Galata* were as sensible of it as those who were on the other Side of the *Water*; but praised be *God* nothing fell, and we were soon rid of the Fears in which this frightful Accident had cast us.

The *Turks* made direful Reflections on it, as if some Calamity would inevitably fall upon the *Empire*, quickly forgetting the great Triumphs and Rejoicings which they expressed but a few Days before for the Surrendry of *Candia*. In the Year 1668. in *August*, the *Earth shook*, more or less, 47 Days together in the *lesser Asia*, at *Angure* (*Ancyra*) and for 15 at *Bachasar*, as we heard from a *Scotch Merchant* who lived there; and particularly, that at this latter Place, on the 2d of *August*, between 3 and 4 of the Clock in the *Afternoon*, it lasted for a quarter of an *Hour*: Several Houses were overthrown, and some Hundreds of Chimneys fell (it being a very popu-
lous

ious Town) and yet there were but 7 killed. The *Trembling* being so violent, both *Turks* and *Christians* forsook their Houses, and betook themselves to the *Fields*, *Vineyards*, and *Gardens*, where they made their Abode for several Days.

Their *Punishments* are very severe; this being judged the most effectual Way to prevent all *publick Disorders* and *Mischiefs*. They use no great Formality in their *Processes*: If the *Criminal* be taken in the Fact, and the *Witnesses* ready and present to attest it, and sometimes if there be but *probable* Circumstances, without full Convictions, they *condemn* him: And soon after Sentence, sometimes in an *Hour* or *less*, hurry him away to *Execution*. For an ordinary Crime, *Hanging* is the usual Death; but for *Robbery* and *Murder*, committed upon the *Highway* by such as rob in Parties and alarm whole Provinces, or for *Sacrilege*, or for any *heinous Crime* against the *Government*, either *Gaunching*, or *Excoriation*, or *Cutting off* the *Legs* and *Arms*, and leaving the *Trunk* of the *Body* in the *Highway*, or *Empaling*, that is, thrusting an Iron Stake through the *Body*, out under the *Neck*, or at the *Mouth*; in which *extreme Torment* the miserable Wretch may live 2 or 3 *Days*, if the *Guts* or *Heart* happen not to be wounded by the pointed *Spike* in its *Passage*. This *Punishment* seems to have been in Use among the *Romans*; *Seneca*, *Epistle* 14. *Cogita hoc loco Carcerem, & Cruces, & Eculeos, & Uncum, & Adactum per Medium Hominem, qui per Os emergat, stipitem*: And so in his Book, *De Consolatione ad Marciam*, cap. 20. *Alii Capite conversos in terram suspendere: Alii per Obscena Stipitem egerunt: Alii Brachia Patibulo explicuerunt*. *Murder* is seldom *pardoned*, and especially if the *Relations* of the *murdered Person* demand *Justice*.

The *Circumcision*, though it be a *sacred Right*, is performed in their private Houses, and never in the *Mosques*.

The *Women* colour their *Eye-brows* and *Lids* with an ugly *black Powder*, I suppose to set off their *Beauty* by such a *Shadow*; and their *Nails* with the *Powder of Kanna*, which gives them a *Tincture* of faint *Red*, like *Brick* (as they do the *Tails* and *Hoofs* of *Horses*) which they look upon as a great *Ornament*. Their great *Diversion* is *Bathing*; sometimes thrice, if not four Times a *Week*. They do not permit them to go to *Church* in Time of *Prayer*, for fear they should spoil their *Devotion*; the *Turks* being of so brutish a *Temper*, that their *Lust* is raised upon the *Sight* of a fair *Object*. They are called oftentimes by the *Names* of *Flowers* and *Fruits*, and sometimes *fantastick Names* are given them, such as *Sucar Birpara*, or *Bit of Sugar*; *Dil Ferib*, or *Ravisher of Hearts*, and the like.

Their *Skill* in *Agriculture* is very mean. In their *Gardens* they have several little *Trenches*, to convey *Water* where it may be most necessary for their *Plants* and *Flowers*. They know little or nothing of *Manuring* their *Grounds*: Sometimes they *burn* their *Fields* and *Vineyards* after *Harvest* and *Vintage*, partly to *destroy* the *Vermin*, and partly to *enrich* the *Soil*. They *tread out* their *Corn* with *Oxen*, drawing a square *Plank-Board*, about a *Foot* and an *half* or *two Feet* over, studded with *Flint*; and *winnow* it upon their

Threshing-Floors in the open Air, the Wind blowing away the Chaff. They feed their Horses with Barley and Chopp'd Straw; for I do not remember ever to have seen any Oats among them; and they make but little Hay.

For Draught of great Weight in their Carts, they make use of Buffallos.

Camels will endure Travel 4 Days together without Water, and will eat Tops of Thistles, Shrubs, or any kind of Boughs. They are very Sure-footed, and kneel when they are a-loading. They live to a considerable Number of Years, some even to 60.

Their chief Furniture of their Houses are Carpets or Mats of Grand Cairo, neatly wrought with Straw, spread upon the Ground; they having no Occasion for Chairs, Couches, Stools, or Tables, their Postures within Doors being different from ours. They have no Hangings, but their Walls are whited, and set off with Painting, only adorned with a kind of Porcelane; no Beds closed with Curtains.

They seal not with Wax, but Ink, at the Bottom of the Paper; the Emperor's Name being usually written with Flourishes, and in perplexed Characters: Nor have they any Coats of Arms upon their Seals, there being no such thing as Gentility among them.

Some of them, notwithstanding their Zeal for Mahomet, and their Religion by him established, retain not only a favourable and honourable Opinion of our Blessed Saviour, but even place some kind of Confidence in the Usage of his Name, or in the Words of the Gospel, though it may seem to be wholly in the way of Superstition. Thus in their Amulets, which they call *Cbaimaili*, being little Bits of Paper 2 or 3 Fingers Breadth, rolled up in Pieces of Silk, containing several short Prayers and Sentences out of the *Alcoran*, with several Circles with other Figures, they usually inscribe the holy and venerable Name of *JESUS*, or the Figure of the Cross, or the first Words of St. John's Gospel, and the like. They hang them about their Necks, or place them under their Arm-pits, or in their Bosoms, near their Hearts (being the same with what the Greeks call *εγκλιτια*) and especially when they go to War, as a Preservative against the Dangers of it; and indeed against any Misfortune whatsoever. Some have them sewed within their Caps: And I heard of a Turk that was so superstitious herein, that he always plucked it off, and was uncovered when he had Occasion to make Water. Some are such Bigots in their Religion, and so furious against Christians, that not only they treat them with all imaginable Scorn and Contempt, but take it ill to be salamed or saluted by them; as if it were the Effect of Sauciness, or unbecoming Familiarity. Their Malice against the Christians makes them envy the rich Furs they line their Vests with, and it is a Trouble to these hypocritical Zealots, to sees the Franks ride upon their fine Arabian Horses.

The Respect which they shew the *Alcoran* is wonderful; they dare not open the Leaves of it with unwashen Hands, according to the Advice or Command written, in Arabick, upon the Cover, *Let no one Touch this Book*
but

but he that is clean. They kiss it, and bend their Heads, and touch their Eyes with it, both when they open it and shut it.

The *Fanizaries*, when they attend upon *Christian Ambassadors* to their *Audience*, seem to appear in their Bravery, and in a Habit far from that of a *Soldier*, being without either *Fire Arms* or *Swords* (which latter are not worn but in Time of Service, or when they are upon a March, or embodied), wearing a Cap made of *Camel's Hair*, with a broad Flap dangling behind, a gilt embroidered Wreath running round it, and an oblong Piece of Brass rising up from the Middle of their Forehead near a Foot, with a great Club in their Hand, like inferior Officers of the *Civil Government*. But when they are in the *Camp* they throw off their upper Vest, and *Turbants*, which they wear at all other usual Times, as troublesome, and put on a *Fess*, or red Cap, which sits close to their Head, and tuck up their *Duliman*, or long Coat, to their Girdle, that they may be the more quick or expedite in their Charge.

They affect Finery and Neatness in their Cloaths and Sashes; not so much as a Spot to be seen upon them, and in rainy or suspicious Weather, are very careful how they go abroad without their *Yamurlicks*, which is a kind of Coat they throw over their Heads at such times.

Their Pans and Dishes are for the most part of *Copper*, but so handsomely tinn'd over, that they look like *Silver*.

There are Thousands of *Gypsies* or *Zinganies* in *Turkey*, who live the same idle nasty kind of Life as they do in *Christendom*, and pretend to the same Art of *telling Fortunes*; and are looked upon as the Off-scouring of Mankind. It is accounted the extremest Point of human Misery to be a *Slave* to any of this Sort of Cattle.

The *Haggai*, or *Pilgrims*, that have been at *Mecca* and *Medina*, forbear to drink Wine most religiously, out of a Persuasion that one Drop would efface all the Merits of that troublesome and expensive Journey: And some have been possessed with such a mad Zeal, that they have *blinded* themselves, after their having been blessed with the Sight of *Mahomet's Sepulchre*.

After *Jatzib*, that is an *Hour and half* in the Night, throughout the whole Year, there is as great a Silence in the *Streets* as at *Midnight*: The Emperor *Achmet*, in the Year 1611, having made an Order, that no one should presume to be out of his House after that Time; which is to this Day most punctually observed. The *Bestangi Basbi*, who has the Command of all the *Agiamoglans* in the *Seraglio*, the *Topgi Basbi*, or such great Officers, attended with a great Train of armed Men, walking the Rounds, and drubbing such as they find abroad at unseasonable Hours, of what Nation or Quality soever, except *Physicians*, *Surgeons*, and *Apothecaries*, whom they allow to visit the Sick.

The *Turkmans* (for so they are peculiarly called, as if they were the true Descendants of the *old Turks* or *Scythians*) have no fixed Residence anywhere, but travel with their Families and Cattle from Place to Place, carrying their Wives and Children upon Camels. They pitch their Tents usually near Rivers and Fountains for the Convenience of Water, and ac-

ording as their Necessities require, make a longer, or a shorter Stay. Their whole Estate consists in their numerous Flocks and Herds, which they sell, upon Occasion, to supply themselves with what they want, at the Towns they pass by. Their only Concern is how to enjoy the Benefits and Blessings of Nature, without the Troubles, and Turmoils, and Disquiets of Life, being contented and happy in one another's Company; void of all Ambition and Envy; courteous and humane to Strangers, that may want their Help and Assistance, kindly entertaining them with such Provision as their Folds afford. The Country lies open without any Inclosures, and the Propriety not being vested in any one, they travel through the Plains unmolested, and find excellent Pasturage every where. The *Turks* till no more Ground than will serve their Necessities; being supplied with *Corn* from *Aegypt*, and from *Moldavia* and *Walachia*, by the Way of the *Black Sea*; letting vast Tracts of Ground lie waste and uncultivated: So that their Sloth herein sometimes is justly punished with Dearth.

They have nothing to shew for their *Houses* and *Possessions*, but an *Hogiet*, or Piece of Paper subscribed by the *Cadi*, if they have acquired them by their Money, or that they were their Father's before them.

The *Dervises* generally are melancholy, and place the greatest Part of their Religion in *Abstinence*, and other Severities. Some cut their Flesh, others vow not to speak for 6 or 7 Years, or all their Lives long, though never so much provoked or distressed. Their Garments are made of a coarse Sort of Wool or Goats-Hair. They are tied up by the Vow of their Order ever from marrying. Several of this *Set*, in the Height of their religious Phrenzy, have attempted upon the Lives of the *Emperors* themselves (at whose Government they have taken Disgust) as *Mahomet* the Second, and *Achmet*, as if such desperate Attempts were fatal to *Bigots* in all Religions.

They pay a mighty Veneration to any *Relick* of *Mahomet*; his *Banner* is still preserved in the Treasury of the *Seraglio*, and looked upon as the great Security of the Empire. They believe that it was sent from Heaven, and conveyed into the Hands of *Mahomet*, by the *Angel Gabriel*, as a Pledge and Sign of Success and Victory in his Battles against the *Christians*, and all other Enemies of the *Mussulman Faith*. It was sent to *Candia* to encourage the Soldiers to endure the Fatigue of that long and tedious Siege; and when it was brought thence, after the Surrendry of the City, to be deposited in its usual Place, the *Vizir* gave several *Christian Slaves*, that rowed in the Galley that was fraught with this holy Ware, their Liberty. They pretend to have some Rags of *Mahomet's Vest*, to which they ascribe great Virtue: In Confidence of which, the Emperor *Achmet*, in the Time of a great Fire, which raged at *Constantinople*, when all other Means failed, dipp'd Part of them in Water, to be sprinkled upon the Fire, to rebate the Fury of it.

Next to the *Mustil*, or *Cadaleskires*, are the *Molla's*, of which these four are the chiefest in Dignity: The *Molla* of *Gallata*, *Adrianople*, *Aleppo*, *Prusa*; and after them are reckoned these 8, *Stambol Epheni*, *Larissa*,
Misir,

Misir or *Cairo*, *Sham* or *Damascus*, *Diarbekir* or *Mesopotamia*, *Cutaia*, *Sophia*, *Philibpi*.

The *Priests* have no Habit peculiar to their Profession, whereby they are distinguished from others. If they are put from their *Mosques* for Miscarriage, or Neglect of doing their Duty, or if they think fit to resign and be *Priests* no longer, they may betake themselves, without any Scandal, to *Secular* Employments; their former Character and Quality wholly ceasing. While they remain *Priests*, they counterfeit a more than ordinary Gravity in their Discourse and Walking; and affect to wear *Turbants* swelling out, and made up with more cross Folds; which was all the Difference I could observe by their Head-Attire, which is various, though I could not find that this was constantly and strictly observed.

In *Byram Time*, which is the great Festival of the Year, at which Time every one looks chearfully and merrily, among other Signs of mutual Respect, they besprinkle one another with sweet Water; they indulge to several Sports; and some are mightily pleased with Swinging in the open Air, the ordinary Sort of People especially, paying only a few *Aspers* for the Diverfion.

The *Government* is perfectly arbitrary and despotical, the Will and Pleasure of the *Emperor* having the Force and Power of a Law, and oftentimes is above it. His bare *Command*, without any *Process*, is enough to take off the Head of any Person (though never so eminent in Dignity; though usually, for Formality, and to silence the Murmurings of the Soldiery and People, the Sentence is confirmed by the *Mufti*). Sometimes *Bassas*, who have amassed great Treasures in their Governments, are cut off in their own Houses, in the midst of their Retinue, the Messengers of Death producing the *Imperial Command*, usually sent in a black Purse, and not a Sword drawn in their Defence. Others, if they are obnoxious to the least Umbrage or Jealousy, though dismissed the *Seraglio* with all possible Demonstrations of the *Grand Signior's* Favour, and with rich Presents, in order to take Possession of Places of great Command in the Empire, before they have got two or three Days Journey from *Constantinople*, have been overtaken and strangled. In the Army Commands are given according to Merit: Courage and Conduct are sure to be rewarded, the Way lying open to the meanest Soldier to raise himself to be the Chief of his Order: But other Preferments depend upon mere Chance, and upon the Fancy of the Emperor, whether the Person be fit or no; and they are as soon lost. The least ill Success or Miscarriage proves oftentimes fatal, and a more lucky Man is put in his Place, and he succeeded by a third, if unfortunate in a Design, though managed with never so much Prudence and Valour. They admit of no *Hereditary Honours*, and have no Respect to *Descent* or Blood, except the *Ottoman Family*: He only is great and noble whom the *Emperor* favours, and while his Command lasts. According to a Tradition that passes current amongst them, a *Bassa's* Son, by a *Sultana*, or a *Daughter*, or a *Sister* of the *Emperor*, can rise no higher than to be a *Sangiacebi*, or Governor of some little Province, much inferior to a *Bassa*, and under his

Jurif-

Jurisdiction: Being born of *Slaves*, for the most part, they do not pride themselves in their Birth, very few among them being scarce able to give any Account of their Grandfathers. They have no *Surnames*, but are distinguished by their Possessions and Places of Abode: And enjoying by Law a Liberty of having what Women they please, they have little or no Regard to Alliance or Kindred.

Their *Empire* owes the Continuance of its Being to the Severity of the Government, which oftentimes takes Place without regard either to Justice or Equity; and to their frequent Wars, which prevent all Occasions of Mutiny and Faction among the Soldiers, which happen frequently when unemployed. So that though Ambition may put a warlike *Sultan* upon enlarging his Territories by new Conquests, yet Reason of State forces a weak and effeminate Prince, such as was *Ibrahim*, to make War for his own Security. Their *Politicks* are not owing to Books and Study, and the Examples of past Times, but to Experience, and the plain Suggestions of Nature and common Sense. Their *Councils* formerly were open, and their Designs known and proclaimed before-hand, as if this had been a Bravery becoming their Greatness, and that they scorned to steal a Conquest. But they have learned since the Art of *Disimulation*, and can lye and swear for their Interest, and seem excessive in their Caresses to the Ministers of those Countries which they intend to invade. But their Preparations for *Arming* are made with so much Noise, that an ordinary Jealousy is soon awakened by it to oppose them, in case of an Attack. They seldom or never care to have War at both the Extremes of the Empire at the same Time; and therefore they are mighty solicitous to secure a Peace with *Christendom*, when they intend a War upon the *Persian*. And as much as is possible, they avoid quarreling with *two Christian Princes* at once; being usually at League either with *Poland* or *Muscovy* when they war upon *Hungary*, and so on the contrary; dreading nothing more than an Union of the *Christian Princes* bordering upon them, which would prove so fatal to their Empire, and quickly put a Period to their Greatness: For hereby they would be put upon a Necessity of making a *defensive War*, to their great Loss and Disadvantage; and at last either be forced to beg a Peace of the *Christians*, or run the Hazard of losing all by a further Prosecution of the War. This they are very sensible of; and therefore as they take all Occasions to promote Quarrels and Dissensions in *Hungary* and *Transylvania*, so they greatly rejoice when the Princes of *Christendom* are at War one with another. This is their great Time of Advantage, and they know that it is their true Interest to pursue it, though they do not always, by reason of the ill Condition of their own Affairs, make use of it. During the *Civil Wars* of *Germany*, the *Bassas* and other Commanders of the Army were very importunate with the *Grand Signior* to make a War on that Side, and to enlarge his Conquests as far as *Vienna*; no Conjecture having been ever so favourable to consummate such a Design, in which *Solyman* so unhappily miscarried: They promised him an easy Victory, assuring him, that the Animosities of the Princes of the Empire were so heightened, that there was no room left for a Reconciliation; that he was but to go at the Head of an Army to take Possession,

cession, and that *Austria* would surrender at the first News of his March towards it. The *Emperor* was not to be moved at that time by these Insinuations and plausible Discourses; being continually urged, he as often denied. One Day, when they came to renew their Advice about the *German War*, he having given Order before, that several Dogs should be kept for some Days without Meat, commanded that they should be brought out, being almost starved, and Meat thrown among them; whereupon they snarled, and bit one another: In the midst of their Noise and Fighting, he caused a Bear to be let loose in the same Area, the Dogs forgetting their Meat, and leaving off their Fighting, ran all upon the Bear, ready to prey upon him singly, and at last killed him. This Diversion the *Emperor* gave his *Bassas*; and left them to make the Application.

A certain *Prophecy*, of no small Authority, runs in the Minds of all the People, and has gained great Credit and Belief among them, That their Empire shall be ruined by a Northern Nation, which has white and yellowish Hair. The Interpretation is as various as their Fancy. Some fix this Character on the *Muscovites*: And the poor *Greeks* flatter themselves with foolish Hopes, that they are to be their Deliverers, and to rescue them from their Slavery; chiefly because they are of their Communion, and owe their Conversion to the *Christian Faith* to the Piety and Zeal of the *Grecian Bishops* formerly. Others look upon the *Swedes* as the Persons described in the *Prophecy*, whom they are most to fear. The Ground and Original of this Fancy, I suppose, is owing to the great Opinion which they have of the Valour and Courage of that warlike Nation. The great Victories of the *Swedes* in *Germany*, under *Gustavus Adolphus*, were loudly proclaimed at *Constantinople*, as if there were no withstanding the Shock and Fury of their Arms; and their continued Successes confirmed the *Turks* in their first Belief; and their Fears and their Jealousies were augmented afterwards, when *Charles Gustave*, a Prince of as heroick a Courage, and as great Abilities in the Art and Management of War as the justly admired *Gustavus*, entered *Poland* with his Army, and carried all before him; seized on *Warsaw*, and drove *Casimire* out of his Kingdom, and had almost made an entire and absolute Conquest, only a few Places holding out. This alarmed the *Grand Signior*, and the *Bassas* of the *Porte*, as if the *Prophecy* were then about to be fulfilled; who did not care for the Company of such troublesome Neighbours, who might push on their Victories, and joining with the *Cossacks*, advance their Arms further, and make their Country the Seat of War, which might draw after it fatal Consequences. To prevent which, Couriers were dispatched from *Constantinople* to *Ragotski*, Prince of *Transylvania*, then in Concert with the *Swedes*, to command him to retire with his Army out of *Poland*, as he valued the Peace and Quiet of his own Country, and the Friendship of the *Grand Signior*, whose Tributary he was, and by whose Favour he had gained that Principality. And the *Crim-Tartars*, the sworn Enemies of the *Poles*, who at that Time lay heavy upon them, were wrought upon by the same Motives and Reasons of State, to clap up a Peace with them; that being freed from these Distractions,

stractions, they might unite their Forces the better together, and make Head against the *Swedes*.

The *Ambassadors* of *Christian Princes*, when they are admitted by the *Grand Signior* to an *Audience* (their Presents being then of course made, which are looked upon as Due, not to say as an Homage) are dismissed in few Words, and referred by him to his *Wakil*, or Deputy, as he usually stiles the *Chief Vizir*; and a small Number of their Retinue only permitted the Honour of *kissing his Vest*, and then rudely enough sent away.

The *Grand Signiors* keep up the State of the *old Asiatick Princes*: They do not expose themselves often to the View of the People, unless when they ride in Triumph, or upon some such solemn Occasion: When they go to the *Mosques*, or divert themselves in the Fields, either in Riding or Hunting, they do not love to be stared upon, or approached: It is highly criminal to pry into their Sports, such an insolent Curiosity being often punished with Death. The Story is famous of *Morad III.* who baiting a Bear in the *old Palace* with a Mastiff, and espying three Fellows upon the Tower of *Bajazid's Mosque*, who had planted themselves to see the Sport, commanded their Heads to be struck off immediately, and to be brought before him, which was done accordingly. Instances of such *Capricios* are frequent in the *Turkish History*; this following happened during my Stay at *Constantinople*.

Upon the Return of *Vizir Achmet* from *Candia*, after the Surrendry of that City, and a happy End put by him to that tedious and bloody War; he acquainting the present Emperor, then at *Adrianople*, with the History of that famous Siege at large, made such terrible Representations of their and the *Venetians* Mining and Countermining one another, that the Emperor was resolved, out of Curiosity, to see the Experiment made of a thing that seemed to him almost incredible. A Work was soon raised, and undermined, and above thirty Murderers, and Robbers upon the Highway, and such like Villains, were put into it, as it were to defend it. The *Grand Signior* stood upon an Eminence, at some considerable Distance, expecting the Issue of it; upon a Signal given, the Mine was sprung, and the Fort demolished, and the poor Wretches torn piece-meal, to his great Satisfaction and Amazement.

The *Moon* is the auspicious Planet of the *Turks*; according to the Course of which they celebrate their *Festivals*. They begin their *Months* from the first *Appearance* of it, at which time they choose, except a Delay brings a great Prejudice and Inconvenience with it, to begin their great Actions. The *Crescent* is the *Ensign* of the *Empire*, which they paint in their Banners, and place upon the Spires of their *Mosques*. Next to the Day of the *Appearing Moon*, they pitch upon *Friday* to fight upon, to begin a Journey, and especially their Pilgrimage toward *Mecca*, or to do any thing of great Consequence, as very lucky and fortunate.

XL. 1. July 18, 1678, at 5 in the Morning we set out from *Aleppo*, being 16 *English*; but with Servants and Muleteers in all 40; and in 4 Hours and an half, travelling South by East, we arrived at a Village called *Cafferabite*, being at the Edge of the *Desart*.

19. We rose at One in the Morning, and directed our Course S. S. E. over the *Desart*, for a Fountain called *Churraick*; but our Guide losing his Way, there being no Path, it was near Noon before we found it. The Water is of a purgative Quality. In our Way we found two *Arabs* with two *Asses*, one whereof carried Water and a little Bread, the other they rode on by Turns; they had one Gun, wherewith they shot *Gazels*, the Bullets being a hard Stone broken round and cased with Lead: They had on the Palms of their Hands, Elbows, Knees and Feet, some *Gazel-skin* tied, that they might be able to creep the better on the Ground to shoot; one of the *Asses* walking by as a Stalking Horse, and the *Arab* imitating the Cry of the *Gazel* till he gets within Shot. These *Arabs* are called *Silebee*. At the Well came to us some *Arabs*, that were making Ashes of the ordinary Sort of Weeds called *Chuddraife*, *Ruggot*, and *Cuttaff*: These they cut and dry, and putting them into a Pit, set Fire to them, and the Ashes cake at the Bottom. The Ashes they carry to *Eglib* and *Tripoli*, to make Soap of; but the best Sort of Ashes are made of the Weed *Sbinon*, which grows about *Tadmor*, *Soukney*, *Tibe*, and *Yarecca*: It grows like Broom in *England*, and in Shape resembles *Coral*.

20. We rose at 4 in the Morning, and travelling 2 Hours E. S. E. we arrived at *Andrene*, where we found the Ruins of 2 or 3 Churches, and of a great Town lying in a large Plain; where having taken some Fragments of *Greek* Inscriptions, which afforded no certain Sense, but yet were evidently *Christian*, we marched again S. by E. and in about 4 Hours Time came to a pleasant Aquæduct called *Sbeck-alal*: This Aquæduct is cut through the main Rock, for a great way from the Mountains, and where it ends, the *Arabs* have made a Garden, which afforded us Melons, Cucumbers, Purslain, &c. In a Grot hard by, there dwelt an *Arab* with his Family; he had a Dozen Buffalo's, which they used both for their Milk, and to plow the Ground, sowing both Wheat and Barley: Hither the *Arabs* resort, when they have committed any Robbery about *Aleppo*, or *Hama*, and here they repose and divide the Spoil.

21. We rose at 4 in the Morning, and riding 2 Hours South, we came to a Ruin called *Briadeen*: Here we found the following Inscription on a Stone, good Part in the Ground:

ΑΦΙΕΡΩΘΗ ΑΑΙΑΥΝΔΙΟΥ ΤΟΥ ΑΜΦ ΕΤΟΥΣ
ΔΙΑ ΜΑΤΕΡΝΟΥ ΚΑ (ΙΙ) ΑΠΠΟΥ ΚΑΙ ΜΑΙΚΟΥ ΚΝΕΤΜΝ
—Υ—N

From hence going S. E. in 4 Hours more, we came to a Well called *Costal* (which signifies a Spring in *Arabick*). Most Part of our Way through the *Desart* we were troubled with Rat-Holes in great Numbers, like Coney-boroughs,

*A Voyage of
some English
Merchants at
Aleppo, to
Tadmor; by
Mr. Tim. La-
noy and Mr.
Aaron Good-
year, n. 218.
p. 129.*



boroughs, which, by the Sinking in of the Earth, very much incommoded our Horses and Mules. These Rats have at their Tails a Bush of Hair, and the *Arabs* eat them all, excepting one Part. From this Well we arose about 4 in the Afternoon, and began to ascend small Hills covered with Trees, which for the most part, were the small *Pistacho's* which the *Arabs* pickle with Salt; but eaten green, are good to quench Thirst. We travelled three Hours up the Hills, where we pitched that Night, having no other Water but what we carried with us; and at Night we had a small Shower of Rain, a Thing unusual in that Country at that Time of the Year.

22. We rose by Two in the Morning, and travelling E. S. E. we came by Eleven to a Well called *G'bor*.

23. We rose by One in the Morning, and travelling most East, we came to a large Plain, where we saw before us, on a high Mountain, a great Castle, called by the *Arabs Anture*. When we had travelled 2 or 3 Hours in this Plain, we espied an *Arab* driving towards us on a Camel with his Lance so fast, that he came on a round Gallop, and we supposed him sent as a Spy: Being come up to us, he told us he was of *Tadmor*, and that his Prince, the *Emir Melkam*, had that Day made Friendship with *Hamet Shideed*, another Prince, and that together they had 400 Men; so that he kept us Company an Hour or Two, and inquired of our Muleteers if we were not *Turks* disguised, with Intent to seize on *Melkam*; for we travelled with a *Bandiero*, the Impress being a *Hanjarr*, or *Turkish Dagger*, and a *Half-Moon*. We told him we were *Franks*, which he could hardly believe, wondering that we travelled thus in the Desert, only out of Curiosity. Being come near to *Tadmor*, he went a little before us, and on a sudden ran full Speed towards the Ruins, we not endeavouring to hinder him. Our Guide told us he was gone to acquaint the *Arabs* who we were, and that we ought to suspect and prepare for the worst; so we dismounted 20 of our Servants, each having a long Gun and Pistols at his Girdle, and placed them a-breast before us, we following at a little Distance behind, on Horseback, with Carabines and Pistols. In this Order we proceeded, and came to a most stately *Aqueduct* which runs under Ground in a direct Passage 5 Miles, and is covered with an Arch of Bastard Marble all the Way, and a Path on both Sides the Chanel for 2 Persons to walk a-breast; the Chanel itself being about an *English Yard* in Breadth, and three Quarters of a Yard in Depth. At 20 Yards Distance all the Way are *Ventiducts* for the Air to pass, and the Holes are surrounded with small Mounts of Earth to keep the Sand and Dust from falling down. We marched close by these Mounts, which might serve us for Defence, expecting every Moment that the *Arabs* would come to assail us, having the Disadvantage of the Sun and the Wind in our Faces: Wherefore we travelled hard to gain an Eminence where we might post ourselves advantageously, and stop and repose a little to consider what we had to do. The *Arabs*, finding us to come on with this Order and Resolution, thought not fit to adventure on us; so we gained the Hill, from whence we might discern these vast and noble Ruins, having a Plain, like a Sea for Greatness, to the Southwards of it. Here having refreshed our Men, we fetched a little
Compass,

Compass, and descended by the Foot of a Mountain, on which stands a great Castle, but uninhabited. Here two *Arabs* came to us with Lances, one being *Chiab* to *Melkam*, and we sent two to meet them; they gave the *Salam Alike*, and ours returned the *Alica Salam*, and advancing to our Company, told us, the *Emir* had understood of our coming, and had sent them to acquaint us that he was our Friend, and that all the Country was ours. We sent back with them our *Janizary* and a Servant to visit the Prince in his Tents, which were in a Garden. In the mean time we dismounted at a Watering-place amidst the Ruins, but did not unload till our *Janizary* and Servant returned with the *Emir's Tescarr*, assuring us of a Friendship and Protection, a Writing which the *Arabs* were never known to violate before. With them came also one that belonged to the *Sbeck* of the Town, for whom we had Letters from *Useffe Aga* the *Emeen* of *Aleppo*. He desired us for greater Security to pitch our Tents under the Town-Walls, which is in the Ruins of a great Palace, the Wall yet standing very high, the Town within but small, and the Houses, excepting 2 or 3, no better than Hog-sties. So we pitched in a deep sandy Ground, where we found it exceeding hot. Here we waited till Three of the Clock without eating any thing, expecting the *Sbeck* should have presented us, according to the usual Custom of the *Turks* to their Friends, and have given some Answer to the Letters we brought him; but on the contrary, we found by the Gestures of the People that we had Reason to suspect them. Hereupon two of our Company, believing that the Want of a Present to the *Emir* was the Cause thereof, resolved to adventure to give him a Visit, and taking the *Janizary* and one Servant, they carried him a Present of 2 Pieces of red Cloth, and 4 of Green, and several other things. Being come, he welcomed them into his Tent, and placed the one on his Right-hand, and the other on his Left. *Melkam* was a young Man, not above 25, and well featured, and a most excellent Horseman; *Hamet Shideed*, the other Prince, was more elderly, about 40 Years of Age, and was not in the Tent, but sat under a Palm-tree near it. He treated them with *Coffee*, *Camel's Flesh*, and *Dates*; and inquired of their Journey, and the Cause of their coming: They told him it was only Curiosity to see those Ruins. He said that formerly *Solomon Ibn el Doud* built a City in that Place, which, being destroyed, was built again by a strange People, and he believed that we, understanding the Writing on the Pillars, came to seek after Treasure, he having but 6 Moons before found a Pot of *Corra Crusses*. After this he went out of the Tent, leaving them smoking Tobacco, to the *Janizary* and Servant; and told them, that never till that Day any *Franks* had been at that Place, and that now we knew the Way through the Desert, we might inform the *Turks*, to their Ruin and Destruction; so that it would be convenient for them to destroy us all; but that we coming as Friends, he would only have 4000 Dollars as a Present, else he would hang them and the two *Franks* up, and go fight the rest. This Message being brought them, they answered, they could say nothing to that Demand, not knowing our Minds: But if he would permit them to go and speak with the rest, they would re-

turn an Answer. Hearing this, he threatened present Death; but at length gave Leave to our *Janizary* to carry us a Letter from them, wherein they shewed the Danger they were in, and earnestly intreated us to redeem them, the Price set upon them being 2000 Dollars; one half in Money, the other half in Goods, as Swords, Cloaths, Tents, &c. which the *Emir* promised to estimate at their Worth.

Upon the Receipt of this Letter we began to examine what Monies we had, Cloaths, and other Trade, and found that we could not near make up that Sum. In this Confusion came Two *Arabs* to receive the Things, and immediately Word was brought that the *Emir* would come and visit us: We sent him Word, that if he came with more than two Followers, we would not admit him. So he came with two Servants only: And in Conclusion, we made him up in Money and Goods to the Value of 1500 Dollars; he valuing our Things as we pleased, his Design being not so much to complete the Sum, as to take from us all we had.

After this, about Sun-set, he returned us our two Friends. We kept good Watch in the Night, and the next Day we returned by the same Way we came, and arrived at *Aleppo*, July 29. in the Morning.

This and other the like Violences used by this *Arab* Prince, made the *Bassa* of *Aleppo* resolve to destroy him; not long after he cajolled him with the Hopes of being made King of the *Arabs*; and to draw him near the City, he vested and caressed some of his Followers: Which having its Effect, the *Bassa* surpris'd him in his Tents by Night, and soon after he was put to Death. This those People were willing to believe the Effect of their so abusing the *English*, and might much contribute to the Security and good Usage they found that went the second Time on this Expedition.

We had not Time to view these Ruins by reason of this Usage, though perhaps we might with Safety. We took only one of the Inscriptions as we passed by; which was thus:

ΣΕΠΤΙΜΙΟΝ ΑΥΟΡΟΔΗΝ ΤΟΝ ΚΡΑΤΙΣΤΟΝ
 ΕΠΙΤΡΟΝ ΣΕΒΑΣΤΟΥ ΔΟΥΚΗΝΑΡΙΟΝ
 ΚΑΙ ΑΡ.. ΑΠΗΤΗΝ ΙΟΥΛΙΟΣ ΑΥΡΗΛΙΟΣ ΣΑΝΩΗΣ
 ΨΑΚΚΙΑΝΟΥ ΤΟΥ Ψ.. ΛΕΝΑΙΟΥ ΠΠΕΥΣ
 ΡΟΥΜΑΩΝ ΤΟΝ ΦΙΛΟΝ ΚΑΙ ΠΡΟΚΤΑΤΗΝ
 ΕΤΟΥΣ ΗΟΦ ΜΗΝΕΙ ΞΑΝΔΙΚΩ.

As far as we could conclude from our Journies, and the Position of the Ways taken by two good Compasses, the Distance of *Tadmor* from *Aleppo* is about 150 *English* Miles, and the Course S. S. E. or rather somewhat more Southerly, considering the Variation of the Compass, which is about half a Point Westward in these Parts.

2. We set out from *Aleppo* for *Tadmor* on *Michaelmas-day* 1691. being in all, Masters and Servants, 30 Men, well armed, having obtained a Promise of Security from *Affyne*, then King of the *Arabs*, and one of his own People

A second Voyage to Tadmor; by Tim. Lanoy and Mr. Aaron Goodyear, ib. p. 131.

People for a Guide. This Day our Road pointed S. by E. and in 4 Hours we came to a Fountain called *Capbir-Abiad*, leaving *Old Aleppo* about an Hour distant on the Right-hand. Here we made but a very short Stay; but proceeded to a better Fountain, at the Foot of a very high Hill, covered with loose Stones, the Ruins of a Village called *Broeder*, of which there was not one House remaining; and dining here, we advanced in an Hour and a Quarter, through a fertile open Plain, to a Place called *Emgbir*, famous for the best Wheat that is brought to *Aleppo*. This we made our first Stage; and mounting again in the Morning about 5 o'Clock, in less than an Hour we passed by an uninhabited Village called *Urgbee*, our Road pointing as before, through the fruitful Plain, even and pleasant: But when we came to ascend the Hills, where I reckoned we entered the Desert, we had a troublesome Passage, over loose great Stones, without any Appearance of a Road.

Our Guide had promised to conduct us through pleasant Groves and Forests; but no such Thing appeared, unless we should bestow that Name upon low withered Shrubs that grew in the Way; only one Tree we saw, which was of good Use to us, serving as a Landmark; and when we were come up with it, being left at a little Distance on the Right-hand, we gained the Prospect of a remote Ridge of Hills before us, and on the Top of one of them an old Castle, known by the Name of *Gazar Ibn Wordan*. I soon turned my Eyes from it, to a little round Hill more on the Left, by which we were to direct our Course, and about a Quarter of an Hour from which stood a *Sbeck's* House, called *Sbeck Ailba*, with a Well of Water by it; but such that we had but little Gust to taste, though it served our Horses. All the Country hereabouts is stored with *Gazels*, and there is a Sort of barbarous People there that have hardly any thing else to live upon but what of these they can kill; and Necessity has taught them to be no mean Artists in their Way. That Morning we had travelled about 5 Hours to reach *Sbeck Ailba's*; yet finding nothing to invite our Stay there (though there were 4 or 5 Tombs not ill made, according to the *Turkish* Mode) about one of the Clock we mounted again, bending to the South-East, or something more Easterly. In our Way we had a remarkable Prospect, on the Right-hand, of the Ruins of an antient City called *Andreen*, and sometimes *Londrine*, which we were told had been formerly inhabited by *Franks*, and that there were many Inscriptions there. We proceeded till Sun-set, very weary, and almost without Hope of coming to Water that Night, tho' at the same time near dead for Thirst: And in an Hour's time more our Guide brought us to the Side of a Bog, called by the Name of *Zerga*, where we found Water enough; but it was neither palatable nor wholesome, neither did the Ground seem proper to sleep upon; yet we were forced to be content, there being no removing thence that Night.

Oct. 1. We departed from *Zerga*, about 2 Hours before Sun-rise, and, as soon as it was light, had the Prospect of a very high Hill: To this we made as directly as we could look, finding nothing in our Way observable, except a Multitude of Holes made in the sandy Earth, by Rats, Serpents, and other Animals, which rendered our Riding a little troublesome, as we had
found

found it upon the same Account the Afternoon before. About 2 Hours short of our Stage, we were shewn 3 little round Hills, lying to the Right in a direct Line, known by the Name of *Tenage*; where we were told there was good Water, and it is for that Reason only they deserve the Notice of those that travel through such a thirsty Desert. The Place to which we directed our Course was called *Efree*, where we arrived about 11 o'Clock, and found, to our great Satisfaction, excellent Water. Here we could discern the Foundations of a spacious City, and a Piece of a thick Wall built of chalky Stone was standing: This we judged to be the Remainder of a Castle situated on the Side of the Hill, so as both to defend and command the City. On the Top of the Hill, above the Castle, stand the Ruins of a Fabrick, in Appearance very antient, built of a very hard Stone, yet exceedingly worn by the Weather. It is of an oblong Figure, pointing near to the N. E. and S. W. with only one Door on the Easterly End, which was once adorned with extraordinary good Carvings, of which there are still some Remains; but the greatest Part is either worn away, or purposely defaced; and those Marks of antient Beauty that remain are obscure, and scarcely discernible.

The Outside of the Walls is beautified with Pilasters quite round, with their Pedestals and Capitals regular and handsome; but the Roof is fallen down, and within appears nothing which looks either great or beautiful. The Situation, and placing the Door, hinders one from conjecturing it to have been a Christian Oratory, or Chapel; and therefore in Probability it must have been a Heathen Temple; and if so, then the Piece of the Castle-Wall, being of a softer Stone, must be much more modern. The Goodness of the Water brings the *Arabs* (who rove up and down the Desert) and the *Turkmen* frequently hither; which has occasioned a great many *Graves* about the Temple; and some have had Leisure, and (which is more difficult to be imagined) Skill enough to scratch in the Walls the first Letters of their Names, and many more in *Arabick* Characters, which we could make nothing of, no more than of an *Arabick* Inscription which lay hard by, but appeared not antient.

Oct. 2. We departed from *Efree* about an hour and an Half after Midnight, and in 6 Hours and an Half arrived at Two Wells, the Water 18 Fathom and 2 Foot deep, known by the Name of *Imp Malcha Giub*. Through the greatest Part of this Stage we had a broad beaten Road; and where that was not discernible, we guided ourselves by a Ridge of chalky Hills, under which the Wells lay. The Water we found exceeding bad, and of so noisome a Scent, that we could not endure it so much as at our Noses.

In our Way hither we were shewn the true Plant which they burn for Soap-Ashes, which has no Leaves, but a soft juicy Stalk, shooting into several Branches, and something resembling our Samphire, only it is more round than that. The Ashes likewise we saw, which were made not far from the Wells, which in burning run into Cakes, not much unlike the Cinders of a Forge; only they are heavier, and not so full of Pores, nor so hard as they

they are. In the Afternoon we proceeded on our Voyage 2 Hours and an Half, to a Place called *Almyrrba*, passing rather between than over the Hills, though we had something of an Ascent too. Our Journey hitherto had been altogether Southerly, and but little varying to the Eastward of due South.

Oct. 3. We mounted from *Almyrrba* between 5 and 6 in the Morning, making to the Point of a high Ridge of Mountains, through an uneven defart Way: We came to the Ascent after about 4 Hours Travel, which we found not difficult; and when we were on the Top, we had a pleasant Prospect of the Country. This Mountain was covered on both Sides with great Plenty of Turpentine-trees, which was an Object very pleasing, having seen very few Greens in our whole Journey. This Tree grows very thick and shady, and several of them we saw loaded with a vast Abundance of a small round Nut, the chief Use whereof is to make Oil; tho' some eat them, and account them as great a *Regalio* as Pistaches. Their outward Husk is green, and more oily than that of Pistaches, and within a very thin Shell, a Kernel both in Colour and Relish very much resembling them: But those that eat them seldom take the Pains to search for the Kernels, but eat Husk and Shell all together, which have no ungrateful Taste. From this Hill we had a tedious Descent, and coming at the Foot into a narrow Gut, winding this Way and that between the Mountains, our Passage seemed very long, hot, and tiresome: Our want of Water however obliged us to proceed, whereof we now began to be in great Necessity, especially for our Horses and Mules, who had none the Night before, nor none at all that Day.

About Two o'Clock in the Afternoon a small drizzling Rain, which we had about Half an Hour, increased to a very plentiful Shower, which put us upon producing all the Vessels we had to catch it as it fell from the Heavens, or ran down the Skirts of our Tents; our Horses at the same time greedily drinking it from the Ground. But we might have spared our Pains, for in less than Half an Hour's Time our Camp was in a manner afloat, and we were surrounded with Water not only sufficient for us, but for an Army of 20,000 Men: Those hollow Guts which we passed over without the least Appearance of Moisture, were, by the Cataracts which descended from the Mountains, become Rivers; so plentifully was God pleased to provide for us in our greatest Streight; and which increases both the Wonder and Mercy, the next Morning all this great Quantity of Water was passed away; so that in about Two Hours riding we could hardly perceive that there had been any Rain at all. This memorable Place is known by the Name of *Al-Wisbal*.

Octob. 4. From *Al-Wisbal* we proceeded for *Tadmor*. Our Way lay Southward; but the Gut in which we travelled would not permit us to keep a direct Course. However, in about an Hour's Walk we passed by *Antor* Mountains (our Guide called them *Toul Antor*) thro' a Gut or Rent, both Sides of which so directly answered one to the other, they would tempt a Man to believe they were separated by Art, for an Entrance into the Country. But almost

almost as soon as we were well got within the open Space, we were obliged to ascend another Hill, and so our Road continued over Hills and Valleys interchangeably all the Way. We had hardly proceeded 4 Hours, when we came to the Brow of a rocky Mountain, separated from that whercon stands the *Castle of Tadmor*, but by a narrow Valley: In which Hill, by the Way, appeared some Quarries of fine Stone, which probably might afford Materials to the curious *Buildings* in the City; where we soon after arrived.

Fig. 63.

Having tired ourselves with roving from Ruin to Ruin, and rummaging among old Stones; and more especially not thinking it safe to linger too long in a Place, where should the *Mountain Arabs* (who were Enemies to *Affyne Abbasse*, our Friend) have Intelligence of us, they might either fall upon, or endeavour to intercept us in our Return;

On *Thursday*, O^r. 8. about half an Hour after 4 in the Morning, we departed from *Tadmor*, being very well satisfied with what we had seen, and glad to have escaped so dreaded a Place, without any Trouble or Prentences upon us: But else with some Regret, for having left a great many Things behind, which deserved a more particular and curious Inspection. Our Road lay almost due East, or a little inclining to the North; and on the Left-hand, a Ridge of Hills stretched along for a great Space, sometimes about half an Hour distant from the Road, and sometimes opening wider. These Hills, we were told, were stored with rich Veins of divers Minerals, and afforded all that vast Quantity of Marble, the Remains whereof we had seen at *Tadmor*: And it was from a Fountain called *Abulfarras*, at the Foot of one of them, they fetched out Water which we drank there; the Inhabitants contenting themselves with that which runs from the hot Springs. To the Right-hand lay a most barren Plain, perfectly bare, and hardly any thing green to be seen therein, except it were a few Gourds, which our Servants found on the Side of a little rising Ground, where there was no Shew of any thing moist to feed them. Our Way being plain, we had the Sight of *Tadmor*, especially the Castle, for above half our Stage, till we came to an old *Capbar* House. We made indeed a very short Day's Journey in the whole, finding a Fountain of excellent Water in about 5 Hours and a half's Riding; which, as it was a most welcome Refreshment to us in such a thirsty Defart, so it was the only good Water we met with till we came to *Euphrates*, which was not till the third Day from this Place. At this Fountain we pitched, near to which is a Village, but almost wholly ruined and deserted. 'Twas some time before any body would be seen, for they were afraid of us: At length three Men came out to our Tents, Spectacles of a miserable Poverty, occasioned by their being frequently pillaged by the *Mountain Arabs*, and a great Duty they pay to *Affyne Abbasse* their King, for his Protection. Three hundred Dollars they pay him annually, when one would think the whole Village was not able to make up the Sum of One hundred: Yet being the remotest Place that was under his Jurisdiction, they often suffer by the Inroads of the others. The Name of the Place is *Yarecca*, a Name it received (as we were informed) from a Victory obtained there by the *Turks* over the *Mamalukes*.

Oct. 9. From *Yarecca* we mounted early, and travelling N. E. or near that Point, in 7 Hours time arrived at *Soukney*. The Road we found much like what we had the Day before, lying over a barren Plain; only we had Hills on both Sides, and sometimes closing within half an Hour's riding one of the other. The Village has its Name from the *Hot-Waters* (for so the Word imports), which are of the same Nature with those of *Tadmor*: Herein they bathe frequently, the same little dirty Hole serving both for Men and Women; only they have so much Modesty remaining, that they have different Hours for the one and the other. To say the Truth, 'twas the only Mark of Modesty: in other respects, they seemed a confident, or rather impudent, Generation of People. Before we could pitch our Tents, they flocked about us in Multitudes, Men, Women, and Children; and of the last, many of them as naked as ever they came into the World, not so much as a Rag about them to cover them; and so numerous they appeared, that if we had Reason to think *Yarecca* wanted Inhabitants, we had no less to conclude *Soukney* over stocked. At this Place usually resides an Officer of *Affyne's*, who is their Sub-Bassa, or Governor: He whom we found there was called *Dor*, of a good Family among the *Arabs*, to whom we made a Present, and he civilly returned it in Barley for our Horses. Afterwards he came under our Tents, and invited us to an Entertainment; which, considering the Circumstances of the Place, was very splendid, though it was nothing but *Pilaw* at last, a little diversified by the Dressing; and, to speak truly, I judge we could not have less than a Bushel of Rice set before us. His Palace indeed was not very stately, there being few Cottages in *England* but might vie with it. To the Room wherein we were entertained, which doubtless was the best, if not the only one he had, we were forced to clamber, rather than ascend, by broken Steps made of Stone and Dirt. When we were got in, and commodiously seated after the *Turkish* Mode, it seemed large enough for about a Dozen or Fourteen People: At the upper End was a little Space, separated from the rest by a Ridge made up of Earth, within which I supposed he slept. The Walls were mean, but the Roof much worse, having no other Covering but Faggots; so that certainly it could not be Proof against a Shower of Rain: However, it served well enough for our Afternoon's Collation; and we had come away with a good Opinion of the Gentleman's Civility, had he not afterwards endeavoured to make a Pretence upon us, and so would have forced us to pay dear for our Rice: He pretended to a customary Duty of a Chequin a Head of all *Franks* that passed that Road; though probably neither he, nor his Grandfather before him, had ever seen a *Frank* there before. But when he understood by our Guide, that we were not so easily to be imposed upon; and withal, that we were *Affyne's* Friends, and in our way to his Tents; and especially our Treasurer, a Person he very much esteemed, who therefore would be sure to acquaint him with any Exaction or Injury offered us; his Mouth was quickly stopt, and he grew so sensible of his Error, that he sent to excuse it, and presented our Treasurer with a Fan of black Ostrich Feathers, and in the Morning

came himself, and conducted us about an *Hour* on our Way. This Village pays to *Affyne* 1500 *Dollars per Annum*.

Oct. 10. Continuing our Voyage still to the N. E. or something more *easterly*, we found it another pleasant and easy Stage to another Village called *Tiebe*, so called (as they say) from the Goodness of the *Waters*, the Word signifying Good: But we found them not so over-excellent; they had the Taste, and were doubtless tinctured with the same *Mineral* with those of *Soukney* and *Tadmor*, though not so strong. But the Village itself made a better Shew than usual; and the People appeared of some better Fashion, and more civilized than those we had left. 'Tis pleasantly situated, and makes a good Appearance as one comes up to it; the Prospect being helped by a well-built *Steeple*, to which is now adjoined their *Mosque*: But I am apt to believe it the *Remains* of a *Christian Church*, being built with some more Art and Beauty than you shall easily find in *Turkish* Fabricks: And there are also several *Ruins* about it, which speak it to have been a more famous Place than now it is. Into the *Mosque* we were permitted to enter without any Disturbance. This Village lies in one of the Roads from *Aleppo* to *Bagdat*, and pays to *Affyne* an *annual* Tribute of 1000 *Dollars*. From hence we mounted again in the Afternoon, and proceeded about 2 *Hours* and a *half* farther; having travelled this Day in all about 7 or 8 *Hours*. The Place we pitched at was a *Fountain*, and known by the Name of *Alcome*; but neither Town nor House by it; neither was the *Water* fit to be drank, being of the same Nature with that of *Soukney*, and almost as *warm*.

Oct. 11. From *Alcome* we rose about an *Hour* and a *half* after Midnight, our Guide groping out the Way by the Help of the Stars, which now bended more to the *North* than formerly. As soon as it was light enough to look about us, we found ourselves in a wild open *Desart*, the Ground in some Places covered with a Sort of *Heath*, and in others quite bare: Nor had we travelled long after the Sun was up, before, by the Help of a rising Ground, we discovered *Arsoffa*; but it was after 10 o'Clock before we reached it: And finding no Water any-where near, we were necessitated to proceed forward for the River *Euphrates*, which we found 4 *Hours* distant from it. *Arsoffa*, or (as the *Arabs* call it) *Arsoffa Emir*, seems to be the *Remains* of a *Monastery*, having no Town nor Village near it, and being one continued Pile of Building of an oblong Figure, stretching longways *East* and *West*, and inclosing a very capacious *Area*. At a Distance it makes a glittering Shew, being built of *Gypsing-Stone*, or *Rock-Isinglass*, resembling *Alabaster*, but not so hard; several Quarries of which we past by in our Way to it. When the Sun shines upon it, it reflects the Beams so strong, that they dazle the Eyes of the Spectators. Art or Accuracy in the Workmanship we found none, and but very little *Carved* Work, and that mean enough; nay, the very Cement they made use of, is but little better than Dirt: So that it's no great Wonder to see it in *Ruins*, though it has not the Appearance of any great Antiquity. Round about were the little *Apartments* or *Chambers* for the *Monks*, built *Arch wise*, only one

Story above Ground ; but underneath are several *Cells* or *Vaults*, larger than the *Chambers*, which perhaps might serve for their *Schools*, or *Working-Houses*. In the Midst of the *Area* stand the *Ruins* of several Buildings, some of which seem to have been *Cisterns* for *Water* ; and it may be the *Bathing-places* : But the most remarkable was one, which probably was the *Abbot's*, or *Bishop's House*, there having been some more Pains bestowed upon it than the rest ; and another, which was the *Reliques* of their *Church*. This was formerly no unhandsome Structure, being built in the Form of our *Churches*, and distinguished into three *Isles*, of which the Middle one is supported by 18 turned *Marble Pillars*, with *Capitals* upon them, not of *Marble*, but of a Sort of *Clay*, and cast into the Shape they are in, but of a *Colour* exactly resembling the *Pillar* itself. That which persuades us to believe them *cast*, is a *Greek Inscription* to be seen on all of them ; the *Letters* whereof are not made by *Incision* in the Stone, but seem to be stamp'd, standing out higher than the Distance between them ; and on one of them, by Mistake, they are so placed, as to be read after the *Oriental Manner*, from the Right-hand to the Left. The Words are these, with the *Crucifix* before, as follows :

✠ ΕΠΙ ΛΕΡΙΣ ΕΠΙΕΚ• Τε ΕΥΝΓΕΨΝ ΜΑΡΩΝΙε Τε ΧωΡΕΠΙΕΚ•

From hence our Guide led us to the *River*, by the Assistance of two little Hills, which are known by the Name of *Aff-Dien* ; our Way lying *North*, and a little bending to the *East*. The Sight of the *River* was a very pleasing Prospect : And to our great Comfort we found the *Water* very clear, happening to be there before the *Rains*, and after the *Snow-waters* (which swell and disturb it in the Summer-time) were all past. We pitched upon the *Reach* of the *River*, where it was not very broad, not being above *half a Musket-shot* over.

Oct. 12. This Morning about Sun-rise we proceeded on our Voyage, keeping along the Banks of the *River*, which for the most part led us *West* and *North-West* : And here we had pleasant Travelling, having the *River* on the Right-hand, and Hills of *Marble*, or other fine Stone, on the Left ; and delightful Groves of *Tamarisk*, *Mulberry*, and other Trees, to pass through. Here every thing about us looked fresh and verdant ; and we met frequently Men and Women passing on their Occasions, a thing to which (in our former Stages) we had not been accustomed. We had also a pleasing Prospect of the opposite Shore, and could see a great Way into *Mesopotamia* : But we could meet with no Convenience to cross the *River*. There are no Places of Note remaining upon the *River*, either on one Side or the other ; only on the farther Side we saw an old *Castle*, called *Giabar*, which made a good Shew, being situated on the Top of a Hill, and both for that, and the Way of Building, very much resembling that of *Aleppo* ; only that is the larger, and in the midst of a City ; this less, and has neither Town nor Houses about it. On our Side we pass by a *Sbeck's House*; called *Abul-Rarra*, and the *Ruins* of a Town a little farther, where there was a square Tower,

Tower, built of very ordinary Brick, but pretty intire. After we had left these Ruins, we rested to bate under the Shadow of a Rock, wherein were many Apartments and Conveniencies cut to lodge in; which, I suppose, are made use of in the Winter by the People, who, during the Summer, pitch among the Trees by the River-side. In the Afternoon we continued our Journey as before, keeping always at a little Distance from the River, till a little before Sun-set, having travelled 7 or 8 Hours the whole Day.

Oct. 13. This Day we had the same Satisfaction as the Day before, proceeding as near the River as the Road would permit: And having made a Stage of about 6 Hours, we rested under the Shade of the Tamarisk-Trees by the River-side. In our Way we saw the Ruins of a City called *Baulus*, where the *Turks* had formerly a *Sangiac*: But now there is never an Inhabitant in the Place, nor a House standing, but the Ruins of Houses, and an octagonal Tower of a considerable Height, *viz.* 107 Steps, and beautified on the Outside with Flourishes, and an *Arabic* Inscription round about. It is a handsome Structure, and probably the Work of the *Mamelukes*, since whose Time little has been done to adorn, but abundance to destroy and waste this Country. After Dinner we mounted sooner than ordinary, because, hoping to reach the Tents of *Affyne*, we were unwilling it should be late when we arrived; yet we made it near Sun-set before we got to *Fay*, a Fountain by which he lay. We had travelled still on the same Point N. W. with the Prospect of the River the greater Part of the Way, the nearest Reach thereof not being above an Hour's riding from the Fountain. On the Road we met with several *Banderas* of the *Emir's* Soldiers; who, knowing our Guide, and understanding we were going to him, gave us a very courteous *Salam*; who else, perhaps, might have treated us with another Sort of Civility. The King's Tents spread over a large Plain, and took up so vast a Space, that, though we had the Advantage of a rising Ground, we could not see the uttermost Extent of them. His own particular Tent was pretty near the Middle of the rest, which were pitched about it, not in a circular Manner, but stretching out in Length as the Plain opened; or, for the better Conveniency of a Current of Water, which from the Fountain ran through the midst of them. 'Twas not at all distinguishable from the rest, but by its Bigness, and a little more Company about it; being all made of a Sort of Hair-cloth. It cannot well be doubted but they are descended from the old *Arabes Scenitæ*, they living just after the same manner, having no settled Abode, but remove from Fountain to Fountain, as they find Grass for their Sheep and Camels, and Water for them and themselves. They love to derive themselves from *Ismael*, the Son of *Abraham*.

As soon as we alighted, we were attended by the Officers of the *Emir*, and conducted to a very noble Tent, built after the *Turkish* Mode, and pitched next to his own. Hither he sent to bid us welcome, and to inquire how we had past in our Voyage; and presently after we had a Repast of several Dishes of Meat set before us, to stay our Appetites, till a more plentiful

tiful Supper could be got ready. But before Supper the *King* himself made us a Visit in Person, bidding us welcome to *Fay*, and asking what we had seen in our Travels that pleased? how we liked *Tadmor*? and whether we had found a Treasure there? For this Notion sticks in the Heads of these People, that the *Franks* go to see old Ruins, only because they there meet with Inscriptions which direct them to some hid Treasures. And therefore it is no unusual thing with them, when they find a Stone with an Inscription on one Side, to turn that down to the Ground, that it might not be seen or read of any. But we assured him we went with no such Expectations, but only out of a Desire to see the Place: Neither had we brought any-thing away with us but a Piece of Porphyry Stone, which, upon his Request, we shewed him. We let him see too a kind of rude Draught which we had taken of the Place, which he seemed to like. He made his Visit the shorter, that he might not incommode us after our Journey; but desired us we would live after our own Pleasure, and to our Satisfaction, and command freely whatever the Camp would afford; ordering some of his People constantly to attend upon us. When there was mention made of our Design to be gone the next Morning, he answered, it must not be; himself was invited, the next Day, to a great Entertainment, by one of his Grandees, and we should accompany him; but the Day following he would go out with us, and hunt Part of our Way towards *Aleppo*. When Supper was brought in, there was Victuals enough for three times our Number; a large Dish of *Pilaw* in the Middle, and 12 or 13 Dishes of several Sorts of Meat about it, all dressed after their Manner, but exceeding good. After we had eat and drank what we pleased, we rose up, and our Servants sat down in our Places, it being the Custom of the *Arabs*, and *Turks* too, from the highest to the meanest, all to eat at the same Table. The best Sort sit down first, and so in Order till all are satisfied, and then what remains is carried away. We might, if we had pleased, have lodged under the same Tent where we eat; but having Tents of our own pitched, some of our Company chose rather to retire thither, to avoid being disturbed by too many Visitants.

Oct. 14. The next Morning, about Ten o'Clock, we were told that the King was gone to the Entertainment, and expected we should follow him; and that two young Camels were killed to furnish this sumptuous Feast; which is the highest Piece of Magnificence and Greatness to which these People, whose greatest Riches consist in Camels, can arrive. The Tent was about a Furlong from ours; so mounting our Horses we rode to it, and found it surrounded with a numerous Train of Guests, 300 at least, of different Sort and Quality. It was very large of itself; and, to be still more capacious, it was left open toward the West. The King was seated at the North End, about the Midst of the Tent, upon a Place raised with Cushions and Quilts, and Carpets before him; neither did he sit cross-legg'd, as all the rest of the Company were obliged to do, but in a leaning Posture. They seemed to observe an exact Order in their Places; and when any Person of Note entered, those that were near his Place rose up, and stood till he had seated

seated himself. But the far greatest Part could not come within the Compass of the Ring, but stood behind the Backs of the rest, leaving a spacious *Area* vacant in the middle. When we entered, they made Room for us on the *King's Left-hand*, which here is esteemed the more honourable; where we sat down in the same Posture with those about us, *Cross-legged*, upon a thin *Carpet*. Before Mid-day a *Carpet* being spread in the middle of the *Tent*; our Dinner was brought in, being served up in large wooden Bowls between two Men; and truly, to my Apprehension, Load enough for them. Of these great Platters there were about 50 or 60 in Number, perhaps more, with a great many little ones, I mean, such as one Man was able to bring in, strewed here and there among them, and placed for a Border or Garnish round about the Table. In the middle of all was one of a larger Size than all the rest, in which were the *Camels Bones*, and a thin *Broth* in which they were boiled: The other greater ones seemed all filled with one and the same Sort of Provision, a kind of *Plum-Broth* made of *Rice*, and the fleshy Part of the *Camel*, with *Currans* and *Spices*, being of somewhat a darker Colour than what is made in our Country. The lesser were, for the most part, charged with *Rice*, dressed after several Modes, some of them having *Leben* (a thick sour Milk) poured upon them. *Leben* is a thing in mighty Esteem in these hot Countries, being very useful to quench *Thirst*: And truly we had need of it here; for I did not see a Drop of any sort of *Liquor*, excepting a Dish of *Coffee* before Dinner, drank at this splendid Feast. *Knives, Forks, Spoons, Trenchers, &c.* are silly impertinent Things in the Esteem of the *Arabs*: However, we being known to make use of such things, had large wooden Spoons laid before us. When the Table was thus plentifully furnished, the *King* arising from his Seat, went and sat down to that Dish that was directly before him; and so did the rest, as many as it would contain; which could not be much short of 100; and so without any further Ceremony they fell to, thrusting their Hands into the Dishes, and eating by Handfuls. Neither was there any occasion of *Carving*; only because those Dishes in the middle were too remote to be reached, there was an Officer on purpose, who stepping in among them, and standing in Places designedly left for that End, with a long Ladle in both his Hands, helped any one according to their Desires. When the *King* had eaten what he thought fit, he rose up and washed, and retired back to his former Seat; and we also did the like, others being ready to fill our Places. Nor did we continue much longer under the *Tent* in that numerous Croud; for *Assyne* perceiving us a little uneasy, and supposing we had now sufficiently satisfied our Curiosity, though perhaps not our Appetites, told us, we might take our Liberty, and, if we thought fit, retire to our Tents. This Favour we gladly accepted, and without Ceremony returned, several of his Attendants waiting upon us back. Here we had another Dinner set before us, and having some of our own Wine and Water to drink with it, it went down better with us than the famous *Camel-Feast*. In the Evening, the *King* mounted to see the Flight of a new *Hawk*, and stayed abroad very late, his *Hawk* flying

ing away ; but she was afterwards taken up by his *Falconer* ; otherwise he had not been in a good Humour all that Night, being a Man that delights very much in Sport. After his Return from *Hawking*, we went to wait upon him at his own Tent, to return him Thanks for his most courteous and royal Reception of us, and to desire Leave to depart the next Morning. Here we found him surrounded with the chiefest of his People ; and being placed again on his *Left-Hand*, he entertained us with a great deal of pleasant Discourse, and asked such Questions as shewed him to be a Man of extraordinary Capacity and Judgment. As for Learning, they have no such thing among them, and therefore it is not to be expected that he should be a Scholar : But were he not a Person of more than common Prudence and Understanding, he could never have managed that wild and unruly People as he has done ever since his Advancement to the Throne ; which must therefore have been the more difficult, because as he came to it by the *Deposition* of his *Father* (though not immediately) who now lives with him as a private Man, so has he never wanted Competitors. To his *Father* he pays a great deal of outward Respect, but is forced to keep a very watchful Eye over him. After about an Hour's Discourse, we were dismissed.

Oct. 15. In the Morning, *Affyne* not being at leisure to go a *Hunting*, we proceeded on our Voyage homewards, with a great deal of Alacrity ; and in about three *Hours* and a *half* arrived at *Seray* : And hence, after a short Repast, we continued our Journey to *Sherby Fountain*, which took us up about the like Space of Time. Here we accounted ourselves as good as at Home, being at a Place with which we were well acquainted, and to which several times in the Year some or other of our Nation usually resort, either for *Gazel* or *Hog-hunting*, according to their Season ; nor had we hence above 7 or 8 *Hours* to *Aleppo*.

Oct. 16. Getting up pretty early in the Morning, we resolved to hunt the greatest Part of our Way home, as we did ; and dining at the famous *Round-Hill*, whereon has been spent by the *English*, more Money than would purchase a noble Estate round about it, in the Afternoon we arrived at *Aleppo*.

3. We departed from *Aleppo* on *Michaelmas-day*, 1691, and in 6 easy *Days* Travel over a *desart* Country, came to *Tadmor*. As we rode into the Town, we took notice of a *Castle* about *half* an *Hour's* Distance from it, and so situated as to command both the Pass into the Hills by which we entered, and the City too. But we could easily perceive it was no *old Building*, retaining no Foot-steps of the exquisite Workmanship and Ingenuity of the *Antients*. Upon Inquiry, we were informed that it was built by *Man-Ogle*, a Prince of the *Druces*, in the Reign of *Amurath the Third*, A. D. 1585. But I know not how to give much Credit to this Story, because I find not that either *Man-Ogle*, or any *Drucian* Prince, was ever powerful in these Parts, their Strength lying on Mount *Libanus*, and along the Coast of *Sidon*, *Berytus*, &c. It is a Work of more Labour than Art, and the very Situation alone is enough to render it almost impregnable ; standing on the Top of a
very

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very high Hill, inclosed with a deep Ditch, cut out of the very Rock, over which there was only one sole Passage by a Draw-bridge: This Bridge too is now broken down, so that there is no Entrance remaining, unless you will be at the Pains to clamber up the Rock, which is in one Place feasible, but withal so difficult and hazardous, that a small Slip may endanger one's Life. Nor is there any-thing within to be seen sufficient to recompense your Trouble of getting up to it, the Building being confused, and the Rooms very ill contrived. Upon the Top of the Hill there is a Well of a prodigious Depth; as certainly it must be a great way to come at Water from the Top of such a Rock, the Ditch that surrounds it not having the least Appearance of Moisture therein; which made it therefore seem more strange, that a wild Boar should rush out thence amongst our Horses, when we rode up to take a more particular View of the Place.

This Castle stands on the North Side of the Town; and from hence you have the best Prospect of the Country all about. You see *Tadmor* under you, inclosed on three Sides with long Ridges of Mountains, which open towards the East gradually to the Distance of about an Hour's riding; but to the South stretches a vast Plain, beyond the Reach of the Eye. In this Plain you see a large Valley of *Salt*, affording great Quantities thereof, and lying near about an Hour's Distance from the City. And this more probably is the *Valley of Salt*, mentioned 2 *Sam.* viii. 13. where *David* smote the *Syrians*, and slew 18,000 Men, than another which lies about four Hours from *Aleppo*, and has sometimes past for it. The Air is good, but the Soil exceeding barren, nothing green to be seen therein, save some few Palm-Trees in the Gardens, and here and there about the Town. And from these Trees I conceive it obtained its Name, both in *Hebrew* (*Tadmor*, which signifies a Palm-Tree) and in *Latin* (*Palmyra*) and the whole Country is thence denominat'd *Syria Palmyrena*; and sometimes *Solitudines Palmyrene*: So that the *Latins* did not change, but only translate the old Name, which therefore still obtains in these Eastern Parts, and the more modern is wholly unknown. The City itself appears to have been of a large Extent, by the Space now taken up by the Ruins; but there are no Footsteps of any Walls remaining, nor is it possible to judge of the antient Figure of the Place. The present Inhabitants, as they are poor, miserable, dirty People, so they have shut themselves up, to the Number of about 30 or 40 Families, in little Huts made of Dirt, within the Walls of a spacious Court, which inclosed a most magnificent Heathen Temple. Hereinto also we entered, the whole Power of the Village, if I may so call it, being gathered together at the Door, whether to stand upon their Defence, in case we proved Enemies (for some of them had their Guns in their Hands), or out of mere Curiosity to gaze upon us, I know not. However, our Guide, who was an *Arab*, whom *Affyne*, their present King, had sent to conduct us through the whole Voyage, being a Man known among them, we had an easy Admittance, and, with a great many Welcomes in their Language, were led to the *Sbeck's* House, with whom we were to make our Abode. And

to mention here what the Place at first View represents; certainly the World itself cannot afford the like Mixture of *Remains* of the greatest *State* and *Magnificence*, together with the Extremity of *Filth* and *Poverty*. The nearest Parallel I can think of, is that of the *Temple of Baal*, destroyed by *Jebu*, and converted into a *Draught-House*. And if, what is not improbable, this very Place was a *Temple of Jupiter Belus*, the Similitude will run upon all four.

The whole inclosed Space is a *Square* of 220 *Yards* each Side, encompassed with a high and stately *Wall*, built of large square Stone, and adorned with *Pilasters*, within and without, to the Number (as near as we could compute by what is standing of the *Wall*, which is much the greater Part) of 62 on a Side. And had not the Barbarity of the *Turks*, Enemies to every thing that is *Splendid* and *Noble*, out of a vain Superstition, purposely beat down those beautiful *Cornices*, both here and in other Places, we had seen the most curious and exquisite *Carvings* in *Stone*, which perhaps the World could ever boast of; as here and there a small *Remainder*, which has escaped their Fury, does abundantly evidence. The *West-side*, wherein is the Entrance, is most of it broken down, and near the Middle of the Square, another higher *Wall* erected out of the *Ruins*; which shews to have been a *Castle* strong, but rude; the old Stones, and many *Pillars* broken or sawn asunder, being rolled into the *Fabrick*, and ill cemented. Within were to be seen the *Foundations* of another *Wall*, which probably might answer the *Front*; and that the *Mamalukes*, whose Workmanship it seems most likely to have been, built the *Castle* here for the Security of the Place. Before the whole Length of this new Front, except a narrow Passage, which is left for an Entrance, is cut a deep *Ditch*, the Ascent whereof on the Inner-side is faced with Stone to the very Foot of the *Wall*, which must have rendered it very difficult to have assaulted it. The Passage to, and the Door itself is very narrow, not wider than to receive a loaded *Camel*, or that two Foot-men may well walk a-breast. And as soon as you are within the first Door, you make a short Turn to the Right, and pass on to another of the like Bigness, which leads into the *Court*. But all this is but a new Building upon an old, and by this outward Wall is quite shrouded that *Magnificent Entrance* which belonged to the first *Fabrick*; of the Stateliness whereof we were enabled to judge by the two Stones which supported the Sides of the great *Gate*, each of which is 35 *Foot* in Length, and artificially *carved* with *Vines* and *Clusters of Grapes*, exceeding bold, and to the Life. They are both standing, and in their Places; and the Distance between them, which gives us the Wideness of the *Gate*, 15 *Foot*. But all this is now *walled* up to the narrow Door before-mentioned. Over the little Door there is an *Inscription* in *Greek*, and also another in another *Language* and *Character*, which I never saw till in *Tadmor*, nor understand what to make of it. From that in *Greek* we hoped for some Information; but it will be evident to any one that reads it, that the Stone was brought from another Place, and casually put in there. 'Tis thus:

ΤΟ ΜΝΗΜΕΙΟΝ ΤΟΥ ΤΑϛϵωΝΟC ΕΚΤΙϵΝΕΞΙΔΙΩΝ
 CΕΠΤΙΜΙΟC Ο ΔΑΙΝΑΘΟC Ο ΛΑΜΠΡΟΤΑΤΟC
 CΥΝΚΛΗΤ [ΙΚΟC] ΑΙΡΑΝΟΥ ΟΥ ΑΒΑΛΛΑΘΟΥ ΤΟΥ
 ΝΑCωΡΟΥ ΑΥΤωΤΕ ΚΑΙ ΥΙΟΙC ΑΥΤΟΥ ΚΑΙ ΥΙωΝΟΙC
 ΕΙC ΤΟ ΠΑΝ ΤΕΛΕC ΑΙωΝΙΟΝ ΤΕΙΜΗΝ.

Fig. 64.

Under this was the *unknown Character*, which I shall here give you a *Specimen* of, as well as it could be taken.

The Letters between these [] *Marks* were not legible, but I have ventured to supply the *Defect*, as also you will see in some others following. Neither was the ϵ in ΜΝΗΜΕΙΟΝ upon the *Stone*, but was doubtless omitted by Mistake; and the *Inscription* is nothing else but the *Inscription* of a *Sepulchre*, the like to which we saw several. And as for the other *Character*, it being added almost under every *Greek Inscription* we saw, and rarely found alone, I am apt to believe it the *Native Language* and *Character* of the Place, and the Matter it contains, nothing else but what we have in the *Greek*.

As soon as you are entered within the Court, you see the *Remainders* of two *Rows* of very noble *Marble Pillars*, 37 *Foot* high, with their *Capitals* of most exquisite *carved Work*; as also must have been the *Cornices* between them, before by rude and superstitious Hands they were broken down. Of these there are now no more than 58 remaining intire; but there must have been a great many more, for they appear to have gone quite round the whole Court, and to have supported a most spacious double *Piazza* or *Cloister*. Of this *Piazza* the *Walks* on the West-side, which is opposed to the *Front* of the *Temple*, seem to have exceeded the other in Beauty and Spaciousness; and at each End thereof are two *Niches* for *Statues* at their full Length, with their *Pedestals*, *Borders*, *Supporters*, and *Canopies*, carved with the greatest Artifice and Curiosity. The Space within this once beautiful Inclosure, which is now filled with nothing but the dirty Huts of the Inhabitants, I conceive to have been an open Court, in the midst whereof stands the *Temple*, encompassed with another *Row* of *Pillars* of a different *Order*, and much higher than the former, being above 50 *Foot* high. Of these remain now but 16. But there must have been about double that Number, which whether they inclosed an Inner Court, or supported the Roof of a *Cloister*, there being now nothing of a Roof remaining, is uncertain: Only one great Stone lies down, which seems to have reached from these *Pillars* to the *Walls* of the *Temple*. The whole Space contained within these *Pillars*, we found to be 59 *Yards* in Length, and in Breadth near 28. In the midst of which Space is the *Temple*, extending in Length more than 33 *Yards*, and in Breadth 13 or 14. It points North and South, having a most magnificent *Entrance* on the West, exactly in the middle of the Building; which, by the small *Remains* yet to be seen, seems to have been one of the most glorious Structures in the World. I never saw *Vines* and *Clusters* of *Grapes* cut in Stone so bold, so lively, and so natural in any Place. Just over the *Door* we could make a shift to discern part of the *Wings* of a large Spread-Eagle, extending the whole Wideness thereof: The Largeness whereof

whereof led me at first to imagine it might have been rather a *Cherub* overshadowing the *Entrance*, there being nothing of the Body remaining to guide one's Judgment; and some little *Angels* or *Cupids* appear still in the Corners of the same Stone. But afterwards seeing other *Eagles* upon Stones that were fallen down, I conclude this must have been one likewise, only of a much larger Size. Of this *Temple* there is nothing at present but the outward Wall standing, in which it is observable, that as the *Windows* were not large, so they were made narrower towards the Top than they were below, but all adorned with excellent *Carvings*. Within the Walls the *Turks*, or more probably *Mamalukes*, have built a *Koof*, which is supported by small *Pillars* and *Arches*; but a great deal lower, as well as in all other respects disproportionate and inferior to what the *antient Covering* must have been. And they have converted the Place into a *Mosque*, having added to the South-end thereof new Ornaments after their manner, with *Arabick Inscriptions* and Sentences out of the *Alcoran*, wrote in Flourishes and Wreaths, not without Art: But at the North-end of the Building, which is shut out of the *Mosque*, are *Reliques* of much greater Artifice and Beauty. Whether they were in the nature of *Canopies* over some *Altars* placed there, or to what other Use they served, I am not able to conjecture. They are beautified with the most curious *Fretwork* and *Carvings*; in the midst of which is a *Dome* or *Cupola*, above 6 Foot Diameter, which we found above to be of one Piece; whether hewn out of a Rock intire, or made of some *artificial* Cement or Composition, by Time hardened into a *lapideous* Substance, seems doubtful; though I am rather inclined to believe the latter. It is, in fine, a most exquisite Piece of Workmanship, and on which I could have bestowed more Time to view it than what was allowed us.

Having passed by the *Ruins* of a handsome *Mosque*, we had the Prospect of such *magnificent Ruins*, that if be lawful to frame a Conjecture of the original Beauty of that Place, by what is still remaining, I question somewhat whether any City in the World could have challenged Precedence of this in its Glory.

Advancing towards the North, you have before you a very tall and stately *Obelisk*, or *Pillar*, consisting of 7 large Stones, besides its *Capital* and the wreathed Work about it; the *Carvings* here, as in all other Places, being extraordinary fine. The Height of it is above 50 Foot, and upon it I conceive may have stood a *Statue*, which the *Turks*, zealous Enemies of all *Imagery*, have thrown down and broken in pieces. It is in Compass, just above the *Pedestal*, 12 Foot and a half. On each Hand of this, towards the East and West, you see two other large *Pillars*, each a Quarter of a Mile distant from you, which seem to have some Correspondence one to the other. And there is a Piece of another, standing near that of the East, which would incline one to think there was once a continued *Row* of them. The Height of this to the East I took with my *Quadrant*, and conclude to be more than 42 Foot high, and the Circumference proportionable. Upon the Body thereof is the following *Inscription*;

Η ΒΟΥΛΗ ΚΑΙ Ο ΔΗΜΟΣ ΑΛΙΛΑΜΕΝΑ ΠΑΝΟΥ ΜΟΚΙΜΟΥ
 ΤΟΥ ΑΙΡΑΝΟΥ ΤΟΥ ΜΑΘΘΑ ΑΙΡΑΝΗΝ ΤΟΝ ΠΑΤΕΡΑ
 ΑΥΤΟΥ ΕΥΣΕΒΕΙΣ ΚΑΙ ΦΙΛΟΠΑΤΡΙΔΑΣΚ[ΑΙ] ΠΑΝΤΙ ΤΡΟΠΩ
 [ΕΥ] ΣΕΙΜΩΣ ΑΡΕΣΑΝΤΑΣ ΤΗ ΓΑΤΡΙΔΙ ΚΑΙ ΠΑΤΡΙΟΙΣ
 ΕΞΟΙΣ ΤΕΙΜΗΣ ΧΑΡΙΝ ΕΤΟΥΣ ΝΥΛ ΜΗΝΟ ΞΑΝΔΙΣΟΥ.

It seems evident by this and some following *Inscriptions*, that they were a *Free State*, governed by a *Senate* and *People*, though perhaps under the Protection of greater *Empires*; the *Parthians*, it is probable, first, and afterwards the *Romans*, who for a long time contended for the Mastery here in the East. And this Government might continue among them till about the Time of *Aurelian*, who demolished the Place, and led *Zenobia*, Wife of *Odenatus*, Captive to *Rome*; who, though she be called *Queen*, yet I find not that ever her Husband had the Title of *King*, but was only one of the chief Inhabitants, a leading Man in the *Senate* (as it is probable these *Alilamanes* and *Airanes* were before him) who while the *Romans* were busied in *Europe*, made himself great here, and by his own Force repelled the *Parthians*; who having mastered whatever was held by the *Romans* on the other side of *Euphrates*, made an Incurfion into *Syria*, but were by *Odenatus* driven back beyond the River. In the Course of these Wars *Odenatus* was slain; but his Wife *Zenobia*, being a Woman of a Masculine Spirit, not only kept her Ground against her Enemies abroad, but maintained her Authority at home, keeping the Government in her Hands. Afterwards, out of a Desire to cast off the *Roman Yoke*, she caused the whole Garifon, which was left there by *Aurelian*, to be barbarously cut off. Which bringing *Aurelian* back with his Army, he quickly took the City and destroyed it, putting the Inhabitants to the Sword, and carrying *Zenobia* Captive to *Rome*; which was the fatal Period of the Glory of that Place. This Custom of theirs of running up their *Genealogies* or *Pedigrees* to the 4th or 5th Generation, shews them to have borrowed some of their Fashions from their Neighbours the *Jews*, with whom it is not unlikely they had of old great Commerce; and perhaps many of them were descended from that People, *Zenobia* herself being said to have been a *Jewess*; or else this must have been the Manner of all the *Eastern Nations*. Their *Æra*, or Account of Time, they begin from the *Death* of *Alexander the Great*, as the *Syrians* generally do; the very *Christians* at this Day following the same Usage. Yet though they mark the Date of the *Year* by *Greek Letters*, you may observe they place them a different way from the *Greeks*, setting the lesser Number first, as if they were to be read backward from the Right-hand to the Left; ΝΥ here, denoting 450. The third Letter Α, I take to stand for the *Day* of the *Month*, viz. the last of *Xandicus*, which is with us *April*; this and other Names of *Months*, which are found in other *Inscriptions*, being borrowed from the *Macedonians* with very little Variation. That they were *Idolaters* is plain by the mention of their Country Gods, both here and in other Places; so that their Commerce with the *Jews* did not, it seems, bring

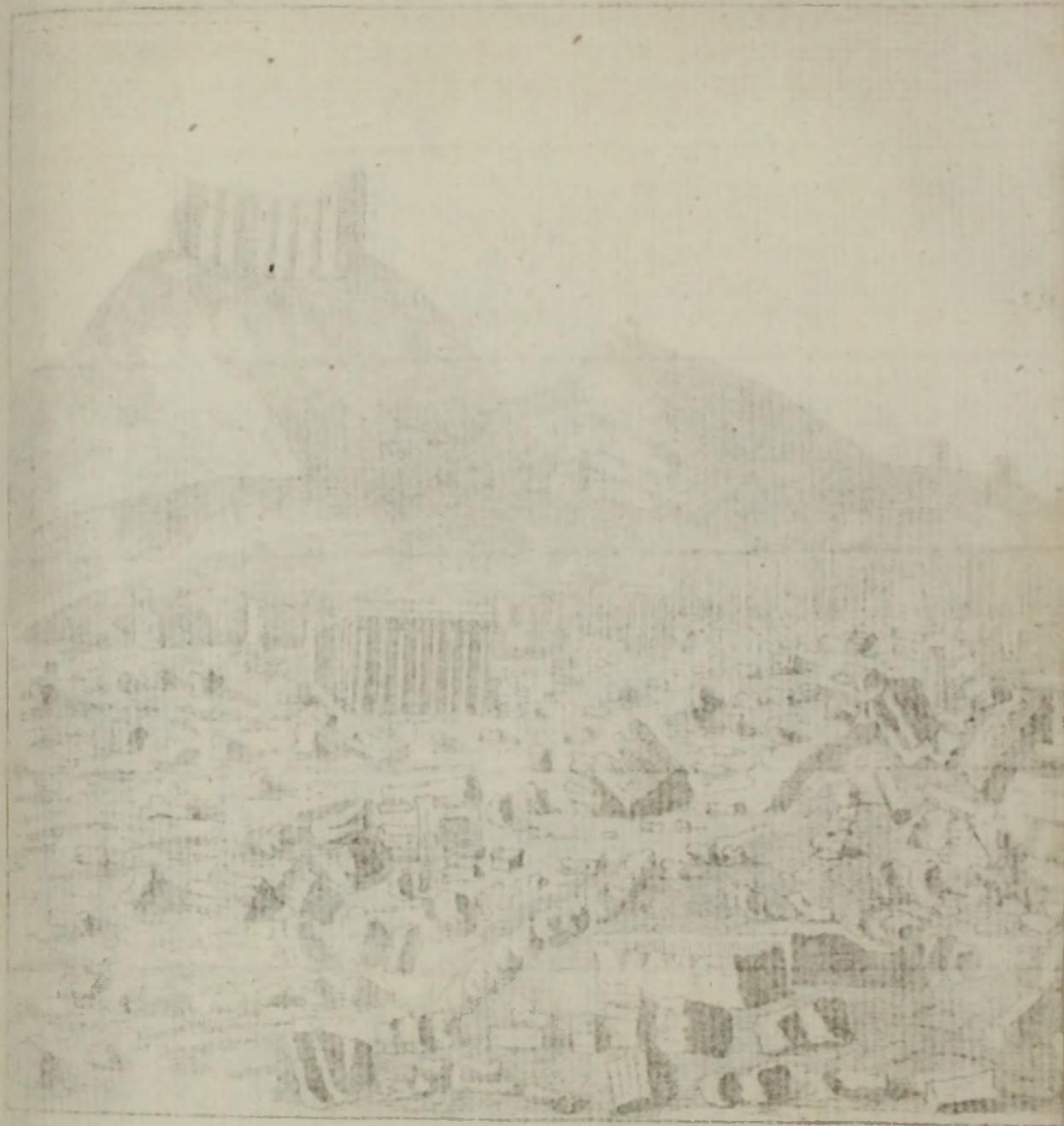


Fig. 63.



bring them to the Knowledge of the true God ; or else they must have degenerated therefrom, and relapsed into *Idolatry*. The other *Pillar* towards the West in Height and Circumference answers this, and has upon the Side the following *Inscription* engraved.

Η ΒΟΥΛΗ ΚΑΙ Ο ΔΗΜΟΣ ΒΑΡΕΙΧΕΙΝ ΑΜΡΙΣΑΜΟΥ ΤΟΥ
 ΙΑΡΙΒΩΛΕΟΥΣ ΚΑΙ ΜΟΚΙΜΟΝ
 ΥΙΟΝ ΑΥΤΟΥ ΕΥΣΕΒΕΙΣ ΚΑΙ
 ΦΙΛΟΠΑΤΡΙΔΑΣ ΤΕΙΜΗΣ ΧΑΡΙΝ

The Date of this is not legible, neither does one know what Judgment to make of the thing itself. That such a *Pillar* should be erected only to support the *Inscription*, and convey these Mens Names to After-ages, without particularizing what they did to deserve that Honour, is something strange ; unless we may suppose it was a prevailing *Vanity* in these *Eastern* Countries, thus to endeavour to eternize their Fame ; an Instance whereof we have in *Scripture*, in *Absalom's* setting up a *Pillar*, and perhaps before ^{2 Kings} him, in *Saul*. Otherwise it may appear no improbable Conjecture, that ^{xviii. 18.} the *Pillar* was erected long before upon some other Occasion, and after- ^{1 Sam. xv.} wards made use of to this End : And I look upon it as past all Doubt, that ^{12.} several other *Inscriptions* which we saw, were much more modern than the *Pillars* on which they were engraved.

Proceeding forward, directly from the *Obelisk*, about 100 *Paces*, you come to a magnificent *Entrance*, vastly large and lofty, and for the Exquifiteness of the Workmanship not inferior to any thing before described. This *Entrance* leads you into a noble *Piazza* of more than half a *Mile* long (930 *Yards* according to our measuring) and 40 *Foot* in Breadth, inclosed with two *Rows* of stately *Marble Pillars*, 26 *Foot* high, and 8 or 9 about. Of these remain standing and intire 129 ; but by a moderate Calculation, there could not have been less than 560. Covering there is none remaining, nor any *Pavement* at the Bottom, unless it be buried under the Rubbish : But upon almost all the *Pillars* we found *Inscriptions*, both in *Greek* and the Language *unknown*, of which we had but Time to take these few, and those not very instructive.

ΙΟΥΛΙΟΝ ΑΥΡΗΛΙΟΝ ΖΕΒΕΙΔΑΝ ΜΟΚΙΜΟΥ ΤΟΥ
 ΖΕΒΕΙΔΟΥ ΑΣΘΡΟΒΑΙΔΑΟΙ ΣΥΝ
 Α[Υ]ΤΩ ΚΑΤΕΛΘΟΝΤΕΣ ΕΙΣ ΟΔΟΓΕΣΙΑΔΑ ΕΝ Π
 ΟΡΟΙΑΝ ΕΣΤΗΣΑΝ ΑΡΕΣΑΝΤΑ ΑΥΤΟΙΣ ΤΕΙΜΗΣ
 ΧΑΡΙΝ ΞΑΝΔΙΚΩ ΤΟΥ ΗΝΦ ΕΤΟΥΣ

This last *Inscription* seems to have been put in Memory of an *Embassy*, performed by those Men that are named therein, for settling a Commerce and Traffick, which was to their Satisfaction accomplished. But with whom, till I can find out what Place is meant by ΟΔΟΓΕΣΙΑΔΑ, I must remain ignorant. I am unwilling to entertain any Thoughts of *Getia* in
 Macedonia,



Macedonia, or of *Olgassus*, a Place mentioned by *Strabo* in *Bithynia*, which comes a little nearer the Name; being both so remote, and the City of *Tadmor* so ill contrived for a Place of Trade, being far from the Sea, and without the Advantage of any River: Yet the *Magnificence* of the Place shews they have not wanted Riches among them: And their *Salt* is a Commodity which still brings them in a considerable Advantage. The Order of the *Numeral Letters* you may take notice is again inverted; but taking them the right Way, the Year 558 falls in with the last Year of *Alexander Severus*, which is of our Lord 234.

About the Middle of the *Piazza*, upon another *Pillar*, was this following *Inscription*:

Η ΒΟΥΛΗ ΚΑΙ Ο ΔΗΜΟΣ ΙΟΥΛΙΟΝ ΑΥΡΗΛΙΟΝ ΖΗΝΟ-
ΒΙΟΝ ΤΟΝ ΚΑΙ ΖΑΒΔΙΛΑΝ ΔΙΣΜΑΛΧΟΥ ΤΟΥ ΝΑССΟΥ-
ΜΟΥ ΣΤΡΑΤΗΓΗΣΑΝΤΑ ΕΝ ΕΠΙΔΗΜΙΑ ΘΕΟΥ ΑΛΕΞΑΝ-
ΔΡΟΥ ΚΑΙ ΥΠΗΡΕΤΗΣΑΝΤΑ ΠΑΡΟΥΣΙΑ ΔΙΗΝΕΚΕΙ ΡΟΥ-
ΤΙΛΛΙΟΥ ΚΡΙΣΠΕΙΝΟΥ ΤΟΥ ΗΓΗΣΑΜΝΕΟΥ ΚΑΙ ΕΠΙΔΗ-
ΜΗΣΑΝΤΕΣ ΟΥΤΕΙΛΛΑΤΙΟΝ ΑΓΟΡΑΝΟΜΗΣΑΝΤΑ ΤΕ
ΚΑΙ ΟΥΚΟΝΙΣΩΝΑ ΦΕΙΔΗΣΑΝΤΑ ΧΡΗΜΑΤΩΝ ΚΑΙ ΚΑΛΩΣ
ΠΟΛΕΙΤΕΥΣΑΜΕΝΟΝ ΩΣ ΔΙΑ ΤΑΥΤΑ ΜΑΡΤΥΡΗΘΕΝΤΑ
ΥΠΟ ΘΕΟΥ ΙΑΡΙΒΩΛΟΥ ΚΑΙ ΥΠΟ ΙΟΥΛΙΟΥ ΤΟΥ
ΕΞΟΧΩΤΑΤΟΥ ΕΠΑΡΧΟΥ ΤΟΥ ΙΕΡΟΥ ΠΡΑΙΤΩΡΙΟΥ ΚΑΙ
ΤΗΣ ΠΑΤΡΙΔΟΣ ΤΟΝ ΦΙΛΟΠΑΤΡΙΝ ΤΕΙΜΗΣ ΧΑΡΙΝ ΕΤΟΥΣ
ΔΝΦ.

This is as perfect an *Inscription* as any I met with, by the Help of which we may make a Judgment of all the rest; at least thus far, that they were put up in Memory of some who had behaved themselves in those publick Offices they bore, either in their own Republick, or under the *Romans*, with Commendation: This being a publick Place, where their Names and worthy Actions were recorded and transmitted to Posterity. What I further observed particularly in this, was the want of the Name after ΙΟΥΛΙΟΥ, and took notice of the like Space vacant in the other *Language* under it; and in both Places it seemed to be not worn out with Time, but voluntarily scratched out: Which confirms me in the Opinion that they are both one, and that the *unknown* was the *vulgar*, as the *Greek* was the *learned Language* of the Place.

Upon another *Pillar* in the same Walk was this:

ΣΕΠΤΙΜΙΟΝ ΟΥΡΩΔΗΝ ΤΟΝ ΚΡΑΤΙΣΤΟΝ ΕΠΙΤΡΟΠΟΝ
ΣΕΒΑΣΤΟΥ ΔΟΥΚΗΝΑΡΙΟΝ ΚΑΙ ΑΡΟΠΕΤΗΝ ΙΟΥΛΙΟΣ
ΑΥΡΗΛΙΟΣ ΕΛΜΗΣ ΚΑΚΚΙΑΝΟΥ ΤΟΥ Μ[Ε]ΛΕΝΑΙΟΥ
ΙΠΠΕΥΣ ΡΩΜΑΙΩΝ ΤΟΝ ΦΙΛΟΝ ΚΑΙ ΠΡΟΣΤΑΤΗΝ ΕΤΟΥΣ
Η Ο Φ . . ΜΗΝΕΙ [Ξ] ΑΝΔΙΚΩ.

From another *Pillar* in the same *Piazza* was transcribed this broken *Inscription* which follows; which I have endeavoured to make up from the former,

former, believing them in Substance the very same, with little Alteration of Names.

ΣΕΠΤΙΜ[ΙΟΝ ΟΥΡΩΔΗΝ] ΤΟΝ ΚΡΑ[ΤΙΣΤΟΝ ΕΠΙΤΡΟ]-
ΠΟΝ ΣΕΒΑΣ[ΤΟΥ ΔΟΥΚ]ΗΝΑΡΙΟΝ ΚΑ[Ι ΑΡΟΑΠΕ]ΤΗΝ
ΙΟΥΛΙΟΣ ΑΥ[ΡΗΛΙ]ΟΣ Ε[ΑΛΜΗΣ] ΠΥΛΑΙΟΣ Μ[ΕΛΕΝΑΙ]ΟΣ
ΜΑΛΩΧΑΝΑΣΣΟΥ ΜΟ[Υ] ΟΚΡΑΤΙΣΤΟ[Σ ΤΟΝ] [ΦΙΛΟΝ] ΚΑΙ
ΠΡΟΣΤΑΤΗΝ ΤΕΙΜΗΣ ΕΝΕΚΕΝ ΕΤΟΥΣ [ΜΗΝ ΕΙΞ]
ΑΝΔΙΚΩ.

What we may collect from both these *Inscriptions*, and divers others of a like Import, is, that as the *State*, the *Senate*, and *People* did sometimes honour those that had been in publick Trust with *Inscriptions* on these *Pillars*; so when this was not done by them, *private* Persons had the Liberty to do the same for their *Friends*. And I shall give you an Instance, by-and-by, of one engraven by a *Husband* in Memory of his *Wife*.

Upon several of these *Pillars* are little *Pedestals* jetting out about the Middle of them, sometimes one Way only, and sometimes more, which seem to have been the *Bases* or Standing-Places of *Statues*. On these *Pedestals* we saw many *Inscriptions*, sometimes when there was none upon the Body of the *Pillar*, and sometimes when there were. As for Instance, this that follows upon the *Pedestal*, thus;

ΣΕΠΤΙΜΙΟΝ ΑΙΡΑΝΗΝ ΟΔΑΙΝΟΘΟΥ ΤΟΝ ΛΑΜΠΡΟΤΑ-
ΤΟΝ ΣΥΝΚΛΗΤΙΚΟΝ.

And upon the *Body* of the *Pillar* this imperfect one;

ΕΞΑ ΝΤΩΝ ΑΥΡΗΛΙ ΡΗΛΙΟ ΔΩΡ ΣΤΡΑ-
ΤΙΩΤΗΣ ΔΕ ΚΗΣ ΤΩΝ ΠΑΤΡΩΝ ΤΕΙΜΗΣ ΚΑΙ ΕΥΧΑ-
ΡΙΣΤΙΑΣ ΧΑΡΙΝ ΕΤΟΥΣ ΤΞΦ.

We see they esteemed it very honourable to have their Memories preserved after this Manner; but it is but little Knowledge of them we can get from hence, save now-and-then the *Time* when they lived. As here, 563 *Years* after the *Death* of *Alexander*, reach to the *Year* of our *Lord* 239.

Another *Inscription* in the same *Piazza* was thus;

ΗΒΟΥΛ[Η ΚΑΙ ΟΔΗ] ΜΟΣ ΣΕΠΤΙΜΙΟΝ ΤΟΝ ΚΡΑΤΙΣΤΟΝ
Ε[ΠΙΤΡΟΠΟΝ] ΣΕΒΑΣΤΟΥ ΔΟΥΚΗΝ[ΑΡΙΟΝ] . . . ΕΟΔΟΤΗΝ
ΤΗΣ ΜΗΤ[ΡΟΚΟΛΩ] ΝΕΙΑΣ ΚΑΙ ΑΝΑΟΜΙΣΑ[ΝΤΑ Τ] ΑΣ
ΣΥΝΟΔΙΑΣ ΕΞ ΙΔΙΩΝ ΚΑΙ ΜΑΡΤΥΡΗΘΕΝΤΑ ΥΠΟ ΤΩΝ ΑΡ-
ΧΕΜΠΟΡΩΝ ΚΑΙ ΛΑΜΠΡΩΣ ΣΤΡΑΤΗΓΗΣΑΝΤΑ ΚΑΙ ΑΓΟΡΑ-
ΝΟΜΗΣΑΝΤΑ ΤΗΣ ΑΥΤΗΣ ΜΗΤΡΟΚΟΛΩ ΝΕΙΑΣ ΚΑΙ ΠΛΕΙ-
ΣΤΑ ΟΙΚΟΘΕΝ ΑΝΑΛΩΣΑΝΤΑ ΚΑΙ ΑΡΕΣΑΝΤΑ ΤΗ ΤΕ
ΑΥΤΗ ΒΟΥΛΗ ΚΑΙ ΤΩ ΔΗΜΩ ΚΑΙ ΝΥΝ ΕΙ ΛΑΜΠΡΩΣ ΣΥΜ-
ΠΟΣΙΑΡΚΟΝ ΤΩΝ ΤΟΥ ΔΙΟΣ ΒΗΛΟΥ ΙΕ[ΡΩΝ] ΤΕΙΜΗΣ ΕΝ
ΕΚ ΕΝ ΕΤ ΞΑΝΔΙΚΩ.

This

This affords a sufficient Confirmation of what I before observed, that these were honorary *Inscriptions* in Memory of those that had behaved themselves well in *publick Offices*; of which we have several mentioned here, whereof some are very well known, but the others not easy to be met with in *Books*. By the Word ΜΗΤΡΟΚΟΛΩΝΕΙΑC we may be assured, that though this City was reduced by the *Romans* into the Form of a *Colony*, yet it had a peculiar Mark of *Honour* set upon it, to signify that it was the Chief of their *Colonies* in these *Oriental Parts*; that the Authority also of their *Senate* and *People* was continued to them; and besides, that there was a *Society* of Men, either *Curators* of the *Temple* of *Jupiter Belus* (to whom the *Temple* before described perhaps was dedicated) or *Overseers* of the *Sports* and *Festivals* that were celebrated in Honour of him, of which *Sodality* this *Septimius* was, when this *Inscription* was made, a *Symposiarch*, perhaps their *Chief* and *Governor*. By this too we find they did not wait for the *Deaths* of those they thus *honoured*, before they provided for the *Preservation* of their *Memories*; but famous Men were thus *registred* for *After-ages* even while they were alive.

Upon one of these *Pedestals* before described, not far from the former, was the following *Inscription*; which I valued the more for the little Remainder it has preserved of the Name of *Palmyra*, by which the Place was known to the *Romans*.

..... ΤΠΙΛΙΟΝ ΟΥΡΩΔΗΝ [CYNKΛ] ΗΤΙΚΟΝ ΚΑΙ
 ΒΟΥΛ ΤΤΗΝ ΠΑΛΜΥΡΗΜΟΝΒΗΛΑ ΚΑΒΟCΑΡCΑ
 ΤΟΝ Φ[ΛΟΝ] ΤΕΙΜΗC ΧΑΡΙΝ ΕΤΟΥC ΟΦ.

The Upper-end of this *spacious Piazza* was shut in by a *Row* of *Pillars*, standing somewhat closer than those on each *Side*; and perhaps there might have been a kind of *Banqueting-House* above, but now no certain *Footsteps* thereof remain. But a little farther to the *Left-hand*, and, it may be, continued with the former *Walk*, lie the *Ruins* of a very stately *Building*, which I am apt to believe might have been for such an *Use*. It is built of a better *Marble*, and has an *Air* of *Delicacy* and *Exquifiteness* in the *Work* beyond what is discernible in the *Piazza*. The *Pillars* which supported it are of *one intire Stone*; and on one of them that is fallen down, but so firm and strong that it has received no *Injury* thereby, we measured and found 22 *Foot* in *Length*, and in *Compass* 8 *Foot* and 9 *Inches*. Among these *Ruins* we found the only *Latin Inscription* we saw in the *Place*, and that so imperfect, there is but little of it intelligible.

..... es Orbis & Propagatores Generis Humani DD. NN.
 Diocletianus fimi Impp. Et Constantius & Maximianus
 Nobb. Cæs. Castra feliciter condiderunt.

And upon the same *Stone*, a little lower,

..... nes

..... ntes *Offiano Hieroclete, V. P. Præf. Provinciæ D. N. M. O. Eorum.*

The Name of *Maximianus Hercules*, who was Partner in the Empire with *Dioclesian*, which should have followed in the Inscription, seems to have been on Purpose scratched out and defaced; for what Reason I cannot guess. The rest is lost by the breaking of the Stone.

In the West Side of the great Piazza are several Openings for Gates, leading into the Court of the Palace: Two whereof, one would easily believe, when they were in their Perfection, were the most magnificent and glorious in the World, both for the Elegancy of the Work in general, and particularly for those stately Porphyry Pillars with which they were adorned. Each Gate had 4, not standing in a Line with the others of the Wall, but placed by Couples in the Front of the Gate, facing the Palace; two on one Hand, and two on the other: Of these remain but two intire, and but one standing in its Place. They are about 30 Foot in Length, and 9 in Circumference: Of a Substance so exceeding hard, that it was with great Difficulty we broke off a few Shivers to bring home with us for a Pattern of the Stone; the Art of making which, I think, is quite lost. We saw several other broken Pieces of Porphyry, but neither of so accurate a Mixture and Composition, nor so large as the former.

The Palace itself is so intirely ruined, that no Judgment can be made what it was in its antient Splendor, either for the Figure or Workmanship thereof. There is only here and there a broken Piece of a Wall remaining beat into Pieces by Violence, and consumed by Time to that Degree, that without the Help of Tradition we could hardly be well assured that a *Royal Palace* did once fill that Space. We may guess, however, that it fronted the famous Piazza before-mentioned, and was surrounded with Rows of Pillars of different Orders; many of which are still standing, some plain, and some wrought and channell'd, as those immediately encompassing the *Temple*. And upon those little Pedestals which stood out of the Middle of some of them, I observed several *Inscriptions*, but could not conveniently take more than one, which, together with the Pillar that supported it, was fallen to the Ground. It was this;

ΜΑΡΘΕΙΝ ΑΛΕΞΑΝΔΡΟΥ ΤΟΥ ΚΑΠΑΔΗ ΤΟΥ ΟΥΑ-
ΒΑΛΛΑΘΟΥ ΤΟΥ ΣΤΜΩΝΟΥ ΣΟΡΑΙΧΟΣ ΑΙΡΑΝΟΥ
ΑΝΗΡ ΑΥΤΗΣ ΜΝΗΜΗΣ ΕΝΕΚΕΝ ΜΗΝΕΙ ΔΥΣΤΡΩ
ΤΟΥ ΞΥ ΕΤΟΥΣ.

If the rest were of a like Nature with this, we have lost no great Matter by not taking them, this being only a *Memorial* which a kind Husband caused to be set up in Honour of his Wife; the Month *Dystrus* answers to our *March*, and the Year 490, from the Death of *Alexander the Great*, the Year of our Lord 166.

I omitted to mention before, that under the *Long Walk* runs a Current of hot sulphureous Waters ; and there is a Well and other Passages down to them : But whatever they may have been of old, they are not now so convenient as another about half a Mile Westward from hence ; where there is a very good Descent into the Water, and it is still used by the People to bathe in. Near to which, upon the Pedestal of a broken Pillar (or perhaps it might be an Altar) remains this following *Inscription* :

ΔΙΙ ΥΨΙCΤΩ ΜΕΓΙCΤΩ ΚΑΙ ΕΠΗΚΩ ΒωΛΑΝΟC ΖΗΝΟ-
 ΒΙΟΥ ΤΟΥ ΑΙΡΑΝΟΥ ΤΟΥ ΜΟΚΙΜΟΥ ΤΟΥ ΜΑΘΘΑ ΕΠΙ
 ΜΕΛΕΤΗ CΟΗ ΑΙΡΕΘΕΙC ΕΦΚΑC ΠΗΓΗC ΥΠΟ ΙΑΡΙΒω-
 ΛΟΥ ΘΕΟΥ ΤΟΝ Βω[ΜΟΝ] ΕΞ ΙΔΙωΝ ΑΝΕΘΗΧΕΝ
 ΕΤΟΥC Δ Ο Υ ΜΗΝΟC ΥΠΕΡΒΕΡΕΤΑΙΟΥ Κ.

I am pretty confident that the Word I have marked with a Line under it, is rightly taken, and therefore know not what to guess it to be, unless the proper Name of the Fountain. And upon that Supposition the *Inscription* is easily intelligible, shewing that *Bolanus*, Son of *Zenobius*, &c. being elected Overseer or Curator of this Fountain under *Jaribolus*, built this Altar to *Jupiter* in the Year of *Alexander*, 474. *i. e.* of our Lord 150, and on the 20th of *October*, if the last *Kappa* be a Numeral, as I suppose it must. But who this *Jaribolus* was, on whom they bestow, as generally upon the *Roman* Emperors, whose Names occur in the *Inscriptions*, the Title of ΘΕΟC, is not so facile a Conjecture. They were under the *Parthians*, before the *Romans* fell in among them ; but the Date shews this to be after the Time of *Hadrian*, and so after their coming. Nay, and in an *Inscription* before-mentioned, which is of a later Date than this by 80 Years, we have the Name of the same Person.

Hot sulphureous Baths are Things very frequent in this Country ; and hence it is that it obtained the Name of *Syria Salutifera*. The Scent of the Waters here is much like those of *Bath* in *England*, but not so strong, neither is the Taste so offensive : On the contrary, when they have run so far from the Fountain, as to become cold, they are very potable, and are the only Water the Inhabitants use.

On the East-side likewise of the long *Piazza* stands, if I may use such an Expression, a Wood of Marble Pillars, some perfect, and others deprived of their beautiful Capitals ; but so scattered and confused, that it is not possible to reduce them into any Order, so as to conjecture to what they antiently served. In one Place are 11 together in a Square after this manner, paved at the Bottom with broad flat Stone, but without any Roof or Covering. And at a lit- tle Distance from that stand the Ruins of a small Temple, which, by the Remains, seems to have been for the Workmanship very curious. But the Roof is wholly gone, and the Walls very much defaced and consumed with Time. Before the Entrance, which looks to the South, is a
 Piazza

Piazza supported by 6 Pillars, two on one hand of the Door, and two on the other, and at each End one. And the Pedestals of those in the Front have been filled with *Inscriptions*, both in *Greek* and the other Language; but they are now so obliterated and worn out, as not to be intelligible. The most perfect was this that follows :

ΜΑΛΕΝΤΟΝ ΚΑΙΑΓΡΙΠΠΑΝ ΙΑΡΑΙΟΥ ΤΟΥ ΡΑΔΙΟΥ
ΓΡΑΜΜΑΤΕΑ ΓΕΝΟΜΕΝΟΝ ΤΟ ΔΕΥΤΕΡΟΝ ΕΠΙΔΗΜΙΑ
ΘΕΟΥ ΑΔΡΙΑΝΟΥ ΑΛΙΜΜΑ ΠΑΡΑΣΧΟΤΑ ΞΕΝΟΙΣ Τε
ΚΑΙ ΠΟΛΕΙΤΑ[ΙC]..... And a little below were these strag-
gling Letters visible.

ΕΝΗ....ΝΥΠΗΡΕΤΗΣΑΝΤΑ ΤΗΤ....ΣΤΡΑΤΕΥΜΑ ΤΟΤ
... ΥΠΟ..... ΗΚΑΙ..... ΤΟΝ ΝΑΟΝ ΤΟΝ.... ΔΙΟΣ....
ΝΤωΤ.....

I should have imagined ΚΑΙ to have been a Copulative, and the second Name, *Agrippa*, distinct from the former; but that the Words following in the Singular Number, will not admit of such a Construction. The Person then, in Memory of whom this *Inscription* was made, must have been named *Malentus Cæagrippa*, who bearing such an Office as *Scribe*, or the like, in the Expedition of *Adrian* the Emperor, performed an Act of publick Beneficence and Generosity, both to Strangers and Citizens, denoted by the Word ΑΛΙΜΜΑ, or *άλειμμα*, which signifies *Unction*. Perhaps he distributed amongst them sweet Oils, to be used in or after their Bathings. It is pity what follows is so imperfect, and especially that we cannot find out the Date; for that might have directed us to the precise Time of *Hadrian's* Expedition into these *Oriental* Parts, where he made great Conquests, and enlarged the Bounds of the *Roman* Empire.

But as great a Curiosity as any were their Sepulchres, being square Towers 4 or 5 Stories high, and standing on both Sides of a hollow Way, towards the North Part of the City. They stretch out in Length the Space of a Mile, and perhaps formerly might extend a great Way further. They were all of the same Form, but of different Splendor and Greatness, according to the Circumstance of their Founders. The first we viewed was intirely Marble, but is now wholly in Ruins, and nothing but a Heap of broken Stones; amongst which we found the Pieces of two Statues, one of a Man, and another of a Woman, cut in a sitting, or rather leaning Posture; the Heads and Part of the Arms of both being broken off, but their Bodies remaining pretty intire; so that we had the Advantage of seeing their Habits, which appeared very noble, but more resembling the *European* Fashion than what is now in the *East*; which inclined me to think they might be *Romans*. Upon broken Pieces of Stone tumbled here and there, we found some broken *Inscriptions*; but, not affording any perfect Sense, they are not worth the transcribing.

Many other Sepulchres there were as much gone to Decay as this, which therefore we passed by, to go to two which stood almost opposite to one another, and seemed most perfect of any, though not without Marks

of the *Turkish* Malice. They are two square Towers, rather larger than ordinary Steeples, and 5 Stories high, the Outside being of common Stone, but the Partitions and Floors within of good Marble, and beautified too with very lively Carvings, and Paintings, and Figures, both of Men and Women, as far as the Breast and Shoulders; but miserably defaced and broken. Under these Statues, or by their Sides, are, in the unknown Character, the Names probably of the Persons there buried, or by them represented; or else some other Memorials of them. We entered one of these by a Door on the South Side, from which was a Walk cross the whole Building just in the Middle. But the Floor was broke up, and so gave us a Sight of the Vault below, divided after the same Manner. The Spaces on each Hand were again subdivided into 6 Partitions by thick Walls, each Partition being capable of receiving the largest Corps; and piling them one above another, as their Way appears to have been, each of those Spaces might contain at least 6 or 7 Bodies. For the lowest, second, and third Stories, those Partitions were uniform, and altogether the same, save from the second Floor, which answered the main Entrance, one Partition was reserved for a Stair-case. Higher than this, the Building being something contracted towards the Top, it would not afford Space for the Continuation of the same Method; therefore the two uppermost Rooms were not so parted, nor perhaps ever had any Bodies laid in them, unless it was that of the Founder alone, whose Statue, wrapped up in funeral Apparel, and in a lying Posture, is placed in a *Nich*, or rather Window, in the Front of the Monument, so as to be visible both within and without. Near to this Statue was the following *Inscription*:

TO MNHMEION EKTICAN EΛABHΛECMANNAIOC CO-
XAEIC MAΛXOC OYABALLAΘOY TOY MANNAIOTY TOY
EΛABHΛOY AYTΩ KAI TIOIC ETOYC ΔIT MHNOC ΞAN-
ΔIKOY.

It is a little doubtful, whether AYTΩ should not rather be made AYTOIC, or else there must be a Fault in the Verb, and all those but the Names of one Person.

The other Monument on the other Side of the Way is very much like this; only the Front and Entrance are towards the North, and is not altogether so polite, nor so well painted; but the Carvings are as good, and it shews altogether as stately and magnificent as the former. Besides, it has the Advantage in Age of a whole Century of Years; as appears from the Date of the following *Inscription*. It is placed above a *Nich* in the Front, adorned with handsome Borders and Cornices; the Place doubtless of some Statue, and probably that of the Founder:

MNHMEION AIΩNION ΓEPAC ωKOΔOMHCEN TIXOC
MOKIMOTY TOY KAI AKIACICOTY TOY MA..... OY EICTE
EAYTON KAI TIOYC KAI EITONOTC ETOYC ΔIT MHNEI
ΞANΔIKΩ.

This is the most antient *Inscription* I met with in *Tadmor*, the 314th Year from the *Death* of *Alexander the Great*, preceding the *Birth* of our *Saviour* about 10 *Years*. The other also is between 20 or 30 *Years* before the Reign of *Hadrian*, and consequently before the *Romans* got Footing here. And from these sumptuous Structures, and these costly *Mausolea*, we may reasonably conclude, they were a potent and opulent People before they became subject to the *Romans*, and were not obliged to them for their *Greatness*.

After 4 *Days* Stay we returned, not the Way that we came, but proceeding Eastward towards the River *Euphrates*. In our Way to which, the 3d *Day*, passing through a Village called *Tieve*, upon a Stone set wrong End upwards, in the Midst of the *Wall* of the *Mosque*, we met with the following *Inscription* :

ΔΙΙ ΜΕΓΙΣΤΩ ΚΕΡΑΥΝΙΩ ΥΠΕΡCΩΤΗΡΙΑCΤΡΑ: ΑΔΡΙΑ-
ΝΟΥ CΕΒ ΤΟΥ ΚΥΡΙΟΥ ΑΓΑΘΑΝΓΕΛΟC ΑΒΙΛΗΝΟC
ΤΗC ΔΕΚΑΠΟΛΕΟCΤΗΝ ΚΑΜΑΡΑΝ ωΚΟΔΟΜΗCΕΝ ΚΑΙ
ΤΗΝ ΚΛΙΝΗ ΕΞ ΙΔΙΩΝ ΑΝΕΘΗΚΕΝ ΕΤΟΤC ΕΜΥ
ΜΗΝΟC ΑωΟΥ.

And under this was another in the same *Language* and *Character* we had seen at *Tadmor*. I was surpris'd to find such an *Inscription* in this Place, nor can any way guess how they should come by it; and the Mention of *Decapolis* makes me still more in the Dark. If one might extend the Bounds of *Decapolis*, as some are said to have done, as far as *Cælo-Syria*, and comprise under this Name again all *Syria*, *Phœnicia* only excepted, then need it not be brought from elsewhere, but first set up in this Village. But this will not be allowed by those who make *Decapolis* only a Part of *Palestine*. The Matter of Fact it contains, is only an Account of the Magnificence of this *Agathangelus Abilenus*, whoever he was, who, for the Safety of the Emperor *Hadrian*, erected of his own Charges, and dedicated to *Jupiter the Thunderer*, a *Royal Banqueting-House* (for so I take *KAMAPA* to signify) and a *Bed of State*; for after *ΚΛΙΝΗ* there is doubtless a Letter omitted, and it ought to be *ΚΛΙΝΗΝ*. The *Date* 445, agrees to the Year of our *Lord* 123, which was the 7th of the Reign of *Hadrian*: And the *Month* ΑωCC is our *August*.

The next *Day* we pass'd by the *Ruins* of a large *Monastery* of the *Maronites*, as I guess it to have been, by an *Inscription* we met with upon the *Capitals* of several *Marble Pillars*, which supported the Middle Isle of a handsome *Church*, which was to this Effect :

† ΕΠΙ ΕΕΡΓΙΩ ΕΠΙΛΚΩ. ΤΩ ΕΥΝΓΕΛΙΩ ΜΑΡΩΝΙΩ ΤΩ ΧΩΡΕΠΙΛΚΩ.

From thence we pass'd on, and came the same Night to *Euphrates*, and having travelled two *Days* on the Banks of that famous River, we came to the *Tents* of the *Kings* of the *Arabs*, who had furnished us with a Guide for our Voyage. With him we remained two Nights, and in two *Days* Travel

vel more came back safe to *Aleppo*, having been but in the whole just 18 Days.

Remarks upon
these Antiqui-
ties; by Mr.
Edmund Hal-
ley, n. 218.
p. 160.

Antiquit.
Jud. lib. VIII.

4. The City of *Tadmor*, whose Remains in Ruins do with so much Evidence demonstrate the once happy Condition thereof, seems very well to be proved to be the same City which *Solomon* the Great King of *Israel* is said to have founded under that Name in the *Desart*, both in 1 *Kings* ix. 19, and 2 *Chron.* viii. 16; in the *Translation* of which, the vulgar *Latin Version*, said to be that of *St. Jerom*, has it, *Condidit Palmyram in Deserto*. And *Josephus* tells us, that he built a City in the *Desart*, and called it *Tadamora*; and the *Syrians* at this Day (says he) call it by the same Name; but the *Greeks* name it *Palmyra*. The Name is therefore *Greek*, and consequently has no relation to the *Latin Palma*, and seems rather derived from *Παλμυρος* or *Πάλμυρος*, which *Hesychius* interprets βασιλευς πατις, or perhaps from *Παλμυτις*, which (according to the same Author) was an *Egyptian God*. Neither is the Word *רמיה*, but *רמ*, that in *Hebrew* signifies a *Palm-Tree*.

History is silent as to the Fate and Circumstances of this City during the great Revolutions in the several Empires of the *East*; but it may well be supposed, that so advanced a Garrison as this was, being above 300 Miles from *Jerusalem*, continued not long in the Possession of the *Jews*, who immediately after *Solomon* fell into Civil Dissension, and divided their Force: So that it is not to be doubted, but that it submitted to the *Babylonian* and *Persian* Monarchies, and afterwards to the *Macedonians* under *Alexander* and the *Seleucidae*. But when the *Romans* got Footing in these Parts, and the *Parthians* seemed to put a Stop to their farther Conquests in the *East*, then was this City of *Palmyra*, by reason of its Situation, being a *Frontier*, and in the midst of a vast sandy *Desart*, where Armies could not well subsist to reduce it by Force, courted and carested by the contending Princes, and permitted to continue a *Free State*, a *Mart*, or *Staple* for Trade, for the Convenience of both Empires, as is abundantly made out from the Words of *Appian* and *Pliny*.

DeBell. Civil.
lib. V.

Appian tells us, That *M. Antonius*, after his Victory at *Philippi*, about 40 Years before *Christ*, sent his Horse to plunder the City of *Palmyra*, pretending only that they were not sufficiently in the *Roman* Interest.

Ὅτι Ῥωμαίων καὶ Παρθυαίων ὄντες ἔφοροι εἰς ἑκατέρως ἐπιδεξίως εἶχον, and that being *Merchants*, they conveyed the *Indian* and *Arabian* Commodities by the Way of *Persia* into the *Roman* Territories, though the true Reason was their Riches: But the *Palmyrenes*, being informed of their Design, took care to prevent them, and so escaped Plunder; and this Attempt of *Antony's* occasioned a Rupture between the two Empires.

Nat. Hist.
lib. V.

The Words of *Pliny*, above 100 Years after, do likewise testify, that this City then continued in the same Enjoyment of their Liberties. *Palmyra Urbs nobilis Situ, Divitiis Soli, atque Aquis amānis, vasto undique Ambitu Arenis includit Agros, ac velut Terris exempta a Rerum Natura, privata sorte inter duo Imperia Summa Romanorum Parthorumque, Et prima in Discordia semper utrinque Cura*. Whereby it appears not only

only that it was a *Commonwealth* in the Time of *Vespasian*, but the Situation thereof is truly described, as it were an Island of *fertile Land*, furrounded with a Sea of *barren Sands*. Such Spots, *Strabo* tells us, were frequent in *Libya*, and by the *Egyptians* were called *Abases*, whence, possibly, the Name of the *Abassyne* Nation is derived.

With these Advantages of *Freedom*, *Neutrality*, and *Trade*, for near two *Centuries*, it is not strange that it acquired the *State* and *Wealth* answerable to the Magnificence of these noble *Structures*. But when the *Romans* under *Trajan* had made it appear, that there was no Comparison between the Puissance of the *Parthians* and them (*Trajan* having taken *Babylon* and *Ctesiphon*, the then Seat of the *Parthian* Empire), the *Palmyreni* were at length determined to declare for the *Romans*; which they did, by submitting themselves to the Emperor *Adrian*, about the Year of *Christ* 130, when *Adrian* made his Progress through *Syria* into *Egypt*. And that magnificent Emperor, being highly delighted with the native Strength and Situation of the Place, was pleased to adorn and build it; when, as it is likely, he bestowed on it the *Privileges* of a *Colony Juris Italici*, which it enjoyed (as *Ulpian* assures us); and the Inhabitants of the City in Gratitude were willing to call themselves *Hadrianopolitæ*, ἐπιχτιδεῖσις τῆς πόλεως ὑπὸ τῷ Αὐτοκράτορος (says *Stephanus*). Nor is it unlikely, that many of those *Marble Pillars* were the Gift of that Emperor, and particularly those of the *long Porticus*; for that none of the *Inscriptions* are before that *Date*; and it was usual for the *Cæsars* to present Cities that had obliged them, with *Marble Pillars* to adorn their publick Buildings. These here were not far to fetch, the neighbouring Mountains affording the *Marble Quarries*: But the Magnitude of the *Porphyry Columns* is indeed very remarkable, considering how far those vast Stones must have been brought by Land-carriage to this Place; it being not known that any other *Quarries* yield it, except those of *Egypt*, which lie about Mid-way between *Cairo* and *Siena*, between the *Nile* and the *Red-Sea*; the *Stone* being very valuable for its *Colour* and *Hardness*, and for that it rises in Blocks of any Magnitude required. And it is a great Mistake of those who suppose it *facilitious*.

From the Time of *Adrian* to that of *Aurelian*, for about 140 *Years*, this City continued to flourish and increase in *Wealth* and *Power* to that Degree, that when the Emperor *Valerian* was taken Prisoner by *Sapores*, King of *Persia*, *Odenatus*, one of the Lords of this Town (which Name occurs in several of these *Inscriptions*), was able, whilst *Gallienus* neglected his Duty both to his Father and Country, to bring a powerful Army into the Field, and recover *Mesopotamia* from the *Persians*, and to penetrate as far as their Capital City *Ctesiphon*; thereby rendering so considerable Service to the *Roman* State, that *Gallienus* thought himself obliged to give him a Share in the Empire. Of which Action, *Trebellius Pollio* (in the Life of *Gallienus*) has these Words: *Laudatur ejus* (Gallieni) *optimum factum, qui Odenatum participato Imperio Augustum vocavit, ejusque Monetam, qua Persas captos traheret, cudi jussit: quod & Senatus & Urbs & omnis Ætas gratanter accepit.* The same, in many Places, speaks of this *Odenatus* with

with great Respect; and, mentioning his *Death*, he says, *Iratum fuisse Deum Reip. credo, qui interfecto Valeriano noluit Odenatum reservare.* But by a strange Reverse of Fortune, this Honour and Respect to *Odenathus* occasioned the sudden Ruin and Subversion of the City. For he and his Son *Herodes* being murdered by *Maonius*, their Kinsman, and dying with the Title of *Augustus*, his Wife *Zenobia*, in Right of her Son *Waballathus*, then a *Minor*, pretended to take upon her the Government of the *East*, and did administer it to Admiration; and when soon after *Gallienus* was murdered by his Soldiers, she grasped the Government of *Egypt*, and held it during the short Reign of the Emperor *Claudius Gothicus*. But *Aurelian* coming to the Imperial Dignity, would not suffer the Title of *Augustus* in this Family, though he was contented that they should hold under him as *Vice Cæsaris*, as plainly appears by the *Latin Coins* of *Aurelian* on the one Side, and *Waballathus* (which Name is often found in these *Inscriptions*) on the other, with these Letters, V. C. R. IM. OR. which *P. Harduin* has most judiciously interpreted, *Vice Cæsaris Rector Imperii Orientis*; but without the Title of *Cæsar* or *Augustus*, and with a *Laurel* instead of a *Diadem*. But both *Waballathus* and *Zenobia* are stiled *CEBACTOI* in the *Greek Coins*, made, it is probable, within their own Jurisdiction. Two of the *Latin* I have seen, and they are as described, excepting the Points.

But nothing less than a *Participation* of the *Empire* contenting *Zenobia*, and *Aurelian* persisting not to have it dismembered, he marched against her; and having in two Battles routed her Forces, he shut her up, and besieged her in *Palmyra*; and the Besieged finding that the great Resistance they made availed not against that resolute Emperor, they yielded the Town; and *Zenobia* flying with her Son, was pursued and taken: With which *Aurelian* being contented, spared the City, and, leaving a small Garison, marched for *Rome* with this *Captive Lady*: But the Inhabitants believing he would not return, set up again for themselves, and (as *Vopiscus* has it) slew the Garison he had left in the Place. Which *Aurelian* understanding, though by this Time he was gotten into *Europe*, with his usual Fierceness speedily returned; and collecting a sufficient Army by the Way, he again took the City without any great Opposition, and put it to the Sword with an uncommon Cruelty (as he himself confesses in a Letter extant in *Vopiscus*), and delivered them to the Pilage of his Soldiers. And it is observable that none of the *Greek Inscriptions* are after the *Date* of this Calamity, which befel the City in or about the *Year* of *Christ* 272, as far as may be collected, after it had been 9 or 10 *Years* the Seat of the *Empire* of the *East*, not without Glory.

In this appears also the great *Utility* of *Coins* to illustrate Matters of *History*; for by them alone it is made out, that there was such a Prince as *Waballathus*, *Vopiscus* singly mentioning him by the Name of *Balbatas*. And from the same *Coins* it appears that *Odenathus* had the Title of *Augustus* 4 *Years*, and *Waballathus* 6 at least; and that the *first Year* of *Aurelian* was the 4th of *Waballathus*. And by the Testimony of *Pollio*, *Odenath*

natbus was declared *Emperor* of the *East*, *Gallieno & Saturnino Coss.* which was *Anno Christi* 263. and died before *Gallienus*, but in the same Year, *viz.* *An.* 267. which, by the *Coins*, was the first of *Waballathus*. He therefore immediately succeeded *Odenathus*, and was, without doubt, his eldest Son by *Zenobia*, and not his Grandson, the Son of *Herodes*, as some learned Men have supposed: For if *Zenobia* could not endure that *Herodes*, Son of *Odenathus* by a former Wife, should succeed his Father in Prejudice to her Children, and for that Reason was consenting to his Murder (as *Pollio* intimates in *Herodes* and *Mæonius*), much less would she endure the Title of *Augustus* in the Son of *Herodes*, and especially when her own Sons were, as 'tis probable, elder than such Grandson. So that it is most likely that *Herennianus* and *Timolaus*, whom *Pollio* reckons among his thirty *Tyrants*, might be the younger Sons of *Zenobia*, on whom also, out of motherly Affection, she might bestow the same Titles of Honour.

But it must be observed, that in the *Greek Coins* this Prince's Name is usually written ΑΥΤ ΕΡΜΙΑC ΟΥ ΑΒΑΛΛΑΘΟC ΑΘΗΝΟΥ, as *Tristian* says he found it upon several *Medals*; but *Patin* has the last Word only ΑΘΗ. I should be glad to peruse some of these curious *Coins*, especially if found in or near *Palmyra*; but I am inclinable to believe that his true Name was *Æranes Waballathus* (as was one of his Progenitors, in the first *Inscription* Vid. Sup. 3. of *Dr. Halifax*), though perhaps the remoter Cities of *Asia* and *Ionia* might, by Mistake, write it *Hermias*. And it is probable that ΑΘΗΝ might be for the first Letters of the Name ΟΔΗΝΑΘΟC, which in *Syriac* begun with an *Aleph*; and the Δ was with those People used instead of Θ, as we see the *Month Xanthicus*, written Ξανθικός in many of these *Inscriptions*, which, doubtless, was pronounced like *D blefum*, or the *Saxon* Ð.

Though this City was at that time so roughly treated by *Aurelian*, yet it is certain that he did not burn it, or destroy the Buildings thereof: And though *Zosimus*, on this Occasion, uses the Words τὴν Πόλιν κατακαύσας, yet that seems only to relate to his demolishing the *Walls* and *Defences* of the Place; and that Emperor's own Letter, extant in *Vopiscus*, doth sufficiently shew that he spared the City itself; and that he took care to reinstate the beautiful *Temple* of the *Sun* that was there, which had been plunder'd by his Soldiers. However, the Damage then sustained was never retrieved by the Inhabitants; and I do not find that ever this City made any Figure in *History* after it: Yet the *Latin Inscription* seems to intimate, as if *Dioclesian* had restored their *Walls* within thirty Years after. About the Year of *Christ* 400. it was the *Head-Quarters* of the *Legio Prima Illyricorum*; and though *Stephanus* gives it no better Title than *ἑπίσκοπος*, yet it appears to have been an *Archbishop's See*, under the *Metropolitan* of *Damascus*. To say in what Age, or from what Hand, it received its final Overthrow, which reduced it to the miserable Condition it now appears in, there is no Light in any of our *Historians*; but it is probable it perished long since in the *obscure Ages* of the World, during the Wars of the *Saracen* Empire; and being burnt and desolated, it was never rebuilt; which occasions the *Ruins* to lie so intire, in a Manner, as they were left, neither

ther being used to other Structures on the Place, nor worth carrying away, because of the great Distance thereof from any other City.

As to the *Geographical Site* of *Palmyra*, *Ptolemy* places it in the *Latitude* of *Tripoly* on the Coast of *Syria*, and 4 *Deg.* more Easterly; viz.

Παλμύρα. οα γ'. λδ.

And he makes it the *Capital* of 16 Cities in *Syria Palmyrena*, whereof *Alakis*, *Danaba*, and *Evania*, were afterwards *Bishops Sees*. *Pliny* calls it CCHI Miles from the nearest Coast of *Syria*, and CCCXXXVII from *Seleucia ad Tygrin* near *Bagdat* (which Numbers are erroneously printed 252, and 537, in most Editions, contrary to the Authority of the MSS.). *Josephus* places it one Day's Journey from *Euphrates*, and six from *Babylon*, which must be understood of *Horseman's Journeys* of about 60 Miles per Diem, it being more than so much from this City to *Euphrates*. *Ptolemy* also mentions a *River* running by *Palmyra*, which did not appear to our Travellers, unless that Gut or Chanel wherein they were overflowed by the Rain-waters were the Bed thereof; which may possibly run with a constant Stream in the Winter, or Times of much Rain: But this (as the Rivers of *Aleppo* and *Damascus* at this Day) is made by *Ptolemy* to have no Exit, but to go off in Vapour, and to be imbibed by the thirsty Earth of these Deserts.

Ib. p. 168.

n. 204. p. 921.

N. 218.

The *Æra*, or Account of Years, observed by the *Palmyreni* in these *Inscriptions*, is evidently that of *Seleucus*, called afterwards *Dhilocarnain* or *Bicornis*, by the *Arabians*, and by them kept in Use till above 900 Years of *Christ*, and not that of the Death of *Alexander*. This may be demonstrated from the 5th *Inscription* of *Dr. Halifax*, wherein *Alexander Severus* is stiled ΘΕΟC, that is, after the Death and Consecration of that Emperor, or after the Year of our Lord 234. and from the Name of *Julius*, who, when this *Inscription* was put up, was *Præfectus Prætorii* (and could be no other than *Julius Philippus Arabs*, who might be esteemed by the *Palmyreni* as their Countryman), it follows, that it was in the last Year of *Gordian*, *An. Chr.* 242. or 243. and that Emperor being soon after murdered by the Treachery of this *Philip*, who succeeded him, and his Treason coming afterwards to Light, it is not strange that his Name was purposely effaced in this *Inscription*. The Date thereof, *An. 554.* shews the Beginning of this Account 311 or 312 Years before *Christ* coincident with the *Æra* of *Seleucus*, which was likewise observed by several other Cities in the East.

I shall not undertake the Part of a Critick on these *Inscriptions*, but only make some few Remarks on them, such as occurred while they passed through my Hands.

1. That the more antient of these *Inscriptions*, dated before the Year 500. do no-where make use of *Roman Prænomena*, which yet are very frequent in them that follow, particularly *Julius*, *Aurelius*, and *Septimius*, taken up by these People out of Respect to the Emperors that bore those Names; and conse-

Halif. Inscr. 1. quently, that *Septimius Odænathus* was most probably the same who was afterwards

terwards *Augustus*. That Name growing in Use in the Reign of *Septimius Severus*, under whom, or his Son *Caracalla*, this *Odænathus* was certainly born; and this *Monument* being erected by him whilst he was yet a private Man, and he afterwards attaining the *Imperial Dignity*, it was necessary the *Inscription* of his *Tomb* (which perhaps was that single one that was all of *Marble*) should be changed: Upon which Occasion this Stone might be brought back into the Town, and, after its Destruction, be clapp'd up casually over the *little Gate-way* where now it stands.

2. KATEΛΘONTEC EIC OAOI E CIAΔA ENΠOPOIAN ECTH- Hal. Inscip. 4.
CAN: *Descendentes Vologesiada Commmercium stabiliverunt, An. 558. five An. Christi 247.* Whereby it appears, that this People having had their Trade interrupted by the Wars between the *Romans* and the *Persians*, under *Gordian*, did now send an Embassy to the Court of *Sapores*, King of the *Persians*, to get it re-established, which succeeded according to their Desires. *Vologesia* was a City built by *Vologeses*, King of the *Parthians* in the Time of *Nero*, on the *Euphrates*, below *Babylon*: *Ptolemy* calls it *Βολυγισια*, *Stephanus*, *Βολυγισια*. *Ammianus*, *Vologessia*; and *Pliny*, *Vologeso-cirta*. Lib. VI.

3. KAI OYKONICΩNA ΦEΙΔHCANTA XPHMATΩN. I submit Hal. Inscip. 5.
it to the Judgment of the *Criticks*, whether this faulty Place may not be amended, by reading it OYK OIKEION AΦEΙΔHCANTA, &c. as likewise whether ΔICMAAXOY, in the same *Inscription*, may not be instead of MAAXOY TOY MAAXOY, which is the ingenious Conjecture of that excellent Grammarian Mr. *Will. Baxter*.

4. *Septimium Vorodem Procuratorem Ducenarium Augusti, &c.* APOA- Hal. Inscip.
ΠETHN. This Word, if *Greek*, is faultily transcribed; and in one Copy I have seen, the O is very small, as I suppose it on the *Stone*; which might occasion the Transcribing thereof without it in the former Voyage: So that Vid. Sect. XI.
it is most probable, that it is the Remains of some other Letter almost worn 1. Inscip. 2.
out. I conjecture it to have been APTARETHN, Π being taken for Γ; and that this *Septimius* was *Præfectus Annonæ*, having the Care to see that the City was sufficiently provided with Bread; which was a most necessary Officer in a Place that must needs be furnished with *Corn* from Abroad. And this same *Septimius*, in another *Inscription*, is stiled . . . EOΛOTHN Hal. Inscip.
THC MHTPOKOΛΩNEIAC lege KPEOΛOTHN, which should signify 10.
that he was Distributer of the Emperor's Munificence in *Flesh* to the People. These *Inscriptions* bear Date in *April, An. Dom. 267.* not long before the Death of *Odænathus*, who is herein stiled CEBACTOC; and it is not improbable but he might institute such a Custom, as at the publick Charge to give the People a Largefs in *Flesh* on particular Days, to reconcile them to the Dominion of their fellow Citizens. This is certain, that *Aurelian* first instituted such a Custom of giving *Flesh* at *Rome*. The Words of *Vopiscus* are, *Idem Aurelianus & Porcinam Carnem Populo Romano distribuit, que hodieque dividitur*: Which Custom continued till the Time of *Constantine*, when (according to *Zosimus*) one *Lucian*, who had this Office of distributing

Swine's Flesh at *Rome*, had Interest enough among the People to set up *Maxentius* for Emperor; and *Salmasius* assures us, that it was not discontinued till the Time of *Heraclius*. It will not therefore seem strange, if I suppose *Aurelian* might find that Custom at *Palmyra*, and at his Return from thence institute the like at *Rome*.

I am inclined to believe, that not only the 6, 7, and 10 *Inscriptions* of Dr. *Halifax*, but also the 11, were in Honour of the same *Septimius Vorodes*, who seems to have been a great Favourite of *Odenathus*, and was, without doubt, respected by the *Romans* on that Account, whom I conclude to have effaced all the *Memorials* of *Zenobia* and *Waballathus*, insomuch that no one appears, among those many taken, that was set up during the six Years they reigned. The Name *Vorodes* seems the same with *Orodes*, which was the Name of the King of the *Partians* that slew *Crassus*: And the *Persians* having, about 40 Years before, expelled the Race of the *Arsacidae*, it is not improbable but the *Remains* of that *Royal Family* might fly for Succour to *Palmyra*, and this *Vorodes* might be one of them.

Hal. Inscrip. 8. 5. In two other Copies of these *Inscriptions*, the 8th is read Σεπλίμιον Ἀσπέννυ Ὀδαινάθου, and not Ὀδαινάθου, as in this Copy; and perhaps ought rather to be Ὀδαινάθου, as being the *Inscription* under a *Statue* of the same *Odenathus*, who is here, as well as on his *Tomb*, stiled *Illustriissimus Patri-cius*, but without a *Date*.

Hal. Inscrip. 5. & 14. 6. ὙΠΟ ΙΑΡΙΒΩΛΟΥ ΘΕΟΥ. It cannot well be doubted, but that this *Deus Jaribolus* is the same with what *Gruter* and *Spon* (in the first of his *Inscriptions*) reads ΑΓΑΙΒΩΛΩ. By the Figure of the *Idol* extant in *Spon*, it appears, that this *God* was made with the *Moon* upon his Shoulders, and consequently was the *Deus Lunus* worshipped by the *Syrians*, whose Name, in the Language of that Country, could not be better expressed than by *Jarebból* ירה בועל *Dominus Lunus*. Whence I am induced to believe, that *Gruter* mistook it, ΑΓΑΙΒΩΛΩ for ΑΓΑΙΒΩΛΩ, the I in the Beginning, and the lower Part of the round Stroke of the P being effaced, so as to pass for Γ.

By the way it is remarkable, that the Person who dedicated this *Monument*, in *Gruter* and *Spon*, is stiled Α. ΑΥΡ. ΗΛΙΟΔΩΡΟΣ; and the same Name occurs in a broken *Inscription*, which Mr. *Halifax* omitted, as being too imperfect. It stood on the Right Hand of the *Entrance* into the little *Temple*, and was thus:

ΛΟΓΚΙΟΥ ΑΥΡΗ[ΛΙ]ΟΥ ---- ΗΛΙΟΔΩΡΟΥ ΤΟΥ.

And after a Blank of three Lines all worn out, except one single O, there followed,

Hal. Inscrip. 9. [ΤΕΙ]ΜΗC ΧΑΡΙΝ ΕΤΟΥC ---- ΜΗΝΟC [ΑΠ]ΕΛΛΑΙ[ΟΥ].

And that imperfect ninth *Inscription* seems to have Relation to the same Name.

7. ΜΑΛΕΝΤΟΝ ΚΑΙ ΑΓΡΙΠΠΑΝ *lege* ΜΑΛΗΝ ΤΟΝ ΚΑΙ Hal. *Inscrip.*
 ΑΓΡΙΠΠΑΝ, it being written ΜΑΛΗΝΤΟΝ, with H, in two other Co-
 pies I have seen, whereby the Sense is cleared.

8. ΑΓΑΘΑΝΓΕΛΟΣ ΑΒΙΑΗΝΟΣ ΤΗΣ ΔΕΚΑΠΟΛΕΟΣ, *Agathan-* Hal. *Inscrip.*
gelus Abilenus Decapolitanus; Patronymicè. There were in those Parts two ^{18.}
 Cities known by the Name of *Abila*, to distinguish which, the one was called
Abila Lysaniæ, from the Name of the *Tetrarch*, St. *Luke* ch. iii. 1. and is
 placed by *Ptolemy* (in his *Cælo-Syria*) about Midway between *Damascus* and
Heliopolis: The other in *Judea*, called *Abila ad Jordanem*, described by
Josephus, in many Places, to lie over-against *Jericho*, near the *Dead Sea*.
Decapolis was so called from its *ten Cities*, enumerated by *Pliny*; and with Lib. V. &
 them he reckons up, among others, the *Tetrarchy* of *Abila*, in the same De- XVIII.
capolis; which demonstrates the *Abila Decapolis* and *Abila Lysaniæ* to be the
 same Place. And though it cannot be denied, but that some of *Pliny's ten*
Cities are not far distant from that near *Jordan*; yet it doth not appear that
 ever this other had the Title of a *Tetrarchy*. Here it is to be observed, that
 what *Pliny* calls *Decapolis*, *Ptolemy* makes his *Cælo-Syria*; and the *Cælo-Syria*
 of *Pliny* is that Part of *Syria* about *Aleppo*, formerly called *Chalcidene*, *Cyr-*
rhistiche, &c.

What this Town of *Tiebe* was antiently called, is not so easily conjectured:
 But if the Numbers of *Ptolemy* may be confided in, it is very near the Situa-
 tion of a City he calls *Oriza*; and perhaps his *Adada* may be our *Soukney*,
 and his *Ræsapha* what is now called *Arsoffa*.

It is taken for granted, that *Old Aleppo* was antiently the City of *Berrbæa*,
 and there want not antient Testimonies to prove it; which being granted, I
 think I may, without Scruple, conclude, that *Adrene*, mentioned in both the
 Voyages, is the Ruins of the City *Androna*, and *Esree* that of *Seriane*; both
 mentioned in the *Itinerary* of *Antoninus*, in the *Journey, à Dolicâ Seriane*.
 But this whole Country is laid about *Half a Degree* more southerly than it
 ought, by *Ptolemy*, who places *Berrbæa* in *Lat. 36 Deg.* For the Meridian
 Altitude of the Tropical Sun at *Aleppo* is found but *77 Deg.* whence the
Lat. 36 Deg. 30 Min. as it was observed there *An. 1680.* by three several
Quadrants.

By the same Observation a much greater Error is amended in the *Latitude*
 of *Aleppo*, in the *Rudolphine Tables* of *Kepler*, who supposes *Aleppo* to have
 been the antient *Antiochia ad Taurum*; and accordingly places it in *Lat. 37*
Deg. 20 Min. wherein he is followed by *Bullialdus*, and others; and several
 Maps have copied the Mistake. But a much greater Use of it is, that thereby
 we are assured that the City of *Aradta*, wherein *Albatani* made his Observa-
 tions, was, without doubt, the same which is now called *Racca* on the *Eu-*
phrates; of which Town an Account may be seen in *Rauwolf's Voyages*, and
 which was not many *Miles* below the Place where our Travellers first came
 on the *River*: And if *Arecca*, in the *Language* of this Country, relates to
Victory (as is said above); it was, doubtless, antiently the City of *Nicepho-* Vid. *Os. 8.*
rion, built by *Alexander the Great*; with which the Situation exactly agrees.

An Inscription
in the Lan-
guage of the
Palmyreni; by
Mr. Octavian
Pulley.

n. 228. p. 537.
Misc. p. 3.

Fig. 65.

XLII. Dr. *Halifax* calling at *Rome* in his Return home from *Aleppo*, An. 1696. enjoined me to find out the *Inscription* in the Language of the *Palmyreni*, mentioned by Dr. *Spon*. I waited upon *S. Fabretti*, Canon of *St. Peter's*, and by him I was fully informed to my Purpose. He lent me also a Draught of it, which I carried to the *Vinea Cesariani*, about a *Mile* without the *Porto del Popolo*, to compare it with the *Original*; but I found it not exact: Wherefore I took a wet Paper, and having first cleared the Letters with a Bodkin, laid it on the *Characters*, and pressing it with my Handkerchief, took it off very fair; then letting it dry, I went over it with my Pen.

On the Top of the *Cypress*, which is upon one of the Sides of the *Marble*, there is a *Label* for an *Inscription*, though nothing upon it; and just below it, on the Left Side, part of a *Boy* appears out of the *Tree*, with a *Lamb* upon his Shoulders, which is omitted in Dr. *Spon*. The *Stone* appeared to me to have remained unmolested for some time, because, from the Ground, the *Inscription* was over-run with *Ivy*, the Wood of which had crept into the Letter, and over the *Gryphons* and *Figures* above it.

Draughts of
several In-
scriptions and
Characters at
Persepolis; by
Mr. F. A.

n. 201. p. 775.
Fig. 66, & 67.

Fig. 66, & 67.

XLII. 1. I have lately retrieved some *Fragments* of *Papers* relating to antique and obscure *Inscriptions* at *Persepolis*, taken in *Nov.* 1667. by Mr. *S. Flower*, Agent in *Persia* for our *E. I. Company*, who died suddenly soon after, and left them dispersed in several Hands.

Fig. 66, 67. These two *Characters* are engraven on the Breast of two *Horses* cut out of the Mountain of *black Marble* at *Nocturestand*, distant a *League* from *Chabelmanare*, or the antient *Persepolis*; one whereof is said to be *Alexander's*, the other *Rustram's*, a famous Hero, supposed to have lived about the Time of *Cambyfes*. Mr. *Flower*.

Fig. 66. This *Character* hath some Similitude with the antient *Hebrew*; but the *Persians* would have it their own, though they understand not a Letter. Mr. *F.*

Fig. 68.

Fig. 68. These two Lines were writ intire on *Rustram's Horse*. Mr. *F.*

Fig. 69.

Fig. 69. This is the (*Arabick*) *Persian Character* engraven at *Persepolis* not above 500 *Years* since, and is little different from the Writing used at this Day. Mr. *F.*

Fig. 70.

Fig. 70. This *Character*, whether it be the antient Writing of the *Gaures*, or *Gabres*, or a kind of *Telesmes*, is found only at *Persepolis*, being a Part of what is there engraven on *white Marble*, and is by no Man in *Persia* legible, or understood at this Day.

A learned *Jesuit* Father, who deceased 3 *Years* since, affirmed this *Character* to be known and used in *Egypt*. Mr. *F.*

It seems written from the Left Hand to the Right, and to consist of *Pyramids*, diversly posited, but not joined together. As to the Quantity of the *Inscriptions*, *Herbert* reckoned in one large Table 20 *Lines* of a prodigious Breadth. Of this Sort here are distinct *Papers*, each of several *Lines*.

Fig. 71.

Fig. 72.

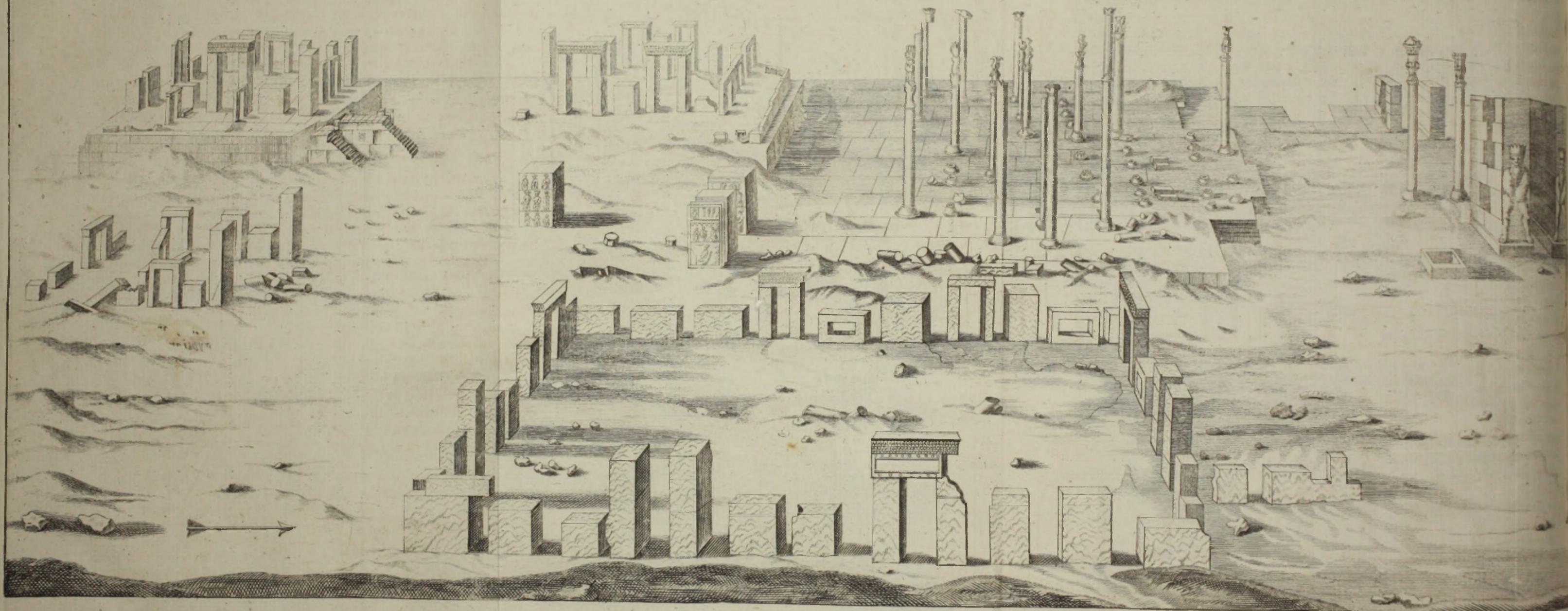


Fig. 71. This *Character* is likewise engraved at *Persepolis* of like *Antiquity* with the former. It has some *Affinity* with the *Syriack* and *Arabick*, and has been pretended to be understood by some of the *Padres*.
Mr. F.

Fig. 71.

2. To the *Inscriptions* found at *Persepolis*, I shall here add the *Draughts* of *The Ruins of Persepolis*; by *Mr. Nic. Witsen.* part of the *Stone-Work* of that proud *Palace*, given me by the *Person* himself that drew them upon the *Place*.
n. 210. p. 117.

XLIII. I have spent 3 *Months* of 1669. in a *Voyage* to the *Upper Egypt*, accompanied with my *Brothers* the *F. Charles* and *Francis*, always ascending upon the *Nile* as high as 300 *Leagues* above *Cairo*, being 2 *Days* Journey on this Side of the *Cascatas* of the *Nile*. I there admired *Store* of *Idol-Temples* yet intire, together with very antient *Palaces* filled with *Statues* and *Idols*. I counted in one *Place* alone 7 *Obelisks* like those at *Rome*, and about 120 *Columns* in one *Hall*, of the *Bigness* of 5 *Brasses*, full, within and without, from the *Top* to the *Bottom*, with *Hieroglyphick Letters*, and with *Figures* of false *Deities*. I found *Statues* of *white Marble*, and some of *black*, of the *Bigness* of 3 *Persons*, with a *Sword* on their *Side*, and of an hard *Stone*, namely, a *Man* and a *Woman*, at the least of the *Height* of 8 *Fathoms*, though seated in *Chairs*, but well proportioned; and two others of *black Marble* representing *Women*, with *Globes* on their *Heads*, and extravagant *Coverings* thereon, which were two *Foot* broad from one *Shoulder* to the other.
Fig. 72, 73. *Observations on Upper Egypt*; by *F. Brothais.* n. 71. p. 2151.

We lighted not but in two *Places* where *Antiquities* were to be seen; one whereof is called *Lozor*, and the other *Candion*, which is a very antient *Castle*, esteemed, by the *Tradition* of the *Country*, to have formerly been the *Residence* of a *King*. Nor indeed is this hard to believe, even before one enters into it, considering in the *Avenues* of the said *Castle* a great *Number* of *Sphinxes* standing in a *Row*, and turning their *Heads* towards the *Alley*. It is known, that this is an *Idol* having the *Head* of a *Woman*, and the *Body* of a *Lion*, which was once a famous *Deity* among the *Egyptians*. They are distant from each other about 2 *Paces*, and are 20 *Feet* long. I walked in 4 *Alleys* ending at 4 *Gates* of the *Castle*; and, for ought I know, there may be more of them, seeing I went but half round the *Castle*, which is very spacious: I reckoned 60 of them on one *Side* of one *Alley*, and as many over-against it, and 51 in another *Alley*, all well measured. The *Alleys* are of the *Largeness* of a *Pall-mall*; the *Gates* of the *Castle* are of an extraordinary *Height*, covered with most excellent *Stones*. Measuring one, which maketh the *Height* of one of them, I found it 26½ *Foot* long, and proportionably thick. I believe that there are above a *Million* of *Figures* in *Profile*, none in *Front*: I speak of those that are graven on the *Walls* and *Pillars*. That which most pleased me was the *Ground*, where the *Azure* and the other *Colours*, which are like *Enamel*, appear as fresh as if they had been laid on but a *Month* before. There are *Temples* so spacious, that 3000 *People* may stand on the *Roof* with *Ease*. In the same *Castle* there is a *Pond*, the *Water* whereof is *bitter*, set about with fine *Stones*. This *Water* is said

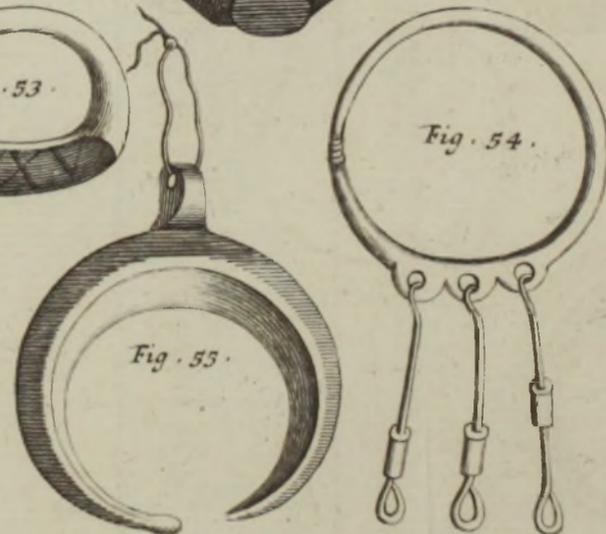
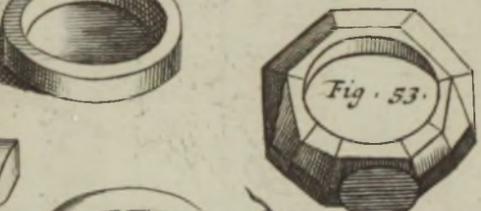
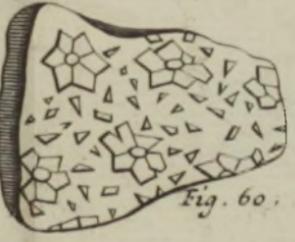
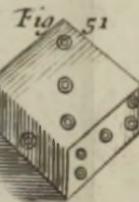
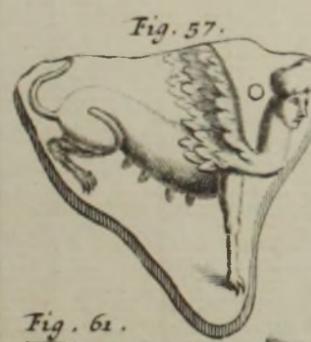
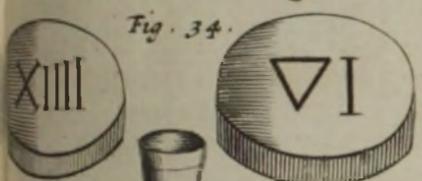
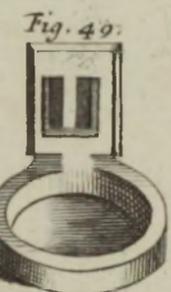
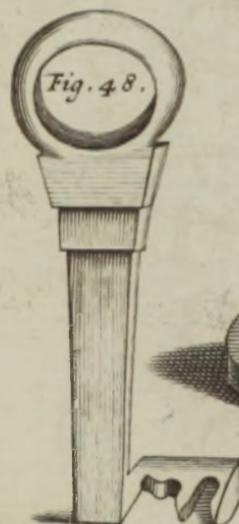
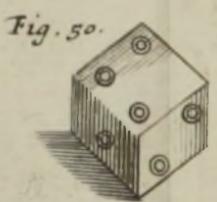
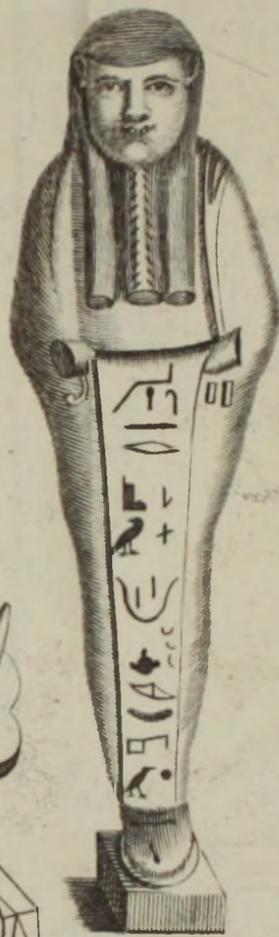
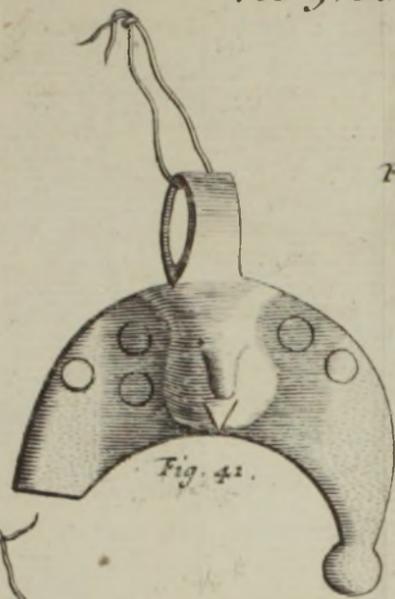
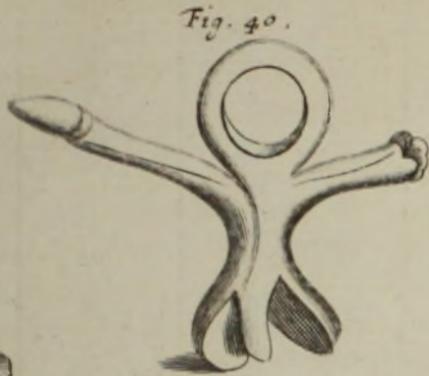
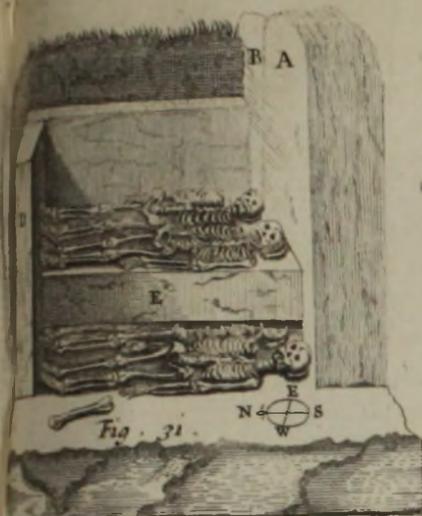
said perfectly to whiten Linen all alone; which I tried not, but we dipp'd a Handkerchief in it, which kept the Scent of Soap for 4 or 5 Days.

There are a great Number of *Christian Cophtes* in that Country, who have many *Monasteries* and *antient Churches*, but poor. We have passed many Places, where was neither *Priest* nor *Church*; but only the poor People, like *Sheep* without a *Shepherd*.

An Account of
the Porphyry
Pillars in
Egypt; by
Dr. Robert
Huntington.
n. 161. p. 624.

XLIV. It may be (I think) taken for granted, that there is no Quarry, or rather Rock of *Porphyry*, in all the lower Parts of *Egypt*: For so far as the *Nile overflows* is perfect *Soil*, and the Boundaries of this *Overflow* (which are never 10 Miles from the Channel, that I saw, generally scarce $\frac{1}{2}$ of it, and in some Places but a *Mile* or *two*, the *Delta* still excepted, which is universally covered, all but the *North Side* to the Sea, and a little to the *East* for some Miles above *Damiata*) are rising Hills of *Sand*; beyond which is perfect *Desart*, upon the *Africk Side* the *Libyan*. [Higher *South*, I have been told, there are *Rocks* nearer the *River*, and in some Places streighten it; but] under these *Sands* is a *yielding Stone*, not much harder than *Chalk*, though not so white, and very easily managed; as at the *Mummies*, deep spacious *Vaults*, which were the old *Repositories* for the *Dead*. And the like may be also said of those *Cells* or *Sepulchres* which are hewn purely out of the *rocky Earth* $\frac{3}{4}$ of a *Mile* on the *South* of *Alexandria*. Albeit nearer the Sea there are *Stones* of a *harder Kind*, and with which they *build*; but by their mouldring away, as appears by the *Remains* of Houses within the *Walls* of the City, it is plain they can't endure the *Weather*, which is sufficiently corroding there; the *Iron* which once plated their thick wooden *Gates* being mostly *eaten away*, and the deep *Characters* upon the Sides of these very *Porphyry Pillars* exceedingly *defaced*. Indeed about *Memphis*, *i. e.* by the *Pyramids*, they have a *milder Air*, and the *Hieroglyphicks* cut in these *Stones* will last well enough, till they shall be removed into a *rougher*; but then they'll *crizle* and *scale*, as I found by sad Experience. For having procured *four Stones*, the best marked with those *Figures* of *Antiquity* I could meet with, and sent them down to *Alexandria*, in order to their Transportation for *England*, I found them, upon my *second Voyage* into *Egypt*, very much injured, being put into the *Customhouse-yard* (where they lie still embargoed) by the *Aga*. But yet farther into the Country there are Mountains of *harder Stone*. In the *Nitrian*, now the *Desert* of *St. Macarius*, and not far from the Lake where the *Latroon*, or true *Nitre*, incrustates upon the Top of the Water, there are many, and some of them not utterly unlike *Porphyry*. That which nearest resembles its *Colour*, though not its *Consistence*, is the *Vein* that produces the *Eagle-Stone*, of which there are many in the *Bahr Batama*, a great sandy Valley: But these *Stones* are of a different Complexion from *Porphyry*.

However, I cannot pronounce that there is no *Porphyry* hereabouts: For in the chief *Monastery* of the four now remaining (of 366, as many as are Days in the longest Year), dedicated to the *Blessed Virgin*, the two *Stones* which secure their Entrance are of the like, if not the very same Substance



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ΗΚΑΖΔΧΣΚΗΤΔ ΔΧΘΥΓΘΗΗ ΗΥΗ 854ΚΗ 745ΜΕΗΚΕΛΗ
ΣΚΚΗΛΖΔ Η ΣΚΚΙΛΖΗΗΔ

Handwritten text in a cursive script, likely a transcription of the hieroglyphs on the figures.

stance ; which I more particularly observed, upon the Account of their ingenious Contrivance ; for these poor People, lying otherwise at the Mercy of the roving *Arabs*, with these two *Mill-Stones* (for that's their Make) thus make good their *Gate* against them (or rather their Passage) into which they run them, and then drive a great wooden Wedge between them on the Inside, which so fastens them that they cannot be loosed, but upon the Inside neither. And of such a sort of *Porphyry* is the noted *Sphynx* (a mighty *Head* and *Shoulders* 110 *Feet* in Compass) yet standing by the *Northern Pyramids*. I have indeed been told of the Place upon *Mount Sinai*, whence this *Porphyry* came ; but so they shew the very *Rock* where the two excellent double *Rows* of *Pillars* in the *Church* of *Bethlem* were hewn ; tho' I went away satisfied that it was a quite different Sort of *Stone*. Another tells of a *Pillar* of the same Make yet lying there ; and if this be certain, you need seek no further : Albeit, I must tell you, that the *Stones* brought thence, with the Representation of a *Buck* (it must needs be called) upon them, tho' reddish, are of a much finer, and more even Texture. *Father Carlo Francisco d'Orleans*, now Superior of the *Capucines* at *Cairo*, who went 300 *Leagues* up the *Nile* in the *Year* 1669, told me of many *Temples*, *Statues* and *Pillars* at that Distance, though I cannot be sure he said there were any of *Porphyry*. But since it was in *Thebais*, why may we not suppose them of that black, white and red speckled *Thebaick Marble*, famous in the World, and wherewith the lesser *Pyramid* perhaps was crusted, yet to be seen upon the Ground about it, which when polished looks finely ?

Those which I have myself seen are one of them at the *Matarea*, 3 or 4 *Miles* East of *Grand Cairo*, and 2 at *Alexandria*, just within the *Wall* upon the North-side of the City (for *Pompey's Pillar*, as they call it $\frac{1}{2}$ *Mile* without the *Gate* to the South, is quite of another Make and Matter) one of these is thrown down and broken into Pieces, but was of the same Dimensions for Breadth and Thickness with the other. The *Franks* call them *Agulia's* ; the *English* particularly *Cleopatra's Needles* ; but the Inhabitants content themselves with the general Name of *Pillars*. They have no *Basis* or *Pedestals* above Ground ; and if they ever had, they must needs be very deep in the Earth. The *Stone* itself is something more lively than the *Porphyry* of *St. John's Font* (for by that Name it is known) at *Ephesus* ; much more vivid than those four tall square *Pillars* at *Tadmor* (in its middle Age *Palmyra*) which are each of them but of, I think, one Piece ; whilst all the rest, exceeding many, of another Sort of *Stone*, are of several Pieces and round. The Clearness of its Complexion may perhaps be attributed in part to the Air, which corrodes them especially upon the *North* and *East*. The *Hieroglyphick Character*, with which they are engraven, is perhaps the *aboriginal Egyptian Letter*, long since worn out of common Use in the Country, as the *Samaritan* (so it is now generally called) was amongst the *Jews* ; and bears Proportion with the *China* (now in Use) where each Note represents a Word, or rather an intire Signification. And moreover it seems to be wrote the same Way, from the *Top* to the

Bottom, as may be seen on the Board I brought from a Door in the Village *Succara*, which is (next to the *Mummies*) the largest Piece of *Ægyptian Writing* perhaps at this Day in *Europe*. I confess, that in the *Vaults*, or *Priests Chambers*, cut out of the Rock close by the second *Pyramid*, the whole *Walls* are inscribed therewith; but I speak of an *Original*. And if all that is there *written* were but exactly *copied*, it might be then lawful to hope, that the *Language* so long since dead and buried in the House of *Bondage*, might have its *Resurrection* in the Land of *Liberty*.

That such vast *Monuments* might be removed from Place to Place is difficult indeed, but not impossible; for some of these *Mountains* are near the *Red Sea*; and *Sufs* from *Cairo* is but two or three Days from the *Nile* less. How possible it is to convey mighty *Weights* by *Water*, let the *Obelisks* at *Rome* declare, which were all of them brought from this very Country: And that such things may be done by *Land* too, though not by every one, is plain enough, because we see they have been done. At *Baalbec*, which is 14 *Hours* from *Damascus* (for thence I went, accompanied with *Mr. Ant. Balam* and *Mr. Jos. Verney*) there is a *Stone* about 66 *Foot* long on the *North-side* of the *Castle-Wall*, and two more of 60 each: And I believe we saw the *Way* they travelled, having left one of their *Company*, tho' not quite so big, in the *Road*, as a *Monument* thereof to this very *Day*.

Explanation
of the Fi-
gures; lb.
p. 627. & n.
178. p. 1252.
Fig. 74.

The Draught of one of these *Obelisks* was very well taken by *Monfieur Brute*, a *French Druggerman*: But that of the other, by a *Dutch Painter*, is not so well.

Fig. 74, represents the *Obelisks*, or *Aiguille*, near the *Matarea*: The Height of this *Pillar* is 67 *Foot*; the Bigness $7\frac{1}{3}$ with the *Hieroglyphick Character*. oo, shews the Height of the *Nile's* rising above the *Superficies* of the *Earth* when it *overflows*.

Fig. 75.

Fig. 75, represents the *Needle* at *Alexandria*.

Some unknown
antient Cha-
racters; by
Mr. Flower.
n. 203. p. 872.
Fig. 76.
Vid. inf.
Cap. III.

XLV. I. These *Characters* being 22 in *Number*, are all that could be distinctly collected out of the *antient Sculptures*, to be found at this *Day* extant at the admired *Hills of Canary*, where there are divers *Receptacles* cut out of the main *Rock*, by the incredible *Industry* and *Charge* of the *antient Inhabitants* of those *Parts*, supposed *Moors* or *Negroes* of *Ethiopia* rather than *Gentues*; by reason of the large *Proportion* of their usual *Statures*, which is at least eight *Foot* in *Height*, having great *Lips*, full *Eyes*, flat *Nose*, and curled *Hair*.

Remarks;
by *Mr. Francis Aston*.
p. 873.
Vid. sup.
Sect. XLII.

2. It is probable the *Intent* of this *Paper* was to compare these *Characters*, being very *antient*, with them at *Persopolis*.

The *Places* here pointed at are chiefly three, two upon the *Island of Salsete*, and one upon the *Island Pory*, called the *Pagode* of *Olifant*; of such a *Bigness*, that one of them is described by *Linschoten* to be equal to a *Village* of 400 *Houses*; to consist of 4 *Ranges* of *Building*, one over another, within the *Mountain*; and to contain no less than 300 *Rooms* or *Habitations*, adorned throughout with strange frightful *Statues* of *Idols*, *Lions*, *Tygers*, *Elephants*, *Amazons*, and a hundred other things very well designed.

Who

Who were the Architects is very uncertain; *Balbi* names the *Romans*, and *Alexander the Great*; others the *Chineses*; *Mr. Flower*, the *Abassins*; who have some few Churches cut in the Rocks; but *Alvarez*, who saw them twice, says, the Country affirms they were made by *Ægyptians*, or other white Men. But though their Beginning be obscure, their End may more easily be declared; for the *Portugueses*, upon the Building of *Goa*, began to destroy them, and have continued to do so ever since.

XLVI. *A Paper omitted, viz.*

A Dissertation of *Dr. Barrow*, De *Sestertio*; taken out of the 4th Vol. n. 190. p. 384. of his Works.

XLVII. *Accounts of Books, and Emendations, omitted.*

1. **I**nstitutionum Chronologicarum Libri duo; una cum totidem *Arithmetices Chronologicæ* Libellis: per *Gulielm. Beveregium*, S. Th. D. Lond. 1669, in 4to. n. 47. p. 956.
2. *Ægidii Strauchii Breviarium Chronologicum*. *Witebergæ*, in 12mo. n. 50. p. 1022.
3. *Abregé Chronologique de l'Histoire Sacre & Profane*, par le P. L'Abbé *J. J.* in 5 Vols. *Paris*, in 12mo. lb. p. 1022.
4. *Tabula Mathematico-Historica*; à *Cl. Megerlino*, *Matheseos Prof.* n. 127. p. 667. *Bafil.*
5. *Nouvelle Science de Temps*; ou *Moyen General de concilier les Chronologues*; par le *S. Meynard*, *Seigneur d'Iserné*. *A Paris*, in 12mo. n. 131. p. 793.
6. *Palæologia Chronica*: A *Chronological Account of antient Time*; in 3 Parts; *Didactical, Apodeictical, Chronical*; by *Rob. Cary*, D. LL. *Lond.* 1677, in Fol. n. 132. p. 808.
7. *J. Wallisii*, S. T. D. *Exercitatio de Periodo Juliana*. *Lond.* 1678. n. 139. p. 980.
8. *Quæstio Triplex de Anno, Mense, & Die, Christi Nati, Baptizati & Mortui*. Auth. *R. P. Michaele Seneschallo*, è *S. J. Leodii*, 1670, in 4to. n. 60. p. 1085.
9. *Julius Celsus de Vita & Rebus Gestis Julii Cæsaris*: *Ex Museo Joan. Georgii Grevii*. *Iterata Editio*. 1697. n. 222. p. 327.
10. *The Primitive Origination of Mankind, considered and examined according to the Light of Nature*; by *Sir Matth. Hale*. *Lond.* 1677, in Fol. n. 136. p. 917.
11. *A Letter of L'Abbé de la Charmoye to L'Abbé Nicaise*, concerning the Original of Nations. *Some Remarks on it*; by *M. Leibnitz* and *Dr. Wallis*. n. 255. p. 274. p. 273. 283.
12. *Olai Rudbekii Atlantica, sive Manheim veri Japeti Posterorum Sedes, ac Patria: ex qua non tantum Monarchæ & Reges, ad totum fere Orbem reliquum Regendum ac Domandum, Stirpesque suas in eo Condendas, sed etiam Scythæ, Barbari, Aæ, Gigantes, Gotbi, Phryges, Trojani, Amazones, Thraces, Libyes, Mauri, Tusci, Galli, Cimbri, Cimmerici, Saxones, Germani, Suevi, Longobardi, Vandali, Heruli, Gepidæ, Teutones, Angli, Pitones, Dani, Sicambri, aliique Virtute Clari & Celebres Populi, olim Exierunt*. *Upsal.* n. 4. p. 118. n. 255. p. 283.

- n. 62. p. 20; 2. 13. *De Anglorum Gentis Origine, Disceptatio*; Auth. *Rob. Sberinghamo Cantab.* 1670, in 8vo.
- n. 124. p. 596. 14. *Britannia Antiqua Illustrata*: Or, The Antiquities of antient *Britain*, derived from the *Phœnicians*, &c. *Vol. I.* By *Aylet Sammes.* *Lond.* 1676.
- n. 209. p. 115. 15. The History of the Church of *Malabar*, from the Time of its being discovered by the *Portuguese* in the Year 1501. Giving an Account of the Persecutions and violent Methods of the *Roman* Prelates to reduce them to the Subjection of the Church of *Rome*; together with the Synod of *Diamper*, celebrated *Ann.* 1599. With some Remarks upon the Faith and Doctrine of the Christians of *St. Thomas* in the *Indies*, agreeing with the Church of *England*, in Opposition to that of *Rome.* Done out of *Portuguese* into *English*; by *Mich. Geddes*, Chancellor of the Cathedral Church of *Sarum.* *Lond.* 1694, in 8vo.
- n. 213. p. 358. 16. The Antiquities of *Palmyra*, alias *Tadmor*; built by King *Solomon* in the Desert of *Arabia*: Containing the History of that City, and its Emperors, from its Foundation to this present Time; by *Ab. Seller*, in 8vo.
- n. 153. p. 386. 17. *Recherches Curieuses, &c.* Curious Researches of Antiquity, contained in divers Dissertations concerning Medals, Base-Reliefs, Statues, *Mosaick* Works, and Inscriptions of the Antients; by *Dr. Spon*, 1683, in 4to.
- n. 260. p. 467. 18. *Linguarum Vett. Septentrionalium Thesaurus Grammatico-Criticus & Archæologicus.* Accedit Catalogus Librorum *Veterum Septentrionalium*, tam eorum qui excusi sunt, quàm qui in *Membranis Scriptis* nondum eduntur, quàm fieri licuit, Locupletissimus. Auth. *G. Hicks*, S. Th. D. *Oxon.* in Fol.
- n. 198. p. 688. 19. A Treatise of the *Roman* Ports and Forts in *Kent*; by *W. Somner*, &c. To which is prefixed the Life of *Mr. Somner.* *Oxon.* 1693, in 8vo.
- n. 220. p. 259. 20. Parochial Antiquities, attempted in the History of *Ambrosden, Burcester*, and other adjacent Parts, in the Counties of *Oxford* and *Bucks*; by *White Kennet.* *Oxon.* 1695, in 4to.
- n. 228. p. 538. 21. A Book of Old *Roman* and *Etruscan* Sepulchres lately found; by *Petro Sancto Bartoli.*
- n. 166. p. 825. 22. *Specimen Universæ Rei Nummariæ Antiquæ*: Or, An Essay towards an Universal History of antient Coins and Medals; by *Andreas Morellius.* *Paris*, 1683, in 8vo.
- n. 236. p. 57. 23. *Numismata*, A Discourse of Medals, Antient and Modern; together with some Account of Heads and Effigies of illustrious and famous Persons, in Sculps, &c. To which is added a Digression concerning Physiognomy, by *T. Evelin*, Esq; *Lond.* 1697, in Fol. Some Errata of the Prefs are
- n. 240. p. 204. here corrected.
- n. 177. p. 1242 24. *Edvardus Bernardus, de Mensuris & Ponderibus κατ' ἐπίσημόν.* *Oxon.* 1685.
- n. 179. p. 33. 25. An Essay towards the Recovery of the *Jewish* Weights and Measures, comprehending their Money, by the Help of antient Standards, compared with ours of *England*; by *Rich. Cumberland*, D. D. *Lond.* 1686, in 8vo.

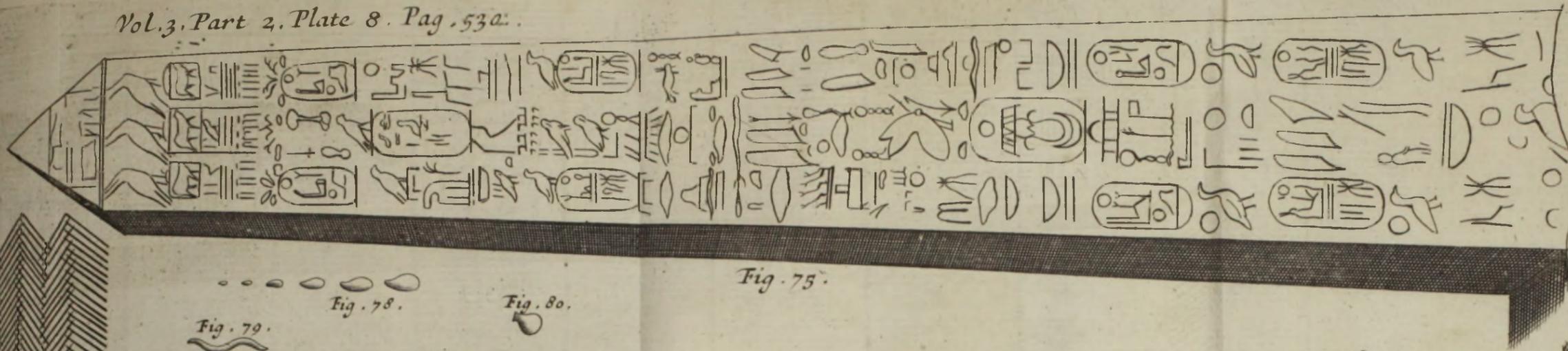


Fig. 75.

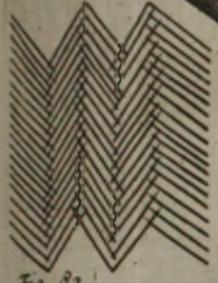


Fig. 83.

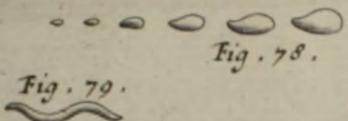


Fig. 79.

Fig. 78.

Fig. 80.

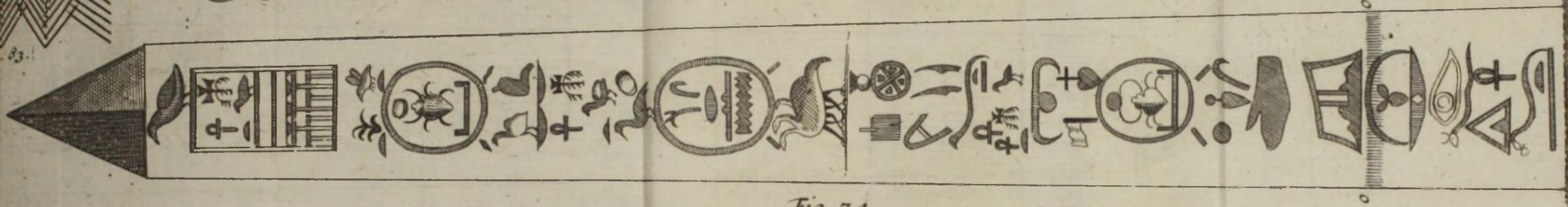


Fig. 74.

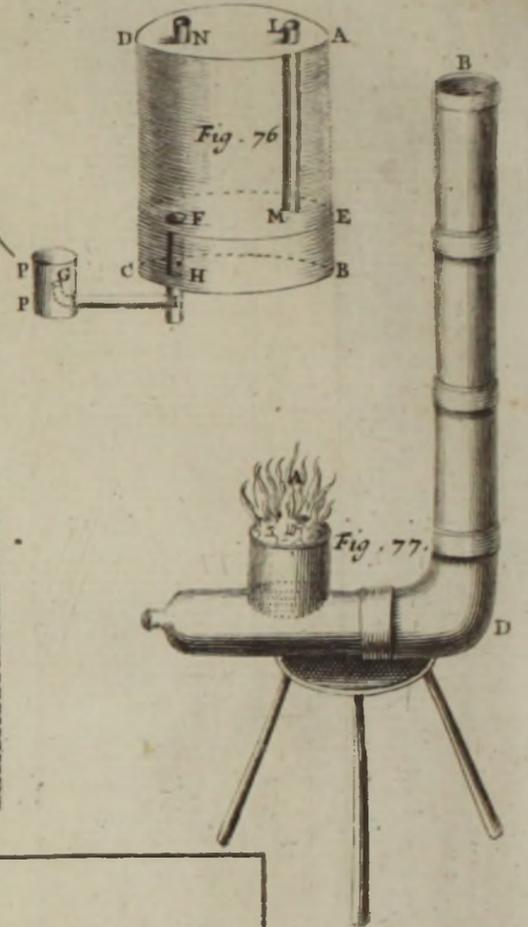


Fig. 76.

Fig. 77.

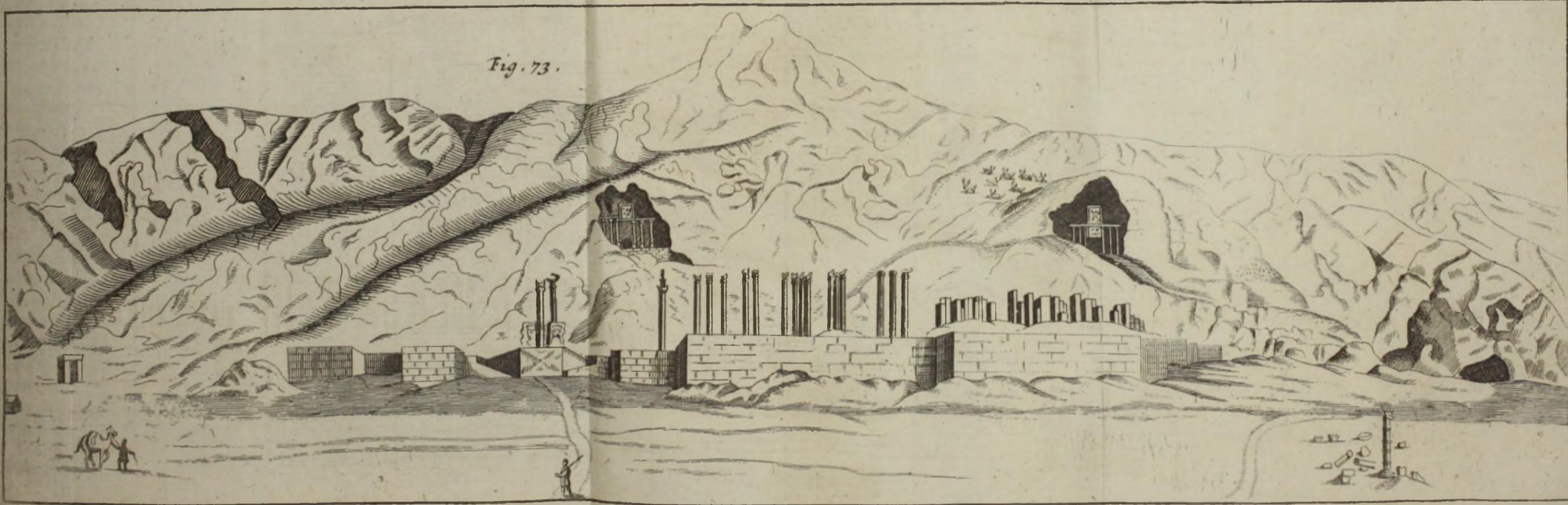


Fig. 73.

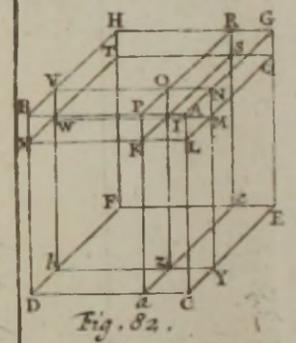
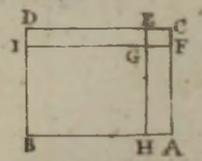
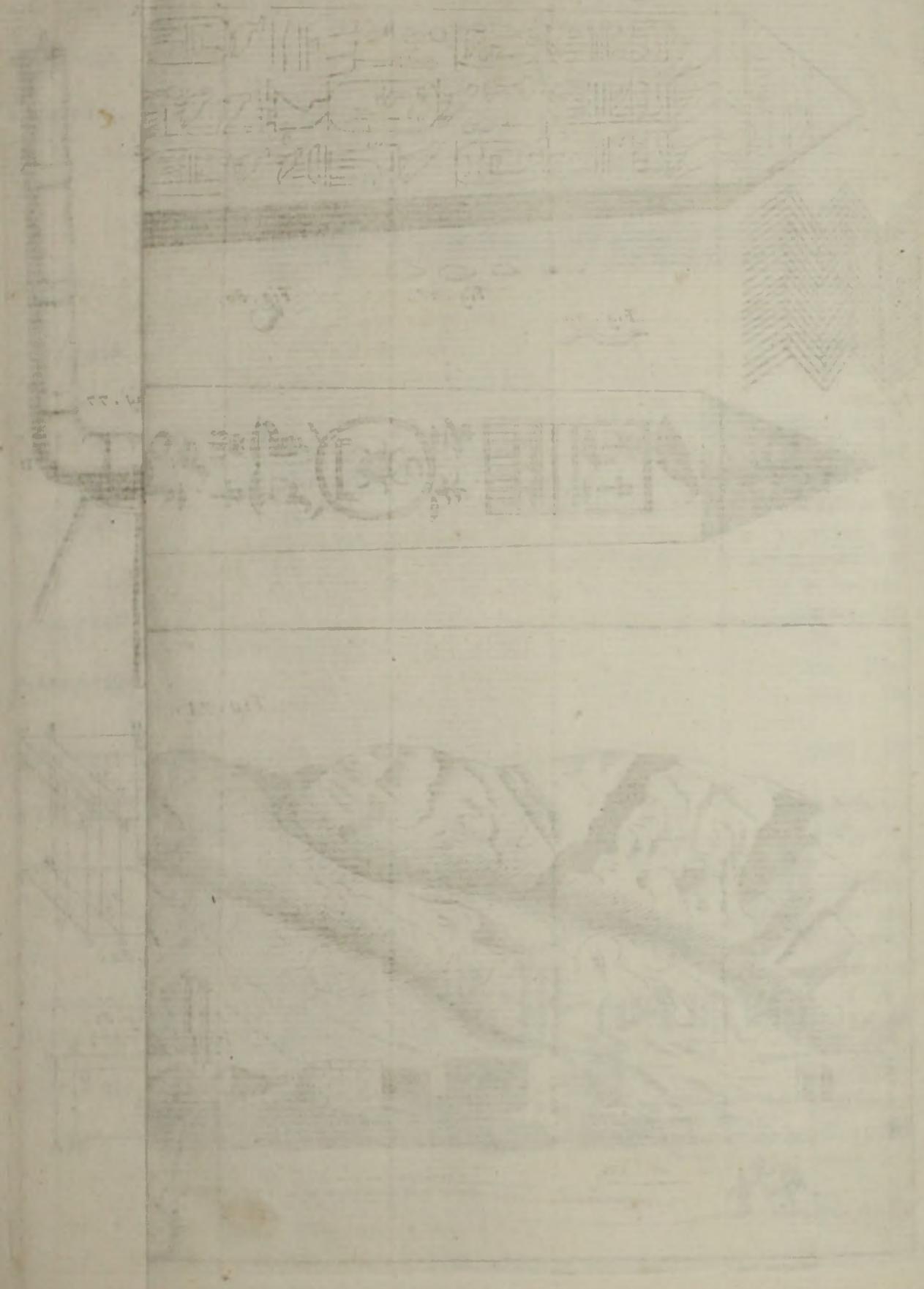


Fig. 82.

Fig. 81.



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C H A P. III.

Voyages and Travels.

THAT Part of the County of *Lincoln* that lieth towards the Sea, is a Level about 50 Miles long, viz. from *Grimsbj* to *Crowland*; and broad from the Sea to the Woulds (or High-lands) 10. It may be divided first into Marshes, extending from *Grimsbj* to about *Wainfleet*, in which are a great Stock of large Sheep, which yield a very lusty Wool, or of a large Staple (as here phrased) 3 or 4 Fleeces usually making a Tod of 28 Pounds. Several hundred Loads are yearly carried out of it into *Norfolk*, *Suffolk*, the North and West Countries, in great Packs (called *Pockets*) of about 2500 *lb.* Weight, and there manufactured.

Several Observables in Lincolnshire; by Mr. Chr. Merret. n. 223. p. 343.

2. *Fens*, the East begins about *Wainfleet*, and ends at *Sibsey*, yielding a great Plenty and Variety of Fowl and Fish, particularly Duck, Mallard, and Teal, which are usually taken in Decoys, and sent to *London*. The Decoy Men contract for them all at a certain Rate *per Dozen*, which the Carriers (*Kedgers*) are obliged to take off their Hand: Two Teal are reckoned equal to a Duck, which usually cost here about 9 Shillings a Dozen. About *Midsummer* (when moultering Time is) several Persons, some for Pleasure, others for Profit, go in small Boats among the Reeds, and with long Poles knock them down, they not being able to swim or fly from them. A little before *Michaelmas*, great Flights arrive in these Parts, which soon grow fat. When the Decoys are frozen (which they keep open as long as possible, by breaking them) the Fowl resort to the Sea for their Food. As for Fish, there are great Quantities, especially Pike, some being of a very large Size. The Fens abound no less with *Quadrupeds*, as Beasts, Sheep especially (which will grow fat) and Horses. These Fens are common, so that each Town hath a distinct Brand, and also each Man: There are several Fen-Riders, which look after them. The Cattle, when used some small time in a Piece of Ground, seldom leave it; so that each individual Person may easily find his own Goods in such a large Tract. Through these Fens run great Cuts or Drains, in which are a great many Fish. There are also vast Numbers of Geese, which live on the Grass, but both taste rank and muddy; but they yield vast Quantities of Feathers and Quills, there having been 300 Baggs, each weighing one Hundred and an Half, exported from *Boston* in one Year. The Owners pull them 4, 5, nay, some 6 times a Year for their Feathers, and thrice for their Quills; each Pulling comes to 2 Pence. Some Persons have 1000, and some more; they are kept at little or no Charge, except in deep snowy Weather, when they feed them with Corn. Between *Spalding* and *Crowland* grow very great Crops of Oats, and also large Quantities of *Rapum Sylv.* (call'd *Cole-Seed*) whereof they make Oil, by breaking it between two great black Marble Stones

Stones of near a Tun Weight, one standing perpendicularly on the other (they come out of *Germany*) in Mills, called Oil-Mills; some go with Sails, and serve also to drain the Fens, and are called Engines, being of good Use, and discharge great Quantities of Water.

These Fens lying low, being of great Extent, and receiving vast Quantities of Water from the High Country, makes them subject to overflowing; and although there be great Cost and Skill used to keep them dry, yet they are sometimes like a Sea: Sheep have been brought out in Boats, and the Inhabitants supplied in their upper Rooms with Provisions by them. To drain them there are great Cuts of 20, 30, and 40 Foot wide running through them; most of them made by a Body of Men called Undertakers. They also made very large Sluices; but the Country has since dammed up their Sluices, and built new ones (called Goats and Clows). Some cost near 2000 *l.* And although made with great Skill and Strength, yet are they subject to be blown up by the vast Quantities and Force of Water that lieth upon them (especially when overflowed). Some have two or more Pair of Doors, of 6, 8, or 10 Foot high, which shut when the Water in the River is higher than in the Drains; and, *è contra*, running sometimes a Body of 8 Foot square, for about 6 or 7 Hours, during the Ebb.

3. *Pasture-Grounds* lying between the Sea and these Fens; they are very fertile, feeding a great Number of fat Oxen and Sheep, which weekly are sent to *London* in Drovers. Their Wool, both as to Plenty and Goodness, much like to that of the Marshes. Tallow here is in good Plenty, which supplieth *London* and other Places. Here each Town hath an Out-fall by Drains, and Goats to keep them dry.

Near unto the Fens stands *Boston*, now not so remarkable for Trade; but for the Church, Steeple and River may compare (probably) with any private Parish in *England*. The Church looks like a beautiful Princess among a Company of fair Ladies, no County yielding fairer Churches; and what is more observable, not a Stone fit for Building in all this Tract. The Church is very lofty; and cieled with *Irish* Oak, neatly wrought; the Body is 100 Foot wide. The Steeple is a Tower of 285 Foot high, Octangular towards the Top, of curious Stone carved Work, standing not above 12 Yards from the River *Wisbam*; 'tis but 32 Foot wide, and but 40 long. At each Angle is a large Butterefs; the Stones of the Sides between them are but 7 Inches thick; so that this stately curious Building seems to be supported by them: It much resembles *St. Mary's* at *Antwerp* (only wanting the hollow Crown-work and Weather-cock on the Top of all) of which the Inhabitants report *Charles V.* the Emperor, should say, That it ought to have a Case, and only be shewn on Holydays. Records mention the Foundation to be laid 9 Foot below the Bottom of the River. The Length of the Church is equal to the Steeple's Height. The Pillars (which are very neat and small for their Height) Windows and Stairs are equal to the Months, Weeks and Days in a Year. From the Top of it *Lincoln* and *Lyn* may be seen; as also Ships sailing in the Seas at a great Distance: 'Tis
a great

a great Land-Mark, and may be seen above 40 Miles at Sea. The River is remarkable for good Pike, according to the old Rhime,

*An Ankham Eel, and a Witham Pike,
All England cannot shew the like.*

As also for the Rapidness of its Stream; of late there are Eagers, sometimes endangering Shipping, without great Care, which much destroy its Banks and Keys, though fortified with great Piles and *Jetties*, &c. so that neither Town nor Country can scarcely keep it within its Banks, it often breaking and over-topping them, which in time is like to ruin the Town, except assisted by Parliament, or by taking in of the Fen, which might make it flourish again, it being as rich in Soil as any Ground probably in *England*. But what is most remarkable, some Years 40, 50, or 100 Tun of Oil hath been made of a small Fish, called in Latin *Pungitius*, here Stickleback, elsewhere Prickling or Banestead, having small Prickles on its Back, whence most of its Names, thereby scaring the Fish out of our River, especially Smelts, of which we have good Plenty and large. They are not above an Inch and Half long, and about half as broad, taken in this River above the Town, for about five or six Miles: About a Bushel are taken at a Draught, and about 8 Chalder will make a Hogshead. They boil by Night what were taken by Day, else the Oil will run of itself, and to waste.

The Sea loseth and gaineth considerably in this County; for about *Holeback*, *Sutton*, and *Wainfleet*, great Marshes have been lately taken in; but Northward of *Ingold Meals*, it hath lost much more. I have seen the Roots of Trees that have been dug out of the Sands at low Water near a Mile from the Shore, which I take to belong to Fir, the Bark smelling aromatically, and somewhat like that of Fir-Timber in Piles that have been long in salt Water, but not near so strong; and at *Mawplethorp* they are often in Danger of being drowned, their Defence being only Banks, or Hills of a small Sand, called Meals, the former Church having been devoured by it.

What is further observable among Animals, is first of Quadrupeds: The Country-People gather up the Dung of Oxen and Cows, which they temper with Water, and spread it on the Ground about five Inches thick, and cut it out in oblong Pieces of about a Foot, and call them Dithes, which they use for Fuel. I have been credibly informed, that one Person's Inventory of them came to 400 *l*. They also gather up Hog's Dung, and steep it in Water, and having well stirred it, strain it, and so use it to wash Cloaths, which when bleached in the Summer, will become white and sweet.

Besides Fowl mentioned by Mr. *Camden*, of Mud-Suckers (which are esteemed the best) we have Ruff and Reve, the former being the Cock, the other the Hen; in Latin, *Aves Pugnaces*, because you shall seldom look on them but they are fighting: Among 100, rarely two are of a Colour; they

they are usually *mewed*; they are scarce and dear, usually bespoke by Persons of Quality. Here are also, almost through the whole Level, Swans in their Drains, which they often feed for Presents with Oats, each requiring two Strike, *i. e.* 16 Gallons, here reputed but a Bushel.

For Fish, here are Turbets in good Plenty (here called Brets) taken in Nets trailed on the Ground by two Horses; one goeth Mid-Rib deep into the Sea, the other near the Shore. Here are also good Plenty of large Soals taken in Trawl-Nets, the Smacks being under Sail trailing them along; as also good Store of Scate, which are taken by Hooks lying near the Shores; as are also Cod and Thornback.

Amongst Insects, Gnats, here Midges, are in some Places very troublesome; some have Nets made of Silk to secure them from being bitten. Frogs here are in great Plenty, called *Holland Waites*.

As for Vegetables, great Quantities of Hemp are sown in several Places, of which Ropes are made both for Sea and Land; the Female is called Femble, as also Flax: The Seed is broken, and Oil made thereof, as of Cole-Seed. Our Salt-Marshes yield a great deal of *Kali Geniculatum*, which, when pickled, is their Samphire, and very plentifully used, and far esteemed by them before *Crithmum Marimum*. *Carum* grows plentifully in our Pastures; the Seed they call Saxifrage, which they gather and send to *London*. *Myrtus Brabantica*, called *Gall*, is used in some Places to garnish their Chimneys: *Kirton* Pippins are here good, and in very good Plenty. More rare Plants are *Rhamnus Salicis Fol. Fructu Flavescente* C. B. *Limonium*, *Scordium*, *Petasites*, *Lilium Conval.* *Eryngium*, *Althæa*, in great Plenty; *Sambucus vulg. Baccis in Umbellis*, *Militaris Azoides*.

These Parts afford but little Variety of Metals, Gums, or Stones. Amber is pick'd up sometimes on the Sands in pretty big Pieces; I have had one weighing near six Ounces. The *Astroites*, found at *Belvoir-Castle*, will not only *stir* in Vinegar, but also *dulcify* it: The like will those do, as also *Lapis Judaicus*, first found in *England* by my Kinsman, Mr. *Robert Jenner*, Rector of *Lyddiard-Milliscient, Wilts*, in a Park belonging to Sir *Walter St. John*, near unto him.

Here Coals are charred, and then called Coak, wherewith they dry Malt, giving little Colour or Taste to the Drink made therewith. On the Sands the poor People sweep together a black small Substance (I suppose it is Coals broken) wherewith they make Fires, by leaving open a Hole in their Chimneys for the Air to blow it; they have one on each Side to open and shut as the Wind fits.

What I have further to observe is, that Agues (here called *Holland Bay-lies*) are very rife; few Strangers escaping without a seasoning. As also, that at *Spalding* there is lately a vast Tunnel laid under the River *Weland*, carrying another under it, for draining the Fens. And, that between *Dunnington* and *Brigg-End*, which is about three Miles, a good Causeway is carried through the Fen, having, in several Places, Bridges for the Water to run under them, whence the Name of *Brigg-End Causeway*: It is

is after great Rains under Water, and Passengers take Guides, the Bridges directing them. It was built at the Country's Charge, who also purchased near 100 Pounds per Annum to maintain it; now under the Care of the Family of the *Shuttlewoods*. It is farther observable, that there are a great many Hills thrown up called *Barrows*, mentioned by Sir *Tho. Brown* in his *Miscellaneous Tracts*, supposed to be *sepulchral Monuments*.

Some Years great Quantities of *Acus Major* come into our Haven; and they say the fresh Water blinds them, and that they portend hard Winters. They run their *Beaks* into our *ousy Shore*, where the *Tide* leaves them, and so are taken up in great Quantities: They are said to eat like *Mackarel*; the Palate is ruled by the Eye; they looking like them. Our *Fen Geese*, when taken up and fed with Corn, become as good as others. After pressing out the Oil from the *Cole-Seed*, the Remainder is called *Cakes*, which here they heat *Ovens* with, and burn for Fuel (but some smell strong) We export them to *Holland*, where they feed their *Kine* with them.

II. The *Stone* at *Chester*, which is soft reddish Girt, and very friable, with shining Particles intermixed, is very apt to decay with the Weather; so that all old Buildings are very much defaced thereby, and the *Walls* which are built thereof are so frequently out of Repair, that they have Officers on purpose, whom they call *Murengers*, who do gradually refit them where they are most worn out. In some Places the *Stone* is in a manner mouldered away like *Sammel Bricks* in a Wall, leaving the *Mortar* standing. In these *Stones*, and the *Quarries* from whence they came, I have diligently sought for *Shells*, or other *animal Substances*, such as are often found in other Places, but hitherto have found no such things: But the *Stone* is generally interspersed with *Pebbles* and small *Flints*, which, as the *Stone* decays, do discover themselves with it, as if they had been lodged in the *Sand*, whereof the *Stone* consists, before its *Induration*.

*Observations
at Chester:
by Mr. Edm.
Halley.
n. 222. p. 318*

III. From the Top of *Snowdown-Hill* the *Sea* dipped every-where above a *Degree* below us, the *visible Horizon* being a *lesser Circle*. We saw *Ireland* plainly from the W. by S. to S. W. by W. and then appearing in the N. N. W. and the Mountains of *Cumberland* or *Westmorland* very faintly, but evidently in the *North*; and I think we saw as far as *St. David's Head* into the *South*; *Carnarvonshire* and *Anglesey* lay under like a *Map*, affording a very pleasant Prospect, were it not for the Horrors of the neighbouring *Precipices*. Hence we counted 15 or 16 *Lakes*, great and small, where the Cavities of the *Rocks* are filled up with the *Rills* that gleet from the *Hills*: All these are said to abound with *Trouts*, some of which we found to be special good Fish. And in one of these *Lakes* I was on board a *floating Island*, as it may be called: The *Lake* is scarce *half a Mile* about, invironed with a boggy turfy Soil, a Piece of which, about 6 *Yards* long and 4 broad, floats on the Water, being about 5 or 6 *Inches* raised above it; but it is, I believe, about 18 *Inches* deep within the Water, having

*An Account
of Snow-
down-Hill;
by Mr. Ed-
mun Halley.
n. 229. p. 566.*

broad spreading fungous Roots on its Sides, the Lightness of which *buoys* it up. It was driven on the *Lee-Shore*: But I launched it off and swam it, to be satisfied it *floated*. This I take the more Notice of, because it is denied to be true, by the Author of the *Additions to Camden*, lately published; but I myself saw it as described, and was told it had formerly been bigger; there being a lesser Spot, that they told us, had been heretofore a Part thereof, which *floated* likewise.

A little above *Llanberris*, which stands at the *Foot* of the Hill, are the principal *Fountains* of the River that falls into the *Chanel* of *Anglesey*, at *Carnarvon*, called antiently *Segontium*.

Observations
in Scotland;
by Mr. Ja.
Frazer n. 254.
p. 231.

IV. Upon the North-side of *Loch-Nefs* in *Scotland*, stands the famous *Castle* of *Urquhart* upon a *Rock*: The great *Ditch* round it was, for the most part, cut out of the *Rock*, and received the Water of the *Lake*. This *Castle* consisted of seven great *Towers*, and it is said, was built by the *Cummins*; but had its *Overthrow* by *King Edward I.* of *England*: And nothing remains now but one *Tower* to the *East*.

There is, due *West* from the End of the River of *Nefs*, an Arm of the Sea called *Beaulic Frith*, 6 *Miles* in Length, and 2 in Breadth. This Bottom sure has been *firm Land* of old; for near the Middle of it we find long *Oaken Trees* with their whole *Roots*, some above 60 in Length, lying covered with *Sand*, which, no doubt, have grown there, and lie flat as they fell. For further Information, there are three great *Heaps* of *Stones* in this *Lake*, at considerable Distance one from the other: These we call *Cairns* in the *Irish*. One of a huge Bigness (in the Middle of the *Frith*) at Low-Water, is accessible: And we find it has been a *Burial-place*, by the *Urns* which are sometimes discovered. As the Sea encroaches, and wears the Banks upward, there are long *Oaken Beams* of 20 or 30 *Foot* long found: Some of these 8, some 12, or 14 *Feet* under Ground. I saw one of them 14 *Foot* long, that carried the Mark of the *Ax* on it, and had several *Wimble-bores* in it. The River of *Beuly*, which falls into this Arm of the Sea near *Lovat*, hath so sunk, that *Oaken Trees* of incredible Length, and 16 *Foot* under Ground, are discovered in the *Banks*, with Degrees of *Sand*, *Gravel*, *Clay*, and *Earth* above them: And if you remember, when we went to *Bewly*, we found some *Oaks*, with *Coals* and Pieces of *burnt Timber* as low as 16 *Foot*, or thereabouts.

On the Top of a Mountain, called *Scure-in-Lappich*, there is a vast *Heap* of *white Stones* like *Crystal*, each of them bigger than a Man can heave: They will strike Fire like a *Flint*, and have the Smell of *Sea-wrack*. Upon this Mountain are found also *Oyster-Shells* in Plenty, *Scallop* and *Limpet-Shells*, yet 20 *Miles* from any Sea. Round about this Hill grows the *Sea-pink*, in *Irish*, *Teartag*: It has the Taste and Colour of that which grows on our *Sea-Banks*.

The *Pagan Temples*, or *High-Places* of *Idolatry*, are still very numerous here: Upon the River-side of *Narden*, I reckoned 13 in 2 *Miles*. They are *Orbicular* round, and at the *West End* two high *Stones* like *Pyramids*.

There is an outward and inward Circle of lesser Stones, and a round *Mote* in the *Centre* for *Sacrifice*. Another Sort of them are only of *Earth*, and a *Trench* round about, and a *Mote* in the *Middle*. In many of these I find a round *Heap* of *Stones*, and *Urns* in them: It seems a different *Religion* afterwards turned these *Places* of *Worship* into *Burial-places*.

V. In *Scotland*, one of the most ordinary *Soils* for *Barley-land*, is an Earth digged and mixed with *Beasts Dung*: In a Place near my Dwelling there is a Plat of Ground, less than an *Acre*, out of which, for these many Years past, Earth hath been digged for the said Use; and in *two Years* Time it will grow up again, and fill the excavated Place; so that it continually furnishes *Soil* for the adjacent Lands. Another I have, in a Farm belonging to myself, twenty *Miles* distant from this, of the same Nature and Quality. Both are a stiff clayish Earth, of a dark Colour and moist: It will grow a *Foot* high in *two Years*. Nothing makes our Land give better Increase of *Barley* than *Sea-wrack* (*Alga Marina*): But Lands often used to this *Manure*, yield but bad *Oats*, and a small Quantity; and the Husks both of *Barley* and *Oats*, that grow on such Lands, are thicker than those that grow on other Lands; and these Grains have also greater Mixture of *Darnel*.

*Observations
in Scotland;
by Sir Geo.
Mackenzey.
n. 117. p. 396.*

The Increase that some Places in our *Isles* do yield is almost incredible, considering the *Climate* and *Soil*. For some will ordinarily yield *sixteen* or *eighteen Fold*; as very honest and credible Farmers have often informed me, from their continual Experience: And most of those Lands that yield so well, are of a very *sandy Soil*, and only *manured* with *Sea-wrack*. I have a Piece of Land in *Lothbroom* Parish, that yields every Year plentiful Crops of *Barley*, without ever having so much as one Load of *Manure*, or any kind of *Addition* laid on it: And this it hath done past Memory. I have seen Corn of it several Years; nor doth the Ground grow *less*, nor is it *exhausted*, by yielding such Plenty of Corn and Straw, though it receives no *Addition*.

There are also some Fields that appear to be nothing else but a Gathering of small *Pebbles*, insomuch that Earth cannot well be discerned amongst them; yet do they yield abundance of good Corn, especially of *Barley*; and more than contiguous Lands that are not *stony*.

As for our *Herbs*, I have nothing extraordinary; all I find here are in *History*, excepting one, which grows on *stony Shores*. When the *Highlanders* want *Ink*, they take the *Root* of the *Iris Palustris Lutea* (*Yellow Water Flower-de-luce*), and infuse it *24 Hours* in clear *Fountain-water*; others boil it a little: The Water will not be tinged to any Height. Then they take a rough white *Pebble*, and rub it continually in the Water on a *Knife*, or any Piece of clean *Steel*; and in less than an *Hour's* Time, the Water will become very *Black*, and tolerable good *Ink*.

Our *Foresters* allege, that when *Deer* are wounded, they lie on a certain Herb, which grows plentifully in our *Forests*; and that by its Virtue the *Bleeding* is stanch'd, and the Wound healed. I did take a Quantity

of it, and reduced it to a *Salve*, with Wax and Butter: Its Effect was, that it *healed* too suddenly. So that I durst not adventure to use it in any deep Wound; but for superficial Scars, it hath a very sudden Operation. I find this *Herb* to be *Asphodelus Lancastriae Verus* of *Johnston*, or the *Lancashire Asphodel*.

I cannot omit to add here, that it is very ordinary to find *Molucca Beans* on the Shore of the *Lewes*, or other our *Western Isles*. They are found fast to the *Stalks*, which the common People supposed to be *Sea-Tangles*, and laughed at me, when I said they were *Land-Beans*: Which made me write to the Earl of *Seaforth*, whilst he lived in the *Lewes*, that I supposed these apparent *Tangles* were the *Ham* of the *Beans*, which, by long lying in the Sea, might acquire that Likeness: His Lordship examined the Matter, and found it so. And he likewise sent to me a Piece of a *Cabbage-Tree* that was found on that Shore. It is observable, that the *Kernel* of these *Nuts* will be *fresh* and *sound*: And the People make *Boxes* for *Snuff* of the *Bean-Husk*. Now, considering the Situation of these *Isles*, with respect to any Place where the *Molucca-Beans* grow, let the Observers of *Tides* consider what Reciprocations must be imagined to adjust the *Eastern* and *Western constant Currents* of the Main, with the Wafting of these *Beans* on Places that lie so far out of the *Road* of any of the *direct Tides*. And if they grow only about the *Molucca Isles*, or on no Place on this Side the *Equator*, it would seem more probable, that they came by the *Northern Passage* than any other Way. And their *Freshness* in the *Kernel* seems rather to have been kept in a cold Conservatory, than in the warm Baths of the other Progreis.

Strange Beans
frequently cast
Ashore on the
Orkneys; by
Dr. H. Sloan.
n. 222. p. 298.

VI. I have several times heard of *strange Beans* thrown up by the Sea on the *Islands* on the *North-West* Parts of *Scotland*; especially those of them which are most exposed to the Waves of the *great Ocean*: They are thrown up pretty frequently in great Numbers, and are no otherwise regarded than as they serve to make *Snuff-Boxes*. *Dr. Geo. Garden* hath lately sent me four *Sorts* of them, very fresh, and little injured by the Sea.

The *first* is what is called, at *Jamaica*, commonly, *Cocoons*; by me, *Phaseolus Maximus Perennis*, Folio Decomposito Lobo Maximo Contorto. It grows in both the hot *East* and *West-Indies*. This, I am told, is also cast up on the Coast of *Kerry*, in *Ireland*.

The *second Sort* is what, in *Jamaica*, we call commonly the *Horse-Eye-Bean*, from its Resemblance to the Eye of that Beast, by means of a *Hilus*, or *Welt*, almost surrounding it. This likewise is common to the hot Parts of the *East* and *West-Indies*.

The *third Kind* is that which, in *Jamaica*, is called *Ash-coloured Nickar*, from its being perfectly round, and very like a *Nickar*, such as Boys use to play withal. This is likewise common to the hot Parts of the *East* and *West-Indies*.

The *fourth Sort* of these *Beans* I never saw grow; but I have seen several of them in *Collections* of rare *Fruits*. It is the *Fruetus Exot. Orbicularis Sulcis*

Sulcis Nervisque distinctus 4, seu *Fructus alter Splendens* 4. *Sulcis distinctus* : C. B. Where it grows Authors are silent.

It is easy to conceive, that the *Beans* growing in *Jamaica* in the Woods, may fall from the Trees into the *Rivers*, and be conveyed by them into the Sea : It is likewise easy to believe, that being got to Sea, and floating in it in the Neighbourhood of that *Island*, they may be carried from thence by the *Wind* and *Current*, which is there constantly *East*, and which, meeting with a Stop on the main Continent of *America*, is forced through the *Gulph* of *Florida*, or *Canal* of *Bahama*, into the *Northern American Sea* ; for the *Lenticula Marina Serratis Foliis*, *Lob*, or *Sargasso*, grows on the Rocks about *Jamaica*, and is carried by the *Winds* and *Current* (which for the most part go impetuously the same Way) towards the Coast of *Florida*, and thence into the *Northern American Ocean*, where it lies very thick on the Surface of the Seas. But how they should come the rest of their *Voyage* I cannot tell, unless it be thought reasonable, that these *Beans* being brought *North*, by the *Current* from the *Gulph* of *Florida*, are put into the *Westerly Winds* Way, which generally blow at least *two* Parts of *three* of the *whole Year*, and may be supposed by this means at least to arrive at *Scotland*.

By the same means that these *Beans* come to *Scotland*, it is reasonable to believe that the *Winds* and *Currents* brought from *America* those several Things towards the *Azores* and *Porto Santo*, which are recorded by *Fernan. Cap. 9. Colon*, in the Life of his Father *Christopher*, to be some of the Reasons that moved the said *Cbr. Columbus* to attempt the Discovery of the *West-Indies*.

VII. *Hirta* lies from *Snod*, in *Skye Island*, W. by N. From the nearest Land to it in the *Hereisck* (from whence People ordinarily take Boat) it lies due *West* ; and is about *50 Miles* from the nearest Land.

There are three *Islands* together, *Hirta*, *Soa*, and *Burra* ; but *Hirta* only is inhabited. The other *two* are excellent Pasturage for Sheep, every *Sheep* there having two *Lambs* every *Year*.

In *Burra* there is no *landing*, but to the Men of *Hirta* only, in regard of the Difficulty thereof ; there being but about a *Foot* broad of *Landing-place*, and that only to be attempted when the Boat rises : For their ordinary Way is, when they come near the Rock, they turn their Boat, and set the Side to the Shore, two Men, one at each End of the Boat, with two long Poles keeping it off, that the Waves dash it not so violently against the Rock, when it rises ; at which Time only the Fellow, who is to land, makes his Attempt. If he miss his *Landing-place*, he falls into the Sea, and the rest of the People hale him Aboard ; he having before a small Rope fastened about his Middle, to prevent that Danger. But when he safely lands (which they seldom miss to do), the rest of his Fellows land one by one ; except so many as they leave to attend their little Boat, which ordinarily is of sixteen Oars.

If there be any *Strangers* (as many go from the nearest Islands in Summer), they must be tied about the Middle with a strong Rope ; and when the Men of *Hirta* have climbed up to the Top of the Rock (which is above

*A Description
of the Island
Hirta ; by
Sir R. Moray.
n. 137. p. 927.*

24 *Fathoms* before they set their Foot on *Grass*), they hale up the Strangers to them with the Ropes. When they have gathered as many *Eggs*, and killed as many *Fowls*, as will load their Boat, they lower all into the Boat, and the ablest Fellow is always left behind; who having none to help him, must throw himself into the Sea, and so recover the Boat. This *Burra* lies from *Hirta* about 6 *Miles Northward*.

Soa lies near *Hirta*, on the *South-west*. In this, except *Fowls*, there is only remarkable a *Creek*, where great *Seals* haunt. The People are so mad, that they go in their Boat, about four of them, in that narrow Passage, to kill these *Seals* with Poles, having scarce room for their Oars, and every-where seeming to close up the Mouth thereof. If the Wind changeth, during their being there, it is not possible to save either Man or Boat.

There are several *Rocks* rising out of the Sea, amongst these *Islands*, which the People of *Hirta* call *Stacks*; some 10, 20, 24 *Fathoms* above Water, without any *Grass* upon them. On the round Tops of the *Rocks* a great Number of *Fowls* breed, and in all the Cliffs. Amongst the rest, there is one called *Stacka Donna*, upon the Top whereof breedeth such an abundance of *Fowls*, that though it seems inaccessible, yet the Men of *Hirta* have ventured to go thither. After they have landed with much Difficulty, a Man having room but for one of his *Feet*, he must climb up 12, or 16 *Fathoms* high. Then he comes to a Place, where having but room for his Left Foot, and Left Hand, he must leap from thence to such another Place before him; which if he hit right, the rest of the Ascent is easy; and with a small Cord, which he carries with him, he hales up a Rope, whereby all the rest come up: But if he misseth that Footstep (as oftentimes they do), he falls into the Sea, and the Company takes him in by the small Cord, and then he tries it again.

Hirta Island is two *Miles* in Length, accounted *Five-peny Land*. In it there are ten Families. The Men seldom grow old; and seldom was it ever known that any Man died in his Bed there, but was either drowned, or broke his Neck. They are strong, big, and well-skinned. Their Food is only young *Fowls* and *Eggs*; their Drink *Whey* and *Water*. They are much given to keeping *Holy-days*, having a Number of little *Chapels*, where sometimes they watch whole Nights, making merry together with their Offerings.

The most Service of their *Women* is to harrow their Land; which they must do when their *Husbands* are climbing for *Fowls* for them.

Their ordinary Way of dividing their Land, is one *Half-peny* to every Family. The *Rocks* also are divided, such and such on every *Half-peny*: And there is a kind of *Officer* left by the Master of the Island, who governs in his Absence, and so regulates, that the best *Climbers* and worst are mixed together, that so none of the Land be unlaboured; that is, that all the Shelves of the highest *Rocks* be searched for *Eggs*.

The Way of their *Climbing*, when they kill their *Fowls*, is thus: They go two and two with a long Rope, not made of *Hemp*, but of *Coro-Hides* salted,

salted, and the Thongs cut round about and platted 6 or 9 Fold. Each End of the *Rope* is tied about each one of their Middle, and he that is foremost goes till he comes to a safe Standing; the other standing firm all that Time, to keep him up, in case his Foot should have slipped: When the foremost is come to a safe Standing, then the other goes, either below or above him, where his Business is; and so they watch Time about; seldom any of them being lost, when this is observed.

The foresaid *Officer*, when any Couple is to be *married*, brings them to one of their *Chapels*, and administers an *Oath* to them; so they are *married*. Their *Children*, when they come to the Age of 15 or 16, or thereabout, come with the Master of the *Isle* to the *Hereisch Island*, and are there *baptized*.

An ordinary Way of killing the *Fowls* in the Mist is this: Some of these Fellows lie beside the Door of the little Houses they have in their *Islands*, flat upon their Backs, and open their Breasts; which when the *Fowls* perceive, they sit upon them, and are presently caught, and their Necks broke. One Fellow has killed *Hundreds* of *Fowls* in one Night after this manner.

Sometimes they set *Gins* on the very Top of the highest Rocks, and make them strong for great Fowls. One being setting of these *Gins*, as he was walking along, his great Toe was caught in one of them, which made him stumble and fall down: Yet the *Gin* being fast and strong, kept him hung with his Head downward, till those that missed him came in the Morning, and found him so fallen.

VIII. 1. All the Tribes of *Fowls* are observed to have their *Sentinels*; especially in the Night: The *Watchfulness* of the *Scart* is true to a Proverb. I have known one, who by surprising the *Sentinel* caught 300 in a Night.

2. The Want of *Rain* at the usual Time of laying *Eggs*, hinders the *Sea-Fowls* from laying for some time.

3. If the *April-Moon* goes far in *May*, it hinders the *Sea-Fowls* from laying 10 or 12 Days longer than is ordinary.

4. A poor Man of *Rowdill*, in the Isle of *Harries*, well known by the Name of *St. Clements Blind*, though his Sight served him to travel alone through all *Harries*, *Skye*, &c. yet he was struck *blind* (which confines him to his Bed) *two Days* before the *New-Moon*, at which Instant he recovers his *Sight*. In this he never erred once in his Life-time, for which he was called the *infallible Almanack*.

5. The *Children* of *Ferintosh* in *Rofs* are taught from their Infancy to drink *Aqua Vitæ*, and are observed never to have any *Worms*.

6. Many in the *Highlands*, who pretend not to any Skill in *Chirurgery*, do venture to cut the *Uvula* off when they are troubled with it, and prescribe for a Remedy thereafter a Piece of Bread and Cheefe: Which is attended with good Success, without hindering the Speech.

7. In many of the *Isles*, the Commons apply *Spearwort* for Pains of the *Head*: It being bruised and applied, raises a *Blister*, from which issues much

Observations in the North Isles of Scotland; by Mr. Martin Martin. n. 233.

p. 727.

much Matter; and this they find very effectual for *Pains* in the *Eyes*, *Head*, *Arm*, or *Leg*.

8. They do likewise beat the *Juice* out of it, which they drink for *Purging*; which they do frequently with good Success; and to prevent *Excoriation* of the *Throat*, they drink a little *melted fresh Butter*.

9. *Anna George*, who continued in the State of *Virginity* till the 51st *Year* of her Age (as is evident by her Declaration on her *Death-bed*), married, and brought forth a *Boy* in the 52d *Year* of her Age, having two *Teeth* in his *Head*.

10. Another *Woman* in *Lewis* was 7 *Years* bringing forth a *Child*, *Bone* after *Bone*, and all by the *Fundament*.

11. A *Boy* in the *Isle* of *Skye*, aged 16 *Years*, has a Faculty of erecting his *Ears* at his *Pleasure*. There are several *Towns* in *Skye*, where the *Sheep* have no *Marrow*: All these *Towns* are *rocky*, *high*, and very *windy*.

12. The *Inhabitants* of *St. Kilda* are every *Summer* infected with a *Cough* upon the *Chamberlain's* Landing, which lasts for 10 or 12 *Days*, and the usual *Remedy* for it is *Gibben* drank upon *Brochan* of *Meal* and *Water*. This *Gibben* is the *Fat* of *Sea-Fowls* preserved in the *Stomach*; a sovereign *Remedy* for *Coughs* and *Green Wounds*.

Several
Things in
Ireland in
common with
the West-
Indies; by
Dr. Tho.
Molineux.
n. 227. p. 507.

IX. That there is a sort of Alliance between *Ireland* and the *West-Indies*, appears in several Things, of which they partake both *in common*. For a they on the *Coast* of *New-England*, and the *Island Bermudas*, gather considerable Quantities of *Ambergrease*, so on the *Western Coast* of *Ireland*, along the *Counties* of *Sligo*, *Mayo*, *Kerry*, and the *Iles* of *Arran*, they frequently meet with large *Parcels* of that precious Substance, so highly valued for its *Perfume*. In the *Year* 1691, Mr. *Constantine*, an *Apothecary* of *Dublin*, shewed me one *Piece* of *Ambergrease*, found near *Sligo*, that weighed 52 *Ounces*. On the *Outside* it was of a close compact Substance, blackish, and shining like *Pitch*; but when it was cut, the *Inside* was more porous, and something of a *yellowish Colour*; not so grey, close, and smooth, as the cleanest and best Sort of *Amber*; but, like it, speckled with whitish Grains, and of a most fragrant Scent. I have still a *Piece* of it by me that weighs above 6 *Drachms*, with several *Samples* of 3 or 4 other Sorts of *Amber*, all found on that *Coast* of *Ireland*; some intirely black as *Pitch*, others of a perfect white Substance, exactly answering the Description of that Sort of *Amber* Olaus *Wermius* mentions in his *Museum*, under the Name of *Ambræ Griseæ nondum maturæ*.

p. 34.

Nor is the kind of *Whale-Fish* that is often taken in *New-England*, and affords the true *Sperma Ceti*, a Stranger to the *Coast* of *Ireland*, that respects *America*. This we may properly, I think, with Dr. *Charleton*, call the *Cetus Dentatus*, from its large, solid, white *Teeth*, fixed only in the *lower Jaw*, to distinguish it from that Species that gives the *Whale-Bone*, most naturally named by *Aristotle*, *Mysticetus*, from its bearded, horny *Lamineæ* in the *Roof* of its *Mouth*: Of which Kind likewise there have been 3 or 4 stranded in my Time, but on the *Eastern Coast* of this Country that regards *England*.

Hist. Animal

This

This *Cetus Dentatus* is truly figured by *Jobnstonus* and Mr. *Ray*. There have been three of this Kind taken, to my Knowledge, in the Space of 6 Years, all on the *Western Coast* of this Country; one near *Colerane*, in the County of *Antrim*; another about *Skip-Harbour*, in the County of *Donnegall*; and a 3d in *Aug.* 1691. 71 Foot long, towards *Bally-Shannon*, where *Lough-Erne* discharges its Waters into the *Western Ocean*.

Hist. Pisc.
Tab. II.
Ichthyolog.
Tab. II.

And then it was I had an Opportunity of truly informing myself what Sort of Substance *Sperma-Ceti* is, and in what Part of the *Whale* 'tis found: Concerning which Matter, *Physicians* and *Naturalists* have given the World such various and false Accounts. 'Tis truly nothing else but Part of the *Oil*, or *liquid Fat*, of this particular Sort of *Whale*; which *Oil*, at first, when confused and mixt, shews itself like a *whitish Liquor*, of the Consistence and Colour of *Whey*; but laid by in Vessels to settle, its Parts by Degrees separate; that which is lighter, and swims at Top, becomes a clear *Oil*, pellucid like *Water*, serviceable for all the Uses of common *Train-Oil*, got out of the *Blubber* of other *Whales*; and that which subsides, because 'tis heavier, and of a closer Consistence, candies together at the Bottom; and is what is sold for *Sperma-Ceti*, at 12 *Sbil.* the *Pound*, when 'tis thoroughly blanched and refined from all its Filth, and the remaining Parts of the *Oil*, that otherwise discolours it, and gives it a rancid offensive Scent; of this Substance several *hundred Pounds Weight* may be gotten out of one *Whale*; but the cleansing and curing of it is troublesome, and requires no small Art, Time, and Charge; which occasions the Value of that which is thoroughly refined: The *Fat* of the whole Body affords it; but that of the *Head* gives the greatest Quantity and purest *Sperma-Ceti*.

I have some Reason to believe, that to these Instances of *Amber-Griese*, and *Sperma-Ceti* (besides those of the *Moose-Deer*, the *Horns* whereof are frequently found *under Ground*, and were formerly described, of which *Ireland* partakes more than any other Country of *Europe*, from its Neighbourhood with the *Northern America*), we may likewise add some of our more rare and spontaneous *Plants*, because they are found growing only in those *Western Parts* of *Ireland*, and no-where else in the whole Country, or any of the neighbouring Kingdoms about us. I shall mention but 2 or 3 of many which I have been told are peculiar to those Parts; and those are the *Arbutus sive Unedo*, or the *Strawberry-Tree*, not to be found any-where of spontaneous Growth nearer than the most Southern Parts of *France*, *Italy*, and *Sicily*, and there too 'tis never known but as a *Frutex* or *Skrub*: Whereas in the rocky Parts, in the County of *Kerry* about *Lough-Lane*, and in the *Islands* of the same *Lough*, where the People of the Country call it the *Cane-Apple*, it flourishes naturally to that Degree, as to become a large tall Tree. *Petrus Bellonius* takes notice, that it does so in *Mount Athos* in *Macedonia*; and *Juba* is quoted by *Pliny*, as mentioning a Thing extraordinary, for saying the *Arbutus* grows to a high Tree in *Arabia*. The Trunks of those in *Ireland* are frequently 4 Foot and a half in Circumference, or 18 Inches in Diameter, and the Trees grow to about 9 or 10

Vid. Vol. II.
Cap. III. Sec.
XXXVI.

Yards in Height, and in such plenty, that they now cut them down, as the chief Fuel, to melt and refine the Ore of Silver and Lead-Mines, lately discovered near the Castle of *Ross*, in the County of *Kerry*.

The other Plant I shall take notice of, is *Cotyledon, five Sedum Serratum, Latifolium Montanum Guttato flore Parkinsoni & Raii*, vulgarly called by the Gardeners *London-Pride*, I suppose, because of its pretty elegant Flower, that, viewed near at Hand, and examined closely, appears very beautiful, consisting of great Variety of Parts. The whole Plant is most accurately described by that profound Naturalist Mr. *Ray*: But he knew no certain Place where it grew spontaneous, not having met with it in all his Travels, nor any Author mentioning its native Country. It grows plentifully here with us in *Ireland*, on a Mountain called the *Mangerton* in *Kerry*, 6 or 7 Miles over, and reputed the highest in *Ireland*, 2 Miles from the Town of *Killarny*, and 4 Miles from the Castle of *Ross*. Here it spreads itself so abundantly, as to cover great Part of the Mountain; and forasmuch as I understand, like the *Arbutus*, it is peculiar to this County alone.

New England
Rarities.

Whether both the foregoing Plants are truly *American*, I cannot at present determine; but this I know, that *Sabina Vulgaris*, or common *Savin*, is mentioned by Mr. *Josselyn*, as a Plant common on the Hills of *New-England*; and I have been assured by an Apothecary of *Dublin*, that he has gathered *Savin*, growing wild as a native Shrub, in one of the Islands of *Lough-Lane*, in the County of *Kerry*; and if so, I have reason to believe that hereafter farther Inquiry may add to these I have here given, several other Examples of Things natural and common to that and this Country.

Observations
made in a
Voyage from
England to
the Caribbee
Islands; by
Dr. Stubbs.
n. 27. p. 493.

X. 1. I took notice at *Deal*, where I set Sail for *Jamaica*, of the great Difference in the Rusting of Iron, in such Houses as front the Sea, in comparison of that Effect in the Street immediately placed behind that other in which I made this Observation. They told me, that it rusted more at high Floods than at neap Tides, the Height of the Beach hindering the saline Exhalations. This Remark put me in mind of the Vanity of the Argument of M. *Ligon's* and others, viz. That the Air of the *West-Indies* was hot and moist, because of the Rusting of Iron; whereas it indeed arises from some other Principle in the Air: For at the Point of *Cagua*, where it scarce raineth 40 Showers in a Year, Iron rusts as much or more than anywhere; yet are there other Parts of the Island, in which, of 9 Months, not one passes without great Rain. Besides, in *Jamaica*, it rusts least in rainy Weather.

The Steams of the Sea are found of such a Nature, that our Sweet-meats rotted; Sugar of Roses, and other Lozenges, grew moist; and those Pyes and Gammons of Bacon, which had kept well before, after they had been once exposed to the open Air, decayed more in a Day or two, than in 6 Weeks before.

On the Point *Cagua*, the Iron Guns of the Fort were so corroded, that some were near become useles, being perforated almost like Honey-combs; but the Guns which lay in the Salt-water, were not much endamaged by Rust, as we found upon taking up of some.

Many Things receive Damage by the Air: Not only Iron rusts, but even Linen rots; and Silks once exposed to the Air, do rot without losing their Colour. If a Lancet be once exposed to the Air, it will rust, though you presently put it up again; but if it be never exposed to the Air, it will hardly rust.

At *Deal*, a certain Ale-seller will warrant, that the Ale, as he orders it, shall be carried good to the *West* or *East-Indies*. His Way to prepare it is this (as he told me himself) he twice mashes it with fresh Malt, and twice boils it well; yet all this kept it not from Souring, as I observed during my Stay there. We bought of it to carry to *Jamaica*, and then he directed us thus; To every Rundlet of 5 Gallons, after it is placed in the Ship, not to be stirred any more, put in two new-laid Eggs whole, and let them lie in it; he said, that in a Fortnight or little more, the whole Egg-shells would be dissolved, and the Eggs become like Wind-Eggs, inclosed only in a thin Skin; after this, the whole White would be preyed on, but the Yolk would not be touched or corrupted. By this means we did preserve the Ale to *Jamaica*, and it was much better than at *Deal*.

Concerning the *Thames-Water*; It is not only observable, that in 8 Months time it acquires a spirituous Quality, so as to burn like Spirit of Wine (and some *East-India* Ships, I am informed, have run the Hazard of Firing, by holding a Candle near the Bung-hole at the first Opening of the Cask), but also that the Stinking of it is no Corruption, nor perhaps unwholsome; for we drank it all the Way, so as to hold our Noses, yet had no Sickness; but we had a Proportion of Brandy each Week, which perhaps might correct it. If you take off the Bung from any Cask that stinks, and let the Air come to it, it will in 24 Hours become sweet again; and if you take a Broom-stick, and stir it about well, it will become sweet in 4 or 5 Hours, casting a black Lee to the Bottom, which remixes with it, and so occasions a 3d or 4th Fermentation and Stench; after which it stinks no more. But though *Thames-Water* upon Stench do not putrify, yet other Waters (as far as hath been hitherto observed) do become irrecoverable upon stinking, and dangerous to drink.

I observed at Sea, after we were out of the *Narrow*, the Sea grew darkish, and after perfect Azure; yet was it much more salt the farther we went, as I tried by a Water-Poise, which rose about half an Inch above the Sea-Water in the Downs, and at 24 Degrees more, 2 Inches: But after that I never observed any Difference unto *Jamaica*, the Sea being probably so impregnated with Salt, as not to imbibe more.

As to the Colour of the Sea, I conceive there is a great Variety in it and its Steams, as in Grounds at Land; which may occasion the Sickness in some Places more than in others: For the Sea smells differently in the

Narrow and Main: And as to *Colour*, it is of a *Sea-green*, and more *sickly* in the *Downs*, than at *Torbay*; and on *Plymouth Coast*, more than past the *Land's-End*; and in the *Bay of Biscay*, than in the *Long-Reach*. Something perhaps may be imputed to the Difference of the *Waves*, which are *short*, and make a *Copling-Sea* in the *Bay of Biscay* (yet we came not within 80 *Leagues* of *Cape Finis-Terræ*). In the *Long-Reach* it is a *long rolling Wave*, but never *breaks*. About *Florida*, *Virginia*, and *New-England*, it is a *great rolling Wave*, but *breaks*. And as the *Sea* coloureth from *Green* to *Darkish*, and so to *Blue*; so in our Return it coloured from *Blue* to *Dark*, and so to *Green*. When we were in the Latitude of *Barbados*, and had failed so for some Days, and apprehended ourselves to be within 70 or 80 *Leagues*, I observed the *Sea* was black and thick, not transparently *Blue*, as before, and the Foam against the Ship Sides was turbid, and of another Consistence than before: but when the Sun was high, it turned *Green*; whereupon I asked the Master, who told me we were within 60 *Leagues* of *Barbados*, and that the *Sea* was there soundable, whereas before it was not so. But at *Barbados*, in the Anchoring-place it was *Blue*; as we rowed ashore, in the Shallow it was *Whitish*: And so at *Jamaica*, near the Shore, it is transparently *White*, but within three *Yards* more transparently *Blue*.

As to the Burning of the *Sea*, I could never observe so great a Light, as to perceive Fishes in the *Sea* off the Stern; yet was the Light great, and at some times more than other. I suppose several subject Earths, Currents, and Winds, do vary it. I observed it burned more at *Deal* the Night before we set Sail, than ever in the Voyage. All the Water ran off our Oars almost like liquid Fire; the Wind was then S. E. and the Seamen told me, that at East and South Winds it burnt most.

I shall not trouble you with an Account, how two contrary Winds poise each other, and make a Calm in the Midst, Ships at a Distance sailing with contrary Gales at the same Time.

It is observable, that in the *Indies*, such Places as have any high Mountains, have also every Night a Wind, that blows from the Land, maugre the *Levantine* Wind which blows at Sea, but with a slacker Gale at Night; which seems to shew, it depends not only on the Motion of the Earth, but Sun. There is none at *Barbados* or *Saona*, but at all the other Islands: And in *Jamaica* every Night it blows off the Island every Way at once, so that no Ship can any-where come in by Night, nor go out but early in the Morning, before the Sea-breeze come in. I have often thought on it, and could imagine no other Reason, but that those Exhalations, which the Sun hath raised in the Day, make haste (after his Strength no longer supports them) to those Mountains, by a Motion of similar Attraction, and there gather in Clouds, and break thence, by their own Force and Weight, and occasion a Wind every Way: For as the Sun declines, the Clouds gather, and shape according to the Mountains; so that old Seamen will tell you each Island in the Afternoon towards Evening, by the Shape of the Cloud over it. And this Attraction appears further, not only from the Rain that gathers on the Tree in the Island of *Ferro*, spoken of by Sir R. Hawkins in his Observations, and *If.*

Vossius upon *Pomponius Mela*, as also *Magninus de Manna*, but also from *Sec. XII.* the Rains in the *Indies*; there being certain Trees which attract the Rain, so as that if you destroy the Woods, you abate or destroy the Rains. So *Barbados* hath not now half the Rains it had when more wooded. In *Jamaica* likewise, at *Guanaboa*, they have diminished the Rains as they extend their Plantations. But to return to *Jamaica*: That this Night-Wind depends much upon the Mountains, appears by this, that its Force extends to an equal Distance from the Mountain, so that at *Port-Morant*, which is the Eastermost Part of the Island, there is little of Land-breeze, because the Mountain is remote from thence, and the Breeze spends its Force along the Land thither. I shall further illustrate this kind of Attraction. In the Harbour of *Jamaica* there grow many Rocks, shaped like Bucks and Stags-Horns: There grow also several Sea-Plants, whose Roots are stony. Of these Stone-Trees (if I may term them so) some are insipid, but others perfectly nitrous. Upon those other Plants, with petrified Roots, there gathers a Lime-Stone, which fixes not upon other Sea-Fans growing by them: It is observable also, that a *Monchinel-Apple*, falling into the Sea, and lying in the Water, will contract a *Lanugo* of Salt-petre.

It is commonly affirmed, that the Seasons of the Year, betwixt the Tropicks, are divided by the Rains and fair Weather, and 6 Months are attributed to each Season. But this Observation holds not generally true: For at the *Point* in *Jamaica* scarce fall (as was hinted above) 40 Showers in a Year, beginning in *August* to *October* inclusively. From the *Point* you may look towards *Port-Morant*, and so along to *Ligonée*, 6 Miles from the *Point*; and you'll scarce see, for 8 or 9 Months, beginning from *April*, an Afternoon in which it rains not. At the *Spanish-Town* it rains but 3 Months in the Year, and then not much. And at the same Time it rains at *Mevis*, it rains not at the *Barbados*. And at *Cignateo* (otherwise called *Eleutheria*) in the Gulph of *Babama*, it rains not sometimes for 2 or 3 Years; so that that Island hath been twice deserted for want of Rain to plant it.

At the *Point* of *Jamaica*, where-ever you dig 5 or 6 Foot, Water will appear, which ebbs and flows as the Tide. It is not salt, but brackish; unwholsome for Men, but wholsome for Hogs. At the *Caymans* there is no Water, but what is brackish also; yet is that wholsome for Men, insomuch that many are recovered there by feeding on Tortoises, and yet drink no other Water. The Blood of Tortoises is colder than any Water I ever felt there; yet is the Beating of their Heart as vigorous as that of any Animal (as far as I have observed) and their Arteries are as firm as any Creatures I know: Which seems to shew, it is not Heat that hardens the Coats of the Arteries, or gives Motion to the Heart. Their Lungs lie in their Belly, below the Diaphragm, extending to the End of their Shell. Their Spleen is triangular, and of a firm Flesh (no *Parenchyma*) and floridly red. Their Liver is of a dark Green, inclining to Black and *Parenchymatous*. In the *Oesophagus* are a Sort of *Teeth*, with which they chew the Grass they eat in the Meadows, which there grows at the Bottom of the Sea. All the Tortoises from the *Caribbees* to the Bay of *Mexico* and *Honduras*, repair in Summer to the *Cayman Islands*

Islands to lay their Eggs, and to hatch there. They coot for 14 Days together, then lay in one Night some 300 Eggs, with White and Yolk, but no Shells; then they coot again, and lay in the Sand; and so thrice: Then the Male is reduced to a kind of Jelly within, and blind, and is so carried Home by the Female. Their Fat is green, but not offensive to the Stomach, though you eat it as Broth stewed. Your Urine looks of a yellowish Green, and oily, after eating it.

There is no manner of Earth, but Sand at the *Point*; yet I have eaten admirable Melons, Musk, and Water-Melons, that have grown there. A great many Trees also grow there, especially Mangranes, and Prickle-Pears.

In some Ground, that is full of Salt-petre, your Tobacco, that grows wild, flashes as it is smoked.

The Fruit of Trees there of the same Kind ripen not at one time: There is a Hedge of Plum-Trees of three Miles long, as you go to the *Spanish-Town*; on it I have many times remarked some Trees in Flower, others with ripe, others with green Fruit, and others to have done bearing, at the same time. *Jasmins* I have seen to blow before their Leaves, and also after their Leaves are fallen again.

The *Sower-Sap*, a pleasant Fruit there, hath a Flower with 3 Leaves; when these open, they give so great a Crack, that I have more than once run from under the Tree, thinking it all to be tumbling down.

There is a Bird, called a *Pelican*, but a kind of *Cormorant*, that is of Taste fishy; but if it lie buried in the Ground but two Hours, it will lose that Taste, as I have been told for certain.

I tried some Analysis of Bodies, by letting Ants eat them; and I found that they would eat brown Sugar, white, and at last reduced it to an insipid Powder; so they reduced a Pound of Salet-Oil to two Drachms of Powder.

At our first coming there we sweat continually in great Drops for three Quarters of a Year, and then it ceaseth: During that Space I could not perceive myself or others more dry, more costive, or to make less Urine than in *England*; neither does all that Sweat make us faintish. If one be dry, it is a Thirst generally arising from the Heat of the Lungs, and affecting the Mouth, which is best cooled by a little Brandy.

Most Creatures drink little or nothing there, as Hogs; nay, Horses in *Guanaboa* never drink; nor Cows in some Places of the Island for 6 Months; Goats drink but once perhaps in a Week; Parrots never drink, nor Parakeets nor Civet-Cats but once a Month.

The hottest Time of the Day to us is 8 in the Morning, when there is no Breeze. I set a Weather-Glass in the Window, to observe the Weather, and I found it not rise considerably at that time; but by Two of the Clock it rose two Inches.

Venice-Treacle did so dry in a Gallipot, as to be friable; and then it produced a Fly, called a Weavil, and a Sort of white Worm. So did the *Pilule de Tribus* produce a Weavil.

There

There is in the midst of the Island a Plain, called *Magotti Savanna*, in which, whensoever it rains (and the Rain passeth along the Island before it falls there) the Rain, as it settles upon the Seams of any Garment, turns, in half an Hour, to Maggots; yet is that Plain healthful to dwell in.

All the Alteration our Sweet-meats and Lozenges, and Gammons of Bacon, underwent, must be attributed to some peculiar Principle in the Air; for in all our Voyage to the *Barbados* we had not one Shower, that I remember: And if any will have the Air moist, whilst a constant *Levant* (that is, a drying) Wind fills our Sails, at least during the *Long-Reach*, how comes it to pass, that so much Heat joined with Moisture doth not occasion putrid Fevers? And why, in all that Journey, and after in *Jamaica*, when the Glasses for many Weeks stood open and uncovered, did not the lixivate Salts of Wormwood and Ash contract any Moisture? I am sure I never set any Salts in the Sun, or near a Fire, during my Stay there, to preserve them, or to restore them to their coagulated Form: Nor will other Sea Salts there lose much, if not kept dry by a Fire; no, nor lying on the Ground: For I have seen it kept so; yet if it immediately touch the Ground, some of it will moisten away. But I have seen Tortoises dry-salted, and lie on the Ground covered with Salt a Year, and the Salt, under all the Vicissitudes of Weather, never give much, or spoil the salted Tortoise.

*Additional
Observations.
n. 36. p. 699.*

The Way of drinking Brandy with Water, which Sir *Christopher Mings* observed, was this: *First*, to take a Mouthful of Brandy, and whilst it was yet hot in your Mouth and unswallowed, to drink the Water, and so wash it down, it being his and a common Observation at Sea, that it was ever wholsomer to drink it so, than either mixed with the Water, or after it. For, said he, if you drink the Water first, it gives instantly such an Impression of the Coldness to your Stomach and Lungs, as that it is too late to correct it by the succeeding Brandy. Which Reason I could not but allow of; for in those Parts the Passages or Porosities of the Body are so pervious, that what you drink, though cold, instantly dischargeth itself in Sweat, or checks your constant and necessary *Diaphoresis* before you can get the subsequent Brandy down. And Man is so exact a Machine, that a much less thing disorders him there than here. And if a little Brandy should be mixed with a Draught of Water, it would not be efficacious; the Coldness of the Water being more powerful in Bodies so tender as we are there, if hot, to hurt them, than so little Brandy to correct it. But the other way washes the Brandy down first, and as that goes, it fortifies Nature every-where to receive and distribute the subsequent cold Liquor.

About the Colour of the Sea, I have this to add, that as we went and passed from a green Sea to an azure, in the Way, when it was dark-coloured, the Top of each Wave, as it was cast up before the Sun, shewed itself to be azure, the rest of the Wave being Dark-coloured, approaching to Black. And the like I observed coming Home: For though the Sea in its dark Colour resembled exactly what we saw before, as we went out; yet did the Tops of the Waves break and appear Green, long before the great
Waves.

Waves or Body of the Sea became Green. I observed that the Sea, which was azure, and transparent in Sunshiny Days, was black and dark-coloured, and much less transparent, when the Sun did not shine; but in the Green-Sea there happens not the like Difference.

As to those Plants, whose Roots I said were stony, it may be noted, that some of their Roots are totally petrified, some only in part; the rest being of another Kind of more vegetable-like Consistence, whilst the Boughs and Trunk are of another Nature.

Of the Water at the *Point of Jamaica*, I shall further observe, that though the Sand does so percolate, that you find it upon digging 5 or 6 Foot deep, yet from that Sand there arises no Steam into the Air, notwithstanding the Heat of the Country. For Proof hereof, I observed that Men would lie all Night, and sleep on the Sands without Hurt. And to take Notice of that Particular upon this Occasion, it is an usual Thing for the Weevil (or Fly that breeds in Meal, Currans, Raisins, &c.) to be thus cured: After that the Sun hath heated the Sand, they spread a Sheet, and on that spread their Meal, Currans, &c. The Sand being hot under, the said Weavils retire from the Bottom to the upper Parts; and these being heated, they retire all into the Middle; and thence being heated, they are forced to run away out, and are so swept away. And if you spread the Sheet on the firm Ground, though never so much heated with the Sun, it will presently grow damp there, and the Weavils will lodge themselves at the Bottom; so as that you can never separate them any-where else but on the Sand. Also in the Nights I observed, that between the other Ground and our pendulous Hamacks, there gathered not only a greater Coldness of Air, but also Moisture, than was observable at the *Point*, when we hung in the like Posture. It is true that the Reason is obvious, why there should be an Air under the narrow Passage betwixt the Hamack and the Ground, which is not observable above it; but there is also a Dampness, so that I was forced to put two Blankets betwixt me and the Bottom, whilst I had none to cover me at the Top.

During an Hour or two's Stay at the *Caymans*, I examined that Assertion of *M. Ligon's*, that a Tortoise hath three Hearts, and I found it false; for altho' the Resemblance of the two Auricles be such, as also their Bodies or Flesh, as to deceive the unwary Observer, yet there is but one Heart, triangular and fleshy; the other two are only the Auricles, yet of the same Shape and Body. The two Auricles move at a several Time from the Heart, and they are distanced from the Heart about an Inch, and the Passage fleshy (as I remember) and narrow, by which the Blood is infused into the Heart. This Heart hath but one Ventricle; yet there are several Columns of Flesh and Receptacles in it, such as are not in the Auricles.

The Grass of the submarine Meadows is not a Span long, that I could observe, and is of a Green approaching to Yellow. The Tortoises bite much more than they swallow, so that the Sea is covered with the Grass, where they feed, at the Bottom. Once in about half an Hour they come up and fetch one Breath, like a Sigh, and then sink down again: And if out
of

of the Water, they breathe somewhat oftener. If you hurt them on Shore, as they lie on their Backs, the Tears will trickle from their Eyes. You may keep them out of the Water 20 Days and more, and yet they will be so fat as to be fitting Meat, provided you give them twice a Day about half a Pint of Salt-Water. The Fat that is about their Guts is yellow, though that of the Body be green. The Head being cut off, dies instantly; and if you take out the Heart, the Motion continues not long: But any Quantity of the Flesh will move, if pricked, and also of itself for many Hours after it is cut into Quarters; and the very Joints of the Bones of the Shoulders and Legs (answering our *Omoplate* and Thigh yet within the Shell) have their Motion, and even though you prick only the Fat of it: But if you place these Parts of the Tortoise in the Sun, they presently die. The Legs die as soon, in a manner, as cut off.

The Eggs of *Crocodiles* and *Alligators* are little bigger than a Turkey's; The Shell is as firm, and like in Shape to a Turkey's, but not spotted. I inquired into the Stone in the Stomach of a *Cayman*, or *Crocodile*, and I found, by the Inquiry of a very observing Gentleman there, that they were nothing but several Stones, which that Creature swallows for Digestion. He took out of one a Piece of a Rock as big as his Head; out of others he had taken 16 or 20 lesser. None regards them much there, whatever *Monardes* relateth.

I could not hear of any Stones found in the Gall of the Hogs there; but it is usual to find little Stones in their Bladder of several Sizes; but the Shapes of them (none weighing a Scruple) were angular, and pointed with five Angles.

De Laet is in the right as to his Description of the *Manati-Stone*: But he is out in his *Lapis Tiburonum*; for though a *Tiburon* and *Shark* be all one, and differ from a *Manati*, or *Sea-Cow*; yet, by his Leave, though that same be a kind of friable Calx when it is brought hither, yet when it is first taken out, it is not so, but a white Substance, near approaching to the Nature of any Brain, and encompassed in a transparent Jelly: The Jelly dries all away, as it is exposed to the Sun; and the white Substance dries into the Body he speaks of. If my Memory fail me not extremely, it is taken out of two Places over each Eye; and both being usually by Seamen put into the same Paper together, to dry, pass for one. That Creature hath no Bone in his Back, as vast as his Strength is; only in his Head there are Bones. His Jaws are Gristles; and he hath Rows of Teeth, which are Bones like Lancets, and moveable in him, to erect, or lie flat; and multiply to 3, or 4, or 5 (perhaps more), as he grows in Years. His Back-bone is all gristly, and so are his Ribs, yet divided into *Vertebrae*. The Seamen usually cut them into Walking-Staves. They and the Dolphin swim faster than any Ship saileth; so do the *Spanish Mackarel* also.

Civet-Cats, if you do not give them Drink at all, they will not die in a longer Time than a Month: But if they drink once a Month, they will yield more Civet, as I was told; and so if they be fed with Fish: Yet

they piss much, as do Rabbits. In those Places where there is no Rain for a whole Month, or longer, nor any River or Pond, Cows lick the Dew, for a Supply. A Butcher killed a Bull in an Island, where he could have no Water but what was salt. He assured me, that his Bladder was dried up, so that he made very little or no Water; yet he must be guessed to have lived in that Island before the *English* came thither; which was 6 Years before he was killed.

The Swallows in *Jamaica*, as hot as it is, depart in the Winter Months, and the Wild-Ducks and Teal come hither then.

The so famed Tree, called a Cabbage-Tree, I assure you, is nothing else than a Palm-Tree; and all that is eaten as the Cabbage, is what sprouted out that Year, and so is tender. If eaten raw, it is as good as any new Almonds; and if boiled, excels the best Cabbage. When that Top is cut off, the Tree dies. There was one of those Trees at *Barbados*, above 300 Foot high, as I was told for certain. This Tree will never rot, and when it is dried, grows so hard, that you cannot drive a Nail into it.

It is a Mistake (above) that any Tobacco grows wild, in *Jamaica* at least. The Nitrous Tobacco, which grows upon Salt-petre Ground, will not come to so good a Colour, nor keep so long, as other Tobacco; inso-much that the Merchants oftentimes lose all their Tobacco in the Voyage for *England*, or *Ireland*, it rotting all by the Way. In the same Salt-petre Ground the Potatoes, that are planted there, are ripe two Months sooner than elsewhere; but if they be not spent presently, they rot, the Salt-petre (as they told me) fretting the outward Skin of the Root, which is thinner in that Sort of Ground than in other Places. The Sugar-Canes also in those Places grow larger and faster than in other Grounds, but rot presently, if out of Ground, and do not boil so well to Sugar.

In *Jamaica* the Sugar cures faster in 10 Days, than in 6 Months at *Barbados*: And this happens on these Places, where it rains for many Months together; but you must know, that Rains there are sudden, and make no previous Alteration in the Air before they fall, nor do they leave it moist afterwards.

There is a Tree, called a *Bastard Cedar*, whose Wood is really so porous (though you would not guess so upon View), that being turned into Cups, Wine and Brandy will soak through at the Bottom in a short time.

There are many Kinds of Wood in the *Indies* besides that of the *Acajou*, or *Cajous*, that breed no Worms: And there is a Tree, called White-Wood, in *Jamaica*, of which if you build Ships, they will never breed any Worm.

The *Soap-Tree*, I have seen growing at the *Spanish Town*, and the Berries of it (being as big as Musket-Bullets) without any Proportion of *Salt-Lixivate*, or Sulphur, or Oil, wash better than any *Castile-Soap*; but they rot the Linen in time.

They have in *Jamaica* three Barks to tan with, the *Mangrove*, *Olive-Bark*, and another. They tan better than in *England*, and in 6 Weeks the Leather is ready to work into Shoes.

The Juice of *Manioc*, or *Cassavi*, is rank Poison. All Hogs and Poultry that drink it, swell and die presently. If the Root be roasted, it is no Poison, but only occasions Torsions in the Belly,

Concerning the Oil of *Palma Christi*, the *Indians* use it for Lamps. It is a delicate, sweet, and transparent Oil; but I could never find it operate in Physick, notwithstanding I have given a Spoonful of it, and three in a Clyster. This *Palma* does yield an exceeding great Quantity of Oil, and, did we mind any thing, might be a Staple Commodity. The Leaves applied to the Head, give great Ease in the Head-ach, as I have tried it myself; and it is the only Remedy of the *Indians* and *Negroes*.

The *Manchinel-Tree* is a Wood of an excellent Grain, equalling the *Jamaica Wood*, but large to 4 Foot Diameter. The *Spaniards* turn it into Beds, and the *English* usually floor their Rooms with it in *Jamaica*.

The Birds, called by some *Fregati*, we call Men of War: Their Fat is good against Aches, &c. so is that of the *Alligators*, or the *Sbell-fish*, called *Soldats*, or *Soldiers*.

Of the *Shining*, or *Fire-Flies*, there is a great Difference in *Hispaniola* and *Jamaica*, as to Bigness. They can contract and expand their Light as they fly, I am sure; and their Light continues some Days after they are dead: So that I am not of their Mind, who affirm, that it is the *Flammula Cordis* in their Tail.

The *Wood-Lice* will eat Covers and Books, though printed, as I found to my Cost; and they will eat some Sorts of Timber, but not all.

When the *Cirons*, or *Chegoes*, come among the nervous and membranous Parts, they are very painful, and not to be pulled out, lest your Needles touch the Nerves.

I could never hear of any Hurricane about *Jamaica*. I inquired of some that had been in Hurricanes, and they told me, that they had found it to be much colder then, than at other times. I inquired of the Nature of these Tempests, whether the Wind varied all the Points of the Compass, as it is said. They answered, No; but it began always with a North Wind, and when it came East, it ceased: But betwixt the North and East Point it varied so fast, and with such a violent Gust always, that it was impossible for any Ship in the Water to answer the Veering of the Wind: Whence it happens, that the Backs of the Ships are broken, and the Sails and Masts carried by the Board. I saw a Vessel, of about 400 Tun, whose Main-Mast (which is no small one in such a Ship) was wreathed, as you would wreath a Withe, in an Instant, and so born by the Board, before ever they could hand a Sail.

As we failed for *England*, and were to double the Cape at the End of *Cuba*, in order to our passing the Gulph, betwixt the two Capes of *Cariooche* towards the Main, and Cape *Antonio* in *Cuba*, there is a Current which sometimes sets westerly, sometimes easterly: If it set easterly, the Ships have a speedy Passage in three or four Days to the *Havanna*; otherwise it is a Fortnight or three Weeks Sail, the Ship being imbayed in the Gulph of *Mexico*. To know which Way the Current sets in calm Weather, no Wind at all stirring, thus they try it: They hoist out their Boat, and having rowed a little

from the Ship, yet let loose their Plummet (ours did weigh 40 Pounds), and sink it 200 Fathom. Then, though it never touches the Bottom, yet will the Boat turn Head against the Current (which constantly runs very strongly of itself, since so much of Sea runs in the Gulph of *Mexico*); and rides as firmly, as if it were fastened by the strongest Cable and Anchor to the Bottom. If you wonder to hear me mention a Calm thereabouts, where you would expect a constant *Levantine* Wind, I shall inform you, that it is no unusual Thing to meet with Calms, if you approach within any Distance of Land; for some Gust, or Land-Wind, will so poise the *Levantine* Wind, that you shall have a perfect Calm.

The Change of Climate, and the Effects of it, are very sensible to our Bodies, as we approach the *Tropick*. There usually happened Sickneses in our Ships about that Time; and as soon as the Seamen pass the *Tropick*, they still use Expressions of Joy, by firing of Guns, in Testimony of Gladness for their safe Arrival so far. I could not learn of the old Seamen any other Reason for the different Condition of Health, with which our Ships now sail, in Comparison of what our Ancestors experimented, than this; Generally all our Seamen and Passengers let Blood in the Voyage before that Time; yet is not that to be done rashly, nor by all in the same Degree of Latitude; for I carefully observed in our Ships the Alteration of our Bodies upon the Change of Climate, and found that the Blood of the *English*, which consists of Parts more gross, and is extracted from a more substantial Food, *viz.* that of Flesh, than in other Countries, did attenuate, and the Pulses in some became very lofty, full and quick; in others slow, yet more lofty and full than before. In some there was a Sense of Pricking in their Flesh; in some a great Dulness, and Oppression of Spirits and Heaviness; after which they pass into a Condition of Sweating, which pursues them afterwards for a long time. From this Agitation of Humours, it is easy to shew the Reason why our Ancestors fell sick, and how necessary it is to bleed, when any feel those Symptoms in him; for immediately upon Bleeding, the Pores are opened, and they fall to sweat; and by this Course those Numbers of People we carried over with us to *Jamaica*, arrived safe. Some I caused to be blooded in 32 Degrees, some in 28, some in 24 and 23 Deg. And in all our Ships there died but three. In our Ship two had the Disease, so much talked of, called the *Calenture*; but they were thus cured presently. I was talking with one of them, and on a sudden he beheld green Leaves, as he imagined, floating on the Sea, which yet was Azure-coloured: After that he began to admire the fine Woods, which he fancied to be near us. I immediately gave him a Vomit of the Glass of Antimony in Sack; which no sooner had wrought its Effect, but all those Imaginations vanished. At Night I gave him some Conserve of red Roses vitriolated, Salt of Wormwood and Diascordium. The next Day he was blooded at the Arm in the Morning, and in the Forehead in the Afternoon. His Diet was Water-gruel with Cream of Tartar in it, and also some Prunes stewed. I could perceive nothing of any Fever in the Disease: His Pulse was low, slow and equal: His Temper rather colder than ought to be; so far was he from any Sense of Heat, or Discoloration of his Tongue,

or Thirst. The other Person imagined nothing but Groves of Oranges and Limons, and begged the Opportunity of a Boat to go ashore with great Earnestness; so that if not watched, perhaps he might have leaped into the Sea. The Symptoms were the same as in the other, only his whole Body seemed to be much colder, yet was not he sensible of any Coldness in himself. I caused him to be vomited, and he was well in his Head, as soon as ever the Vomit made him sick at the Stomach, as yet not having wrought. I dieted him as the other, and only blooded him in the Arm. I let them Blood merely out of Caution (for else they seemed well), and to promote Transpiration and Sweating, which succeeded according to my Desire.

Undoubtedly the Seat of that Disease is in the Stomach, and those Parts adjoining to it, in which the first Concoction is performed; and it is highly probable, that it principally ariseth from the ill Diet, by eating too much salt Meat in Voyages, the saline Steams from the Stomach affecting the Brain in a peculiar Manner.

As to the Cure, by Vomiting, I shall not now explain how Vomits work; it sufficeth that the Disease was seated in and about the Ventricle; and that in hot Countries, as well as in hot Seasons, the Rule of *Hippocrates* takes place, *Aestate per Superiora*. I never saw any good Effect of the most innocent Purge, during my Stay in the *Indies*, except in chronical Distempers; nor did I ever almost give any (after frequent Trials had made me cautious) but Pills that were antimonial, or *Mercurius Vitæ*, or *Vomitiva Infusions*; and by this Method I preserved our Ships well, and effected those speedy Cures, which, I think, none had before seen in *Jamaica*. It is true, of the common Sort in the other Ships, when we came to *Barbados*, upon View I found many *Hydropical* and *Storbutical*: And as soon as we came there, I caused all that were any thing ill to be vomited and purged with *Mercurius Vitæ*, the *Vomitiva Infusion*, and *Cambodiu*; by which means, and one Meal of fresh Meat, and some Limons, all the disorderly Rabble recovered.

The Sea-Breeze comes not into *Jamaica* till 8 or 9 of the Clock in the Morning, and ordinarily ceaseth about 4 or 5 at Night: But sometimes the Sea-Breeze blows in the Winter Months 14 Days and Nights together, and then no Clouds gather, but Dews fall. But if a North Wind blow (which sometimes in the Winter Months lasts as long), then no Dews fall, nor Clouds gather. The Clouds begin to gather about 2 or 3 of the Clock in the Afternoon at the Mountains, and do not embody first in the Air, and after settle there, but settle first, and embody there; the rest of the Sky being clear till Sun-set; so that they do not pass near the Earth in a Body, and only stop where they meet with Parts of the Earth elevated above the rest; but precipitate from a very great Height, and in Particles of an exceeding rarified Nature, so as not to obscure the Air or Sky at all, that great Variety of beautiful Colours in the Canopy of Heaven being raised to a much greater Distance than it is here.

The Tortoises float asleep in a calm Day a long time; so that the Seamen row gently to them, and either strike them with Irons, or ensnare their Legs with a Rope and Running-Net, and so take them.

The Observations continued.
n. 37. P. 717.

I could never adjust the Dose of the Purging-Nuts, having given from 3 to 60, without any Effect in the same Person, so that I never durst rely on them; yet they often do work, as is related.

Inquiring at the *Barbados* of the Doctors and Chirurgeons there, about the Use of *Opium*, so much magnified by *Bontius* and *Piso*, I heard them all condemn it as most stupifying and mortal; and I found that they used the *London Laudanum*, which I have observed to be very *narcotick*, the *Opium* being extracted with Spirit of Wine. But I had a *Laudanum*, of *M. Le Fevre*, called *Laudanum Simplex*, of torrefied *Opium*, extracted with distill'd Vinegar and some other Correctives, which never stupifies, no, nor inclines to Sleep after 'tis taken, yet immediately easeth all Pain: I took it myself for 14 Days every Night in the *Bilious Colick*, which immediately eased the Pains, but perhaps I slept not till 2 or 3 Hours after; taking it with so much Security, that I very seldom weighed it, but guessed at a Pill of 2 or 3, or even 4 Grains. Nor hath this *Laudanum Simplex* (by his Observation) only this Effect in the *Indies*, where I used it in all Cases to all Ages, even sucking Children; but even here in *England* I gave it, not long ago, to a Lady in the *Colick Bilious*, never weighing it, and it eased her Pains; yet did she never apprehend that she had taken any such Thing; and all the Night if any did but stir, she could hear them as perfectly as ever she could when she slept naturally.

The Observation which *Oviedo* hath about Lice, which is, That they leave the *Spaniards* as they go to the *Indies* in such a Degree, and meet them again in the same Latitude in their Return, is very true. For though the Ships we went in, with such a Multitude of Servants and Seamen, were not over-cleanly, yet before we came to the *Tropick*, there were none lousy; whereas before one could not walk amongst them, but his Cloaths would gather Lice. In the *Indies* none are lousy, how nasty soever, except it be in their Heads; and there they breed much. But in our Return home, I observed that they did multiply again, after we came to the Latitude of the *Madeiras*. *Sir Christopher Mings* was of this Opinion, That when they approach the *Long-Reach* and *Tropick*, they begin to sweat excessively; which Sweat abounding over the Body, choaks the old Lice, and kills them. Just thus, he said, it was an usual Remedy for lousy Heads, to rub them all over with Butter or Oil, and he would warrant it would kill all the Lice. And as for any new Generation, the Sweat not lodging in the Pores long enough, it was not disposed to produce those Vermin at all; for no Sweat in the *Indies* is rank, as in *Europe*, that ever he could observe. In their Return the Sweat lodgeth longer in the Pores and Habit of the Body, and the particular Forms or Ferments, being exalted and unloosened, and put into Activity, shape out those Creatures, and so they breed them. But if you ask, Why they breed in the Head in the *Indies*? he answers, That though our Faces sweat much, yet doth not our Hair so much; besides that, the Sweat is lodged in their Hair, and there breeds the Vermin, and they take not the Care of their Heads there as here. However, the *Spanish* Negroes

Negroes wash their Heads with Soap once a Week, to prevent being lousy, whilst the other Negroes lose a great deal of Time in looking after their Heads; which, by reason of their Curls, breed Lice more than the *English*; insomuch that he affirms to have seen great Holes eaten by Lice in the Heads of some of them that were lazy.

In the *Colick Bilious* we often used Clysters of Tobacco-smoke, but with no Success at all. I also gave the Juice of Tobacco, an Ounce in a Clyster, which stupified extremely, but did no other good, than for the present to render them insensible of their Pain. It is usual to give Clysters of a Pint of Brandy there, which will make them as drunk and mad as if they had taken it in at their Mouths: I observed that less Brandy would fox them in a Clyster than if drunk by them. I tried a Quarter of a Pint in a Clyster on myself, and it made me not dead drunk, but raging mad (though mixed with other things), my Reason being depraved by these Fumes: So I never took more of that Clyster but once to reiterate the Experiment, the Effect being the same. But I complied with the *Spanish Negroes*, who, to nourish me, gave me a Clyster of half a Pint of *Madeira Sack*, the Yolk of one Egg, and a little Pepper, warmed and given at Night, and to hold it in all Night; which did gently warm my Bowels, and cast me always into a gentle Sleep and Sweat for some Hours: I took many of these in the Day-time, the Effect ceasing after two or three Hours.

I am of Opinion that Chocolate, if it were well made and taken in a right Way, is the best Diet for *Hypochondriacks* and *Chronical Distempers*, and the *Scurvy*, *Gout*, and *Stone*, and *Women Lying-in*, and *Children New-born* (to prevent Convulsions, and purge the *Meconium* out), and many other Distempers, that ever came into *Europe*: But it is now rather used for *Luxury* than *Physick*, and so compounded as to destroy the Stomach, and to increase *Hypochondriacal Diseases*.

The *Chegoes* breed commonly in the *Negroes*, yet no *English* get them n. 41. p. 825. but by going in Places frequented by them. They are incident most to such as are nasty about the Feet; and very seldom any else have them. They will spread by little and little over the whole Feet, eat off Toes, and over-run the whole Body of some idle Negroes.

2. *Alligators* are shaped like *Lizards*, being Four-footed; they walk with their Belly at a Distance from the Ground, like *Lizards*. Those of a full Growth have Teeth like a Mastiff, and a Mouth of $1\frac{1}{2}$ Foot wide. They are so strong a Scent, that you may smell them at a pretty Distance when they lie on the Land. They may be mastered and killed by any dextrous and skilled in the Way of doing it, which is, that a Man be armed with a good long Truncheon, and fall upon them Side-ways; for doing it Front-ways, they are too nimble for the Assailant, and may by leaping upon him (which they can do the Length of their whole Body) spoil him; but if he lay his Club on them against their Shoulder, and behind their Fore-feet, and lame them there, they are easily subdued. Some of these Observations farther considered; by Mr. Norwood, Jun. n. 41. p. 824.

Tortoises, if their Blood be heated, die; and if they shall live, their Blood must not be hotter than the Element they live in.

The *Chegoes* are not felt to have got into the Body, till a Week after. They will breed in great Numbers, and shut themselves up in a Bag; which when you feel, there are certain skilful Men, who with little Pain will take them out; having great Care to take out the Bag intirely, that none of the Brood (which are like Nits) may be left behind, for fear of giving Rise to a new Generation.

The *Shining Flies* are a kind of *Cantbarides*, looking green in the Day-time, but glowing and shining in the Night, even when they are dead. I have applied them dead to a printed and written Paper in the Dark, and read it.

The *Manchinel-Apple* is one of the beautifulest Fruits to the Eye, of the agreeablest to the Smell, and of the pleasantest to the Taste (being thence called by many the *Eve-Apple*); but if eaten, certain Death. The Wood of it yet green, if rubbed against the Hand, will fetch off the Skin, or raise Blisters; and if any Drops of Rain, falling from this Tree, light upon one's Hand, or other naked Part of the Body, it will also have the aforesaid Effect.

Observations
made at the
Barbados;
by Dr. Tho.
Townes. n.
117. p. 399.

XI. At the *Barbados*, our general Draught of Wine is from the *Madeira*, which, contrary to all other I know of, will not endure a cool Cellar. *French* nor *Rbenish* Wines neither keep nor agree well with our Stomachs, if so constantly drank as in *England*. *Canary Wine* few here care for, counting it fulsome.

This Island is very temperate; and the Sun, notwithstanding his Neighbourhood, is very gentle, being fanned with a constant Gale from the East.

I observe that *Purslane* is here all the Country over, where I have been, and even troublesome to the Planter. In the Fields I have many times gathered a Sallet of it, and it eats as well with Oil and Vinegar as that of our *English* Gardens. Here is likewise a *Sonchus*, *Lens Palustris*: I found also a *Melilot*, or one so like it in all Circumstances (except that the Branches are not so erect), that I cannot find any Difference from that of *England*.

The Springs here are all near the Sea; so that those who live up in the Country have no Benefit of them. They made Ponds formerly to receive Rain; which served well enough, being kept cool by a broad-leaved Weed and Ducks-Meat, which overgrew most Ponds: But now almost every Sugar Plantation hath a Well that gives very good Water.

The Soil is fertile, though not above a Foot or two thick upon a white and spongy Lime-Stone Rock, which affords good Quarries here and there, that serve for Building. Every Dwelling-house, with the Sugar-work and other Out-housing, looks like a handsome Town; most being new-built with Stone, and covered with Pan-Tile or Slate, brought hither in the Ballast of Ships, as are likewise Sea-coal for Forges, and so are bought cheap enough. Indeed the whole Island appears in a manner like a scattered Town, which

with

with the perpetual green Fields and Woods, makes the Place very pleasant.

The *Blood* of *Negroes* is almost as *black* as their *Skin*. I have seen drawn forth the *Blood* of at least 20, both Sick and in Health, and the Superficies of it all is as *dark* as the Bottom of any *European Blood* after standing a while in a Dish. So that the *Blackness* of *Negroes* is likely to be *inherent* in them, and not caused by the *Scorching* of the *Sun*, especially seeing that other Creatures here, that live in the same *Clime* and *Heat* with them, have as *florid Blood* as those that are in a *cold Latitude*; viz. *England*.

XII. I never saw any *Sand* in the *Bermudas*, such as will grind *Glass*, or whet *Knives*, &c. as in *England*; but a Substance like *Sand*, though much softer: Neither have we any *Pebble-Stones*, or *Flints*.

An Observation on Bermudas; by Mr. R. Norwood. n. 30. p. 566.

XIII. There is an Island among the *Bahamas*, which is called *New-Providance*, where many rare Things might be discovered, if the People were but encouraged. It is stored with Variety of *Fish* and *Fowl*, and with divers Sorts of *Trees*, and other *Plants*, whose *Qualities* are not yet known.

Observations in New-Providance, Bermudas, and Virginia; by Mr. Rich. Stafford. n. 40. p. 794.

The Inhabitants here at *Bermudas* live some to an *hundred Years* and something upwards; many do live till they are nigh an *hundred*, but few above: And when they *die*, it is *Age* and *Weakness* that is the Cause, and amongst us is a *Cold*; and that is most gotten in the *hottest* Weather. The *Air* is here very sweet and pleasant. Our *Diet* is but ordinary, and the People generally poor; and I observe that poor People are most *healthful*.

That *Weed* which we call *Poison-Weed*, grows like our *Ivy*. I have seen a Man who was so *poisoned* with it, that the *Skin* peeled off his *Face*, and yet the Man never touched it, only looked on it as he passed by; but I have chewed it in my *Mouth*, and it did me no *Harm*. It is not hurtful to all.

Here are *Spiders*, that spin their *Webs* betwixt *Trees* standing 7 or 8 *Fathom* asunder; and they do their *Work* by *spirting* their *Web* into the *Air*, where the *Wind* carries it from *Tree* to *Tree*. This *Web*, when finished, will snare a *Bird* as big as a *Thrush*.

We cover our *Houses* with the *Leaves*, not the *Bark* of a *Tree*, which is the *Palmetto*; without which *Tree* we could not live comfortably in this Place. The *Leaves* of some of these *Trees* are 8 or 10 *Foot* long, and nigh as broad.

It is reported, that in *Virginia*, and upon the Coast of *Florida*, the *Indians* live to a very great *Age*; and that some of the People are of a *gigantick Stature*, and stronger by far than others.

XIV. Sept. 2. 1699. We weighed at *Madera*, and were under the *Tropick* of *Cancer* by the 10th of the Month, at which time the usual Ceremony of *Ducking* from the *Yard's Arm* was performed on those that could not pay their *Tropick Bottle*. All this time we had a brisk and constant *Trade-Wind*.

A Voyage to New Caledonia in Darien; by Dr. Wallace. n. 262. p. 536.

Wind, which lasted three *Days* more; but afterwards we had it more *variable* than is usual in that Place of the Sea.

The 28th we made *Deſeada*, a ſmall high Iſland, about a *League* in Length, and as much in Breadth: It is full of Trees, but uninhabited. Next Morning we were betwixt *Antegoa* and *Montſerat*, belonging to the *English*: Their Product is Sugar and Tobacco. We were in the Afternoon cloſe by *Redonda*, a ſmall Rock about a *Mile* long, inhabited only by *Noddies* and *Boobies*. When we were ſome *Leagues* from *Redonda*, we ſaw at the ſame time *Antegoa*, *Montſerat*, *Redonda*, *Nieves*, *St. Chriſtopher's*, and *Statia*.

The next Day (which was the 30th) we came in Sight of *Santa Cruz*, belonging to the *Spaniards*.

Oct. 2. We came into *Crab-Iſland*, and ſent ſome of our People aſhore, and took *Poſſeſſion* of it in the *Company's* Name.

Oct. 4. We ſtood to the *Leeward*, hearing there was a Harbour there; and when we came we ſaw the *Danes* Colours flying on the Shore, for the Governor of *St. Thomas* (a ſmall Iſland belonging to the *Danes*, and a *Free Port*) had ſent 14 Men and a Captain to take *Poſſeſſion* of it in the King of *Denmark's* Name: But we found that we had taken *Poſſeſſion* of the Place before they came from *St. Thomas*. They gave in their Proteſt, yet ſeemed to be glad enough of our Neighbourhood.

On the 8th we left this Place, and on the 17th made *Noſtra Signora della Popa*: We lay aſide there, along the Coaſt, until the 3d Day of *November*, generally loſing by Night what we had gained all Day. *Crab-Iſland* is about 6 *Leagues* long, and in ſome Places 5 broad: The Soil is very good: It is all full of *Trees*. All the South-ſide is full of Bays very fit for anchoring in, but the beſt of all is to the *Leeward*, where the *Dane* hoisted his Colours. It is called *Crab-Iſland* from the Multitude of *Land Crabs* there.

Nov. 3. We anchored before *Golden-Iſland*, and ſent in our Pinace to the Bay. The Natives had hoisted a white Flag in Sign of Peace, and told us a great many Stories of *Capt. Swan*, *Capt. Davis*, and others; for they took us for *English*, by reaſon of our red *Fly*; but we took no Notice of the Men they named. At laſt they aſked us our Buſineſs: We told them, we deſigned to ſettle among them, and to be their Friends. They told us, we were very welcome, and that by *Prediction* they had expected us theſe *two Years*; for they ſay, that *two Years* ago it was foretold them, That a People ſhould come and live amongſt them, that would treat them civilly, and teach them good Manners. We converſed ſome time with them, and, after viewing the *Harbour*, we came aboard.

The 4th, we came into the *Harbour* of *Caledonia*: It is a moſt excellent one, for it is about a *League* in Length from N. W. to S. E. It is about *half a Mile* broad at the Mouth, and in ſome Places a *Mile* and more farther in. It is large enough to contain 500 *Sail* of Ships. The greateſt Part of it is *Land-lock'd*, ſo that it is ſafe, and cannot be touched by any Wind that can blow: The *Harbour* and the *Sea*, make the Land that lies betwixt them a *Peninſula*. There is a Point of the *Peninſula* at the Mouth of the

Harbour,

Harbour, that may be fortified against a Navy. This Point secures the *Harbour*, so that no Ship can enter but must be within Reach of their Guns. It likewise defends *half* of the *Peninsula*; for no Guns from the other Side of the *Harbour* can touch it, and no Ship, carrying Guns, dares enter, for the *Breast-work* at the Point. The other Side of the *Peninsula* is either a Precipice, or defended against Ships by *Shoals* and *Breaches*; so that there remains only the narrow Neck that is not naturally fortified. In short, it may be made impregnable; and there is Ground enough within it, if it were all cultivated, to afford 10000 Hogsheads of *Sugar* every Year. The *Soil* is rich; the *Air* good and temperate; the *Water* is sweet; and every thing contributes to make it healthful and convenient. The *Product* of this Place, I mean in the *Harbour* and *Creeks* hereabouts, is *Turtle*, *Manatee*, and a vast Variety of very good small *Fish*, from the Bigness of a *Salmon* to that of a *Perch*. The *Land* affords *Monkeys* of different Sorts, *Wild Deer*, *Indian Rabbits*, *Wild Hogs*, *Parrots* of many Kinds, *Parakites*, *Macaws*, *Pelicans*, and an hundred more *Birds* we have got no Name for. There are, moreover, *Land-Crabs*, *Souldiers*, *Land-Turtles*, *Lizards*, *Guanbas*, *Cock-Lizards*, and *Scorpions*: I had almost forgot *Partridges*, *Pheasants*, and a kind of *Turkey*. All the *Birds* in this Country are beautiful, but none of them, that I could observe, have any *Notes*. We have a *Monkey* aboard that chirms like a *Lark*; it will never be bigger than a *Rat*. This Place affords Legions of monstrous *Plants*, enough to confound all the Methods of *Botany* ever hitherto thought upon: Some of their *Leaves* exceed *three Ells* in Length, and are very broad. Besides these *Monsters*, reducible to no *Tribe*, there are here a great many of the *European* Kindred (but still something odd about them) as *Lingua Cervina* of different Kinds, *Polypodium*, several of the *Plantæ Papilionaceæ*, *Musci*, *Fungi*, *Convulvuli*, and a great many more I cannot now remember.

Now come we to their *People*. The *Men* are generally very civil and sagacious, have all of them good Faces, are of low Stature, but very well built: They are of a Copper-colour, and have black Hair. They used to go naked, but are now as well cloathed as ourselves: They wear a *Plate* of *Gold* in their *Nose*, and a great many Rows of *Beads* about their *Neck* and *Wrists*.

The *Women* are generally the most pitiful-like Things that ever Man saw. Their *Habit* differs from the *Men*, for they ordinarily wear a *Ring* in their *Nose*: They have *Petticoats*, and a *Veil* over their *Face*. They are under no formal *Government*, but every Captain commands his own *River*, *Bay*, or *Island*, where he lives. The greatest of them all is one Captain *Ambrosio*: He commands, particularly, the Country about the *Caballoes Point*, and, when he pleases, he can levy all the *Men* betwixt that and the *Gulf*, about 20 *Leagues*. There is another, Captain *Pedro*, that lives in the House with *Ambrosio*, and is his Nephew and Son-in-law. There is a third, Captain *Andreas*, that commands the *River das Armas*; a fourth, Captain *Brandy*, that commands about the *Golden Island*; a fifth, Captain *Andreas*, that commands the Country adjoining to our Settlement; and a sixth, Captain *Pedro*,

his Confort; a seventh, Captain *Pacigo*, who commands at *Carret Bay*; and Captain *Diego*, that commands the *Gulf: Ambrosio* seems to be the greatest, and *Diego* next; both old Men.

There is no such thing as a *King* or *Emperor* of *Darien*, nor, so far as we can gather from all the chief Men hereabout, has been these 40 or 50 *Years*.

This Country certainly affords *Gold* enough; for besides that the Natives constantly assure us that they know several *Gold Mines* on this Side; besides that, I say, the *Plates* they wear in their *Noses*, and the Quantity of *Gold* that is amongst them, is enough to persuade any Man of the Truth of it. There were one Night aboard here some *Indians* that had an *hundred Ounces* of *Gold* about them. We are certainly much bound to Providence in this Affair; for as we were searching for the Place we were directed to, we found this: And though the Privateers had been so often at *Golden Island*, and though *English*, *Dutch*, and *French*, had been all over this Coast, from *Portobello* to *Cartagena*, yet never one of them made the Discovery; even the *Spaniards* themselves never knew of this Place.

Observations in Mexico; by XV. There were formerly near 80 *Towns* seated round about the *Lake* of *Mexico*, some of which contained 5000 *Families*, and some above 10000. At the present there may be a matter of 30 *Boroughs* and *Villages*, of which the greatest holds not above 500 *Houses*; all the rest having been ruined by the *Revolutions* in that Country.
n. 130. p. 758.

Observations in New-England; by Mr. J. Winthrop. XVI. 1. There are in *New-England*, in the Inland Country, whole *Forests* of a Sort of *Dwarf Oak*, which, though low and slender, yet bears *Acorns*. The Husbandmen find that Sort of Land most difficult to break up at first with their Plough, in regard that the whole Surface is filled with spreading strong Roots of this Sort of *Oak*. Neither must it be thought, that they are small Shoots, which in time would grow big *Trees*; for where these grow, there are no great *Oaks*, or very few, amongst them. I have observed that in some Plains, full of these *Sbrubs*, there have been no *Acorns* on most of them; but whether in other Years they were not fruitful, I knew not. Some Years we know, even the great *Oaks* bear no Fruit, which are very full at other times.
n. 57. p. 1151.

Upon the *Bark* of a certain Tree growing in *Nova Scotia*, and (as I hear) in the more easterly Parts of *New-England*, there are little Knobs, within which there is a liquid Matter like *Turpentine* (which will run out, the Knob being cut open) of a very *sanative* Nature, as I am credibly informed.

The *Pods* of *Silk-Grafs* are full of a kind of most fine *Down*, like *Cotton-Wool*, many such Flocks in one and the same *Pod* ending in a flat Seed. It is used to stuff up Pillows and Cushions. Being tried to spin, it proves not strong enough.

The *Down* also of the *Cotton-Tree* is not fit to *spin*. These *Trees* grow high and big: At the *Bottom* of some of the *Leaves*, next to the *Stalk* of them, is a *Knob*, which is hollow, and a certain *Fly*, somewhat like a *Pisf-mire-Fly*, is bred therein.

Those *Shells*, of which the *Indians* make the *White Wampan-peage*, one Sort of their *Money*, are bred in *Matrices* growing on the *Bottom* of *Sea-bays*. They are like *Periwinkles*, but greater. Whilst they are very small, and first growing, many of them are within one of the concave *Receptacles* of these *Matrices*, which are very tough and strong, so contrived, that they are separate from one another, yet so, that each of them is fastened to a kind of *Skin*, subtended all along to all these *Cases* or *Bags*.

2. The *Plague of the Back* is greatly distant from an *Empyema*. It seems more of a *Colick*, yet is undoubtedly a *nervous Dolour*. The Country-people have learned of the *Indians* to steep *Castoreum* in *Rum*, and so cure it.

By Mr. Benjamin Bullivant. n. 240. p. 167.

As to the *Fire-Flies*, I took several of them in *July*, 1697. I take them to be a *Glow-worm Volant*; the *Lustre* is placed as in a *Glow-worm*. Kill the *Fly* (as I have done) and you'll find the *Scintilla*, a small *Gelly-like Substance*, the which separated into *Atoms*, gives still, in the *Dark*, a *Lustre* proportionable to the *Magnitude* of each *Atom*.

I saw *Butterflies Eggs* that were *testaceous*, and near as big as a *Wren's*, most gloriously *bestudded* with *Gold* and *Silver*: At *Rhode-Island* the *Mowers* find them in the *Grass*, and they hatch in the *Windows*, and are a *Sport* for *Children*.

Tortoises are *amphibious*; I have found their *Eggs* by *Ponds-sides* in great *Quantities*: They are without *Shells*, like those in a *Hen's Belly*; our *Dames* scruple not to use them as *Hens Eggs* in *Puddings*.

Grashoppers in dry *Years* are a *Plague* to the *Husbandmen*; that on some *Islands* they have put *Multitudes* of *Turkeys* to destroy them: They are prodigious in *Quantity*, of a *grey Colour*, and about 3 *Inches* long; in *July* become *Volant*, and have a kind of *Regimental Discipline*, and as it were, some *Commanders*, which shew greater and more splendid *Wings* than the *Commoners*, and rise first when they are pursued by the *Fowls*, or by the *Foot* of the *Traveller*.

The *Hum-Bird* I have shot with *Sand*, and had one some *Weeks* in my keeping. I put a *Straw* for a *Perch* into a *Venice Glass Tumbler*, tied over the *Mouth* with a *Paper*, in which I cut *Holes* for the *Bird's Bill* (about as long and as small as a *Taylor's Needle*); and laying the *Glass* on one side, set a *Drachm* of *Honey* by it, which it soon scented, and with its long *Tongue*, put forth beyond its *Bill*, fed daily; it muted the *Honey* pure.

We have a *Frog* as big as a *Peny-Loaf*: Its *Cry* is exactly like that of a *Bull*. I have examined the *Clam*; he hath a *plain Pipe* or *Proboscis*, from whence he ejects *Water*, if compressed.

The Advantage of Virginia for building Ships; by . . . n. 93 p. 6015.

XVII. *Virginia* abounds all over, 1. With large tall *Oaks* of at least 50 or 60 *Feet* in Height of clear *Timber*, without *Boughs* or *Branching*, being very fit to make *Plank* of any *Size*, very tough, and excellently well enduring the *Water*.

2. With Abundance of *Pines* for *Masts*; and with another sort of *Wood*, called *Cypress*, which is far better than any *Pine* for *Masts*, it being of as tough and springy a *Nature* as *Yew Tree*, bending beyond *Credit*; when *dry* much lighter than *Fir*; and so well lasting in *wet* and *dry*, that it seems rather to polish than perish in the *Weather*.

3. With *Old Pines* for making of *Resin*, *Pitch*, and *Tar*.

4. With the *Conveniency* of *Planting Hemp* for *Cordage* and *Sail-Cloths*.

5. With great *Plenty* of *Iron-Stone*, which hath been tried and found very good; the *Conveniency* of *Wood* and *Lime-Stone* being a good *Inducement* to the *making* of *Iron*, which might be done at a much cheaper *Rate* there than in *England*.

An Account of Virginia; by Mr. Tho. Glover. n. 125. p. 623.

XVIII. *Virginia* being a Part of the *Continent* of *America*, is distant from the *Lizard*, or *Lands End* of *England* 1000 *Leagues*, and is bounded on the *East* with the main *Ocean*, on the *West* with the *Appal-lean* Mountains, on the *North* with *De-la-ware's Bay* and *River*, and on the *South* with the *River* of *Roanoak*: The *Country* lieth within a *Bay* called the *Bay* of *Chisapeake*; The *Mouth* or *Entrance* whereinto is due *West*, being about 6 *Leagues* in *Breadth*, and runneth up into the *Country* *North* and by *East* about 100 *Leagues*, continuing the forementioned *Breadth* a great Part of the *Way*, but narroweth by *Degrees* towards the upper *End* about one half. The *Water* in the *Channel* is for the most Part 9 *Fathoms*, but in some *Places* not above 7. The *Southermost Cape* of this *Bay* lieth in 37 *Deg.* and odd *Min.* *North Latitude*; and within the same are divers little *Islands*, upon some of which there are *Plantations*.

Into this *Bay* do issue so many large, pleasant and commodious *Rivers*, as I verily believe no *Space* of *Ground* of equal *Dimensions* in the whole *World* can boast of the like: The most eminent of these are *James River*, *York*, *Rapahannock*, *Potomack*, *Potuxen*, and *Choptanck*; the four last retain their *Indian* Names. At the *Head* of the *Bay* do enter 3 large *Rivers*; one whereof is called *Suf-cabannah*, from a *Nation* of *Indians* so called, bordering on the same. Besides these, there are twice as many as navigable as these, but by reason they run not above 30 or 40 *Miles*, I shall forbear inserting any of their Names.

Potomock, the largest of all the rest, is at the *Mouth* 10 *Miles* broad, and continueth that *Breadth* for 20 *Miles* up; from which *Place* it is 6 *Miles* broad, and continueth that *Breadth* for 30 *Miles* higher, and is in *Length* about 200 *Miles*. This *River* lieth about the *Middle* of the *Bay*; the other *Rivers*, whose Names are here inserted, are most of them 2 *Leagues* broad at the *Mouth*, and some of them 150, others 120 *Miles* in *Length*.

The *Tides* are scarce discernible, when the Winds hold at *North-West*; but at other Times they flow as they do in *England*, only they appear not so large; the Reason whereof may be, because the *Tide* diffuseth itself into so many spacious Rivers.

In the Rivers are great Plenty and Variety of delicate *Fish*; one Kind whereof is by the *English* call'd a *Sheep's Head*, from the Resemblance the Eye of it bears with the Eye of a *Sheep*: This *Fish* is generally about 15 or 16 *Inches* long, and about half a *Foot* broad; it is a wholesome and pleasant *Fish*, and of easy Digestion.

There is another Sort, which the *English* call a *Drum*; many of which are 2 *Foot* and a half, or 3 *Foot* long. This is likewise a very good *Fish*, and there is great Plenty of them. In the Head of this *Fish* there is a Gelly, which, being taken out and dried in the Sun, then beaten to Powder and given in Broth, procureth speedy *Delivery* to *Women in Labour*.

At the Heads of the *Rivers* there are *Sturgeon*, and in the *Creeks* are great Store of small *Fish*, as *Perches*, *Crokers*, *Taylors*, *Eels*, and divers others whose Names I know not. Here are such Plenty of *Oysters*, as they may load Ships with them. At the Mouth of *Elizabeth* River, when it is Low-water, they appear in Rocks a *Foot* above Water. There are also in some Places great Store of *Mussels* and *Cockles*; there is also a *Fish* called a *Sting Ray*, which much resembles a *Skate*, only on one Side of his *Tail* grows out a sharp Bone, like a *Bodkin*, about 4 or 5 *Inches* long, with which he strikes and wounds other *Fish*, and then preys upon them.

About a Year before I came out of the Country, as I was coming down *Rapabannock* River in a Sloop bound for the *Bay*, 3 *Leagues* short of the River's Mouth, being left alone in the Sloop, I heard a great Rushing and Flashing of the Water, which caused me suddenly to look up, and about half a Stone's Cast from me appeared a most prodigious Creature, much resembling a *Man*, only somewhat larger, standing right up in the Water, with his Head, Neck, Shoulders, Breast and Waist, to the Cubits of his Arms, above Water. His Skin was tawny, much like that of an *Indian*; the Figure of his Head was pyramidal, and slick, without *Hair*: his Eyes large and black, and so were his *Eye-brows*; his Mouth very wide, with a broad black Streak on the *Upper Lip*, which turned upwards at each End like *Mustachoes*; his Countenance was grim and terrible; his Neck, Shoulders, Arms, Breast and Waist were like unto the Neck, Shoulders, Arms, Breast and Waist of a *Man*; his Hands, if he had any, were under Water; he seemed to stand with his Eyes fixed on me for some Time, and afterward dived down, and a little after he rose at somewhat a farther Distance, and turned his Head toward me again, and then immediately falleth a little under Water, and swimmeth away so near the Top of the Water, that I could discern him throw out his Arms, and gather them in, as a *Man* doth when he swimmeth. At last he shoots with his Head downwards, by which means he cast his Tail above the Water, which exactly resembled the Tail of a *Fish*, with a broad *Fin* at the End of it.

On the *Bay* and *Rivers* feed so many *Wild Fowl*, as in Winter-time they do in some Places cover the Water for two *Miles*; the chief of which are wild *Swans*, and *Geese*, *Cormorants*, *Brants*, *Shield-fowl*, *Duck* and *Mallard*, *Teal*, *Wigeons*, with many others.

There likewise keep in the *Rivers*, *Bevers* and *Otters*: The *Bevers* have their Teeth so strong and sharp, that they gnaw down Trees, wherewith they make *Damms* cross the Waters, under which they keep, which are usually called *Bever Damms*, and in some Places serve in the room of *Foot-bridges*.

The original Springs, that make all these *Rivers*, arise at the *Foot* of the *Appal-lean Mountains*; but the *Cataracts*, or *Falls*, of these Rivers are 60 or 70 *Miles* distant from the *Mountains*.

These *Mountains* have their Beginning Northward at the Lake of *Canada*, and run all along the Back of the Country to the South-West as far as the Lake *Usherre*, which is some *Hundreds* of *Leagues*.

There was one Col. *Catlet*, that was a good Mathematician, who with some other Gentlemen took a Journey to make some further Discoveries of the Country to the Westward; and arriving at the *Foot* of the *Mountains* early in the Morning, they left their Horses, and endeavoured to gain the *Tops* of the *Mountains*, which they accomplished about 4 of the Clock in the Afternoon; and then looking further forward, they discovered other *Mountains*, whereof they took the *Altitude*, and judged them inaccessible; which discouraged them from any further Attempts.

Above 5 Years since there was a *German* Chirurgeon, who obtained a Commission from Sir *Will. Bartlet* to travel to the *South-West* of *Virginia*, and to make Discovery of those Parts. He went along the *Foot* of the *Mountains* as far as the Lake *Usherre*, and discovered them to be passable in two Places; and he gives a Relation, that while he was in an *Indian* Town adjacent to the *Mountains*, there came 4 *Indians* on an Embassy to the King of that Town, from a King that lived on the other Side of the *Mountains*.

At his Return he brought an *Emerald* and some *Spanish Money*, which he said he had of the *Indians* bordering on the Lake of *Usherre*; which caused some to think that some *Spaniards* are seated near upon the Back of these *Mountains*.

The Shores all along the *Bay* and *Rivers* are for the most part *sandy*, but only in some Points there is some *Shingle* cast up; but the *Earth* affordeth very few *Stones*, and those that are there, are almost all of them hard and transparent. I have taken up several *Stones*, that would cut *Glass* as well as any *Diamond*: And I do verily think, that there are some *Stones* gathered there, that do abate the Price of *Diamonds*; for I have seen several Rings of *Virginia-Stones*, which in my Judgment have equal'd *Diamonds* in *Lustre*.

The Cliffs of all the Rivers are full of great Veins of *Iron-Mine*; and in some Places of the Country I have seen Rocks of the same to lie a *Foot* above the Earth; and generally all the Highlands under the Mould are a mere

mere Rock of *Iron*: But an *Iron-work* would cost 3000*l.* and the Country being generally poor, they were discouraged from *running* this *Mineral*, by reason of the Charge; though I believe the true Reason is, their being so intent on their *Tobacco Plantations*, that they neglect all other more noble and advantageous Improvements.

They distinguish their *Soil* into three Sorts, *viz.* *High*, *Low*, and *Marshy* Land; all which have some *Sand* mixed in them, that makes their Land warmer than ours in *England*. Their *High Lands* are most *sandy*, but do, notwithstanding, bear very good Crops of *Tobacco*; only it does not hold its Strength so long as the *Low Ground*, which is very rich, being a blackish Mould, about a *Foot* deep, or somewhat more, and will hold its Strength for seven or eight Crops successively, without *manuring*. Their *Marsh Lands* bear Sedges and Rushes, after the Manner of ours; and of these they have not endeavoured any Improvement, as yet. Their Land in general is as good and fertile as the Land of *England*. When the Strength of their Ground is worn out, they never *manure* it to bring it in Heart, but let it lie for Pasture for all Mens Cattle to graze upon, and *clear* more Ground out of the Woods to *plant in*.

As to the *Timber* of this Country, there are divers Kinds; four several Sorts of *Oak*, very tall and smooth. There is also another Sort of *Timber*, called *Hickery*, that is harder than any *Oak*. There are also very large and tall *Poplars*, and, in some Parts of the Country, great Store of *Pines*, fit for *Masts* of *Ships*. There is likewise *black Walnut*, *Cypress*, *Cedar*, *Dogwood*, *Ash*, *Elm*, *Gum-tree*, *Locust*, *Chestnut*, *Hazel*, *Sassafras*, *Holly*, *Elder*, with several others.

As to the *Fruit-trees* of the Country, it affords great Plenty; for there are few *Planters* but what have fair and large *Orchards*, some whereof have 1200 Trees, and upward, bearing all Sorts of *English Apples*; as *Pearmains*, *Pippins*, *Russetins*, *Costards*, *Marigolds*, *Kings-apples*, *Magitens*, *Batchelors*, and many others; of which they make great Store of *Cyder*.

Here are likewise great *Peach-Orchards*, which bear such an infinite Quantity of *Peaches*, that at some *Plantations* they beat down to the *Hogs* forty *Bushels* in a *Year*.

Here are also great Store of *Quinces*, which are larger and fairer than those of *England*, and not so harsh in Taste: Of the Juice of these they make also *Quince-drink*.

Here are likewise *Apricocks*, and some sort of *English Plumbs*, but these do not ripen so kindly as they do in *England*.

There are some sort of *Pears*, but at very few *Plantations*; I have seen the *Bergamy*, *Warden*, and two or three other Sorts, and these are as fair, large, and pleasant, as they are in *England*.

Here grow as good *Figs* as there do in *Spain*, but there are few planted as yet.

Those that take the Pains to plant *Gooseberries*, have them; but I never saw any of our *English Currants* (*Ribberies*) there; and it is observed, that *Oranges* and *Lemons* will not grow there, though they do in more Northern Countries.

I had almost forgot to mention their *Mulberry-trees*, whereof they have had good Store about their Houses: These were planted at first to feed *Silk-worms*, but that Design failing, they are now of little Use amongst them.

The meanest *Planter* hath Store of *Cherries*, and they are all over *Virginia* as plentiful as they are in *Kent*. The *Cherry-trees* grow more *large* generally than they do in *England*, and bear more plentifully, without any Pains-taking of *digging* about them, or *pruning* them.

There groweth wild in some Places of the Woods, a *Plumb* somewhat like our *White Plumb*, but it doth exceed it, being much more succulent.

In the Woods there are abundance of *Vines*, which twine about all the *Oaks* and *Poplars*, and run up to the Top of them: These bear a kind of *Claret Grapes*, of which some few of the *Planters* do make *Wine*, whereof I have tasted: It is somewhat smaller than *French Claret*; but I suppose, if some of these *Vines* were planted in convenient *Vineyards*, where the Sun might have a more kindly Influence upon them, and kept with Diligence and seasonable *Pruning*, they might afford as good *Grapes* as the *Claret-Grapes* of *France* are.

There is also in the Woods a little *Shrub*, which beareth a *Berry* like our *Elder-Berry*, and is a very pleasant *Berry* to eat.

Here is a Tree called a *Chincopine*, which is like a *Chestnut*, with a burry *Husk*, but less by far.

Their *Gardens* have all Sorts of *English Pot-herbs* and *Salads*; they have *Cabbages*, *Coleworts*, *Colliflowers*, *Parsneps*, *Carrots*, *Potatoes*, and *Yams*; and such *Herbs* as grow wild in *England*, and do not grow there, they plant; as *Wormwood*, *Fetherfew*, *Houfeleck*, *Carduus Benedictus*, *Rue*, *Coriander*, *Enula*, and the like.

They have likewise, in their *Gardens*, *Roses*, *Clove-Gilliflowers*, and Variety of other Sorts of *Flowers*.

There grow wild in the Woods, *Plantane* of all Sorts, *Yellow-Dock*, *Burdock*, *Solomons-Seal*, *Egrimony*, *Centaury*, *Scabious*, *Groundsel*, *Dwarf Elder*, *Yarrow*, *Purslane*, and *White Maidenbair*, the best that ever I saw. Upon the Sides of the Hills, *Afarum*, and on the Bay-side, *Soldanella*, or *Sea-Scurvygrafs*, in great Plenty. Here groweth the *Radix Serpentaria Nigra*, which was so much used in the last great *Pestilence*, that the Price of it advanced from ten *Shillings* to three *Pounds Sterling* a *Pound*. Here is also an *Herb* which some call *Dittany*, others *Pepperwort*; it is not *Dittany* of *Candia*, nor *English Dittander*: It groweth a *Foot* or a *Foot and half* high; the *Leaves* are about the Breadth of a *Groat*, and figured like a *Heart*, and shoot out of the *Stalk* and *Branches* one of a *Side*, directly opposite to each other: It smelleth hot like *Pepper*, and biteth upon the *Tongue*. The *Water* of this *Herb* distilled out of a *Limbeck*, is one of the best Things I know to drive *Worms* out of the *Body*; and an *Ounce* of this *Water* taken, provoketh *Sweat* plentifully.

Here grow two *Roots*, which some *Physicians* judge, the one to be *Turbitb*, the other *Mecchoacan*; but whether they be the right, or no, I could not well judge. Both these *Roots* are *purging*, and in their *Operations*

much

much like those we have at the *Apothecaries*, only somewhat more forcible; the Reason may be, because there we have them more new and *succulent*.

Here groweth a Plant about a *Foot* and a *half*, or *two Foot* in Height; the *Leaves* are rugged like to a *Borage Leaf*, but they are longer, and not above two *Fingers* broad: About the *Stalk*, where the *Leaves* grow out, there hang *Berries*, which, being ripe, are *yellow*; the *English* call it the *Fever* and *Ague-Root*. This Root being newly taken out of the Ground, and a *Drachm* and a *half* of it infused in Beer or Water the Space of twelve *Hours*, purgeth downwards with some Violence; but I have given a *Drachm* of the *Root* in Powder, and then it only moveth *Sweat*, and that but moderately. It is a little *bitter* in Taste, and therefore somewhat hot.

All that the Inhabitants give their *Cattle* in Winter is, only the Husks of their *Indian Corn*, unless it be some of them that have a little *Wheat Straw*; neither do they give them any more of these than will serve to keep them alive; by reason whereof they venture into the *marshy* Grounds and *Swamps* for Food, where very many are *lost*.

They have as great Plenty of *Horses*, and as good, as we have in *England*.

As to their *Sheep*, they keep but few, being discouraged by the *Wolves*, which are all over the Country, and do much Mischiefe amongst their Flocks.

In the *Woods* are great store of *Deer*, and some *Rabbets*, which are generally mistaken for *Hares*.

There are also several Sorts of *ravenous Beasts*, as *Wolves*, *Racoons*, *Wild Cats*, *Possums*, *Monacks*, *Flying Squirrels*, with two other Sorts; and in the Northernmost Parts of the Country some *Bears*.

The *Fowls* that keep the *Woods* are, *Wild Turkeys*, *Turkey-Buzzards*, *Turtle-Doves*, *Partridges*, *Hawks* of several Sorts, with many others, of less Note.

There are also divers Kinds of *small Birds*, whereof the *Mocking-Bird*, the *Red-Bird*, and *Humming-Bird*, are the most remarkable; the first for *Variety* and *Sweetness* of *Notes*, the second for his *Colour*, and the last for the *Smalness* of his Body. As to the *Mocking-Bird*, besides his own natural *Notes*, which are many and pleasant, he *imitateth* all the *Birds* in the *Woods*, from whence he takes his Name; he *singeth* not only in the Day, but also at all Hours in the Night, on the Tops of the Chimneys; he is strangely antick in his *Flying*, sometimes fluttering in the Air with his Head right down and Tail up, other times with his Tail down and Head up: Being kept tame, he is very docible. The *Red-Bird*, as I hinted before, taketh his Name from the *Colour*, being all over of a pure *Blood-Red*. The *Humming-Bird* taketh his Name from the *Noise* he makes in *flying*; this is of divers *Colours*, and not much bigger than a *Hornet*, and yet hath all the Parts of a *Bird* intire.

There are five or six Sorts of *Snakes*, amongst which the *Rattle-Snake* is most remarkable, being about the Bigness of a Man's Leg, and for the

most part, about a *Yard* and a *half* long; he hath a *Rattle* at the End of his *Tail*, wherewith he maketh a *Noise* when any one approacheth nigh him, which seemeth to be a peculiar *Providence* of *God* to warn People to avoid the Danger: For this Creature is so *venomous*, that the Bite of it is of most dangerous Consequence, unless they speedily make use of the proper *Antidote*. There are also long *black Snakes*, short and thick *black Snakes*; this latter Sort oftentimes *sucks* the *Cows*, and causes them to give *bloody Milk*. There is another Sort called the *Corn-Snake*, because he is usually found in *Corn-fields*; this is near as big as the *Rattle-Snake*. There are also some other Sorts of *Land-Snakes*, all of which are more or less *venomous*; besides, there are very many *Water-Snakes*, that keep the *Springs* and *Rivers*.

The *Indians* are generally well-proportioned, as to their *Stature*, being somewhat tall, but no ways corpulent; their Hair black, usually hanging right down; their Eyes also black, and their Skin tawny, inclining to Blackishness: They live together in *Towns*, and every *Town* is under a several *King*. At the first coming of the *English*, divers *Towns* had 2 or 3000 *Bow-men* in them; but now, in the southern Parts of *Virginia*, the biggest *Indian Town* hath not above 500 *Inhabitants*: Many *Towns* have scarce 60 *Bow-men* in them, and in one *Town* there are not above 20; and they are so universally thinned in the forementioned southern Parts, that I verily believe there are not above 3000 left under the whole Government of *Sir William Bartlett*; but in my Lord of *Baltimore's* Territories, at the *Head* of the *Bay*, where the *English* were later seated, they are more numerous, there being still in some *Towns* about 3000 *Indians*: But these being in continual Wars with each other, are like, shortly, to be reduced to as small Numbers as the former.

Instead of *Cloaths*, they wear a *Deer-skin*, tucked about their Middle, and another about their Shoulders; and for *Shoes*, they have Pieces of *Deer-skins* tied about their *Feet*.

Their Habitations are *Cabbins*, about nine or ten *Foot* high, which are made after this Manner: They fix *Poles* into the Ground, and bring the *Tops* of them one with another, and so tie them together; the Outside of these *Poles* they line with *Bark*, to defend them from the Injuries of the *Weather*, but they leave a *Hole* on the Top, right in the Middle of the *Cabbin*, for the *Smoak* to go out. Round the Inside of their *Cabbins* they have *Banks* of *Earth* cast up, which serve instead of *Stools* and *Beds*. They have no kind of *Household-stuff* but *earthen Pots*, *wooden Bowls*, and thin *Mats* to lie on; all which they make themselves.

Their *Diet* is *Indian-Corn*, *Venison*, *Wild Turkeys*, *Oysters*, and all Kinds of *Fish* the *Rivers* afford; and all Kind of *Wild Beasts* of the *Woods*.

They are *prohibited* the keeping either *Cows*, *Sheep*, or *Hogs*, by the *English*; lest they should make bold with more than their own.

They did formerly *catch* their *Fish* after an odd Manner, before the *English* came amongst them; which was thus: At the *Head* of their *Canoes* they fixed a *Hearth*, on which, in a dark Night, they would make a *Blaze* with

with *Fire* put to the Shivers of Pine-tree; and they would *paddle* their *Canoes* along the Shore in shoal Water; the *Fish* seeing the *Light*, would come as thick as they could swim by each other, about the *Heads* of the *Canoes*; then with *Sticks*, that were pointed very sharp at the *Ends*, they would strike through them, and lift them up into the *Canoe*: But now they have learned of the *English* to catch *Fish* with *Hook* and *Line*, and sometimes the *English* do use their Way in dark Nights, only they strike with an Instrument of *Iron* somewhat like *Mole-tines*.

They have *Priests*, which are generally thought to be *Conjurers*; for when they have great Want of *Rain*, one of their *Priests* will go into a private *Cabbin*, and, by his *Invocations*, will cause abundance to fall immediately, which they call *Making of Rain*.

They offer the *First-fruits* of all things. The *first Deer* they kill, after they are in *Season*, they lay privately on the Head of a *Tree* near the Place where they killed it; and they say, no good Luck will befall them that Year, if they do not offer the *first* of every thing.

They burn the Bodies of the *Dead*, and sew up the *Ashes* in *Mats*, which they place near the *Cabbins* of their *Relations*.

Some of them say, That the *God* of the *English* is a good *God*, and gives them good Things; but their *God* is an *angry God*, and oftentimes beats them.

Almost every *Town* differs in *Language*, and yet not any of their *Languages* copious; as may be seen by their frequent expressing their Meaning to each other by *Signs*.

Their *Money* is of *two* Sorts; one whereof is made of a *white* kind of *Shell*, which, being divided into small Parts, they put them on a *String*, after the Manner of *Beads*; this they call *Peacke*: The other is of a *blue* *Shell*, ordered in the same Manner, which they call *Rounda*: This last is the meaner Sort, about *Half a Yard* whereof is of equal Value with our *Nine-pence*. The *Chief* of the *Indians* do wear some of this on the *Deer-skins* about their Bodies, laid on like *Lace*.

They have nothing to *trade* with but *Deer-skins*, and some *Bever*, which they exchange with the *English* for *Guns*, *Gunpowder*, *Sbot*, and *Brandy*; having nothing before but *Bows* and *Arrows*, wherewith they killed their *Deer*, and other *wild Beasts*.

They have no other Account of *Time*, but by the *Changes* of the *Moon*.

Their *Winter* is usually in *November*, *December*, and *January*.

They are very *revengeful*; for if any one chance to be *slain*, some of the *Relations* of the slain Person will *kill* the *Murderer*, or some of his *Family*, though it be two or three Generations after; having no *Justice* done amongst them, in this respect, but what particular Persons do themselves, if that may be termed *Justice*.

The *Indians* being a rude Sort of People, use no *Curiosity* in preparing their *Physick*; yet are they not ignorant of the Nature and Uses of their

Plants,

Plants, but they use no *Correctives* to take away the *flatuous*, *nauseous*, and other bad *Qualities* of them.

Their usual Way of *Cure* for most *inward Distempers* is by *Decoction*, which they make partly *pectoral*, partly *sudorifick*: These they cause the *Sick* to drink the Quantity of *half a Pint* at a time, two or three times a Day; but they give nothing to procure *Vomiting* in any *Distempers*, as a bad Omen that the *Diseased* will *die*; neither did I ever know them to use any Ways of *Bleeding* or *Cupping*.

If they have any *Wounds*, *Ulcers*, or *Fractions*, they have the Knowledge of *curing* them. I did once see an *Indian* whose Arm had been *broken*, and viewing the Place, I found the *Bones* to be as *smoothly consolidated*, and as well *reduced*, as any *English Chirurgeon* could have done it.

All *Indians* carry a Powder about them to *cure* the *Bites* of *Snakes*, and in almost every *Town* this Powder hath a *different Composition*, and every Composition is certainly effectual to the correcting the Malignity of the *Venom*. Neither was it ever known to us, that any *Indian* suffered much Harm by these *Bites*, but in a Day's Time he would be as well as if he had never been *bitten*: Whereas some of the *English*, for want of a speedy Remedy, have lost their Lives.

The *Indians* are frequently troubled with violent *Colicks*, which oftentimes terminate in *Palsies*.

The Manner of *Planting* and *Ordering Tobacco* is thus: In the *twelve Days* they begin to *sow* their Seed in *Beds* of fine Mould, and when the *Plants* be grown to the Breadth of a *Shilling*, they are fit to *replant* into the *Hills*; for in their *Plantations* they make small *Hills* about four *Foot* distant from each other, somewhat after the Manner of our *Hop-yards*: These *Hills* being prepared against the *Plants* be grown to the forementioned Bigness (which is about the Beginning of *May*), they then, in moist Weather, draw the *Plants* out of their *Beds*, and replant them in the *Hills*, which afterwards they keep with diligent *Weedings*: When the *Plant* hath put out so many *Leaves* as the Ground will nourish to a Substance and Largeness that will render them merchantable, then they take off the *Top* of the *Plant*; if the Ground be very rich, they let a *Plant* put out twelve or sixteen *Leaves* before they *top* it; if mean, then not above nine or ten, and so according to the Strength of their Soil: The *Top* being taken off, the *Plant* grows no higher, but afterwards it will put out *Suckers* between their *Leaves*, which they pluck away once a Week, till the *Plant* comes to Perfection, which it doth in *August*: Then in dry Weather, when there is a little Breeze of Wind, they cut down what is ripe, letting it lie about four *Hours* on the Ground, till such time as the *Leaves*, that stood strutting out, fall down to the Stalk; then they carry it on their Shoulders into their *Tobacco-houses*, where other Servants taking of it, drive into the Stalk of each *Plant* a Peg, and as fast as they are pegg'd, they hang them up by the Pegs on *Tobacco-sticks*, so nigh each other, that they just touch, much after the Manner they hang *Herrings* in *Yarmouth*: Thus they let them hang five or six *Weeks*, till such time as the *Stem* in the Middle of the *Leaf* will snap in the Bending

Bending of it; then, when the Air hath so moistened the *Leaf* as that it may be handled without breaking, they strike it down, *strip* it off the *Stalk*, bind it up in Bundles, and pack it into *Hogsheds* for Use.

Sometimes they are forced to *plant* their *Hills* *twice* or *thrice* over, by reason of an *Earth-worm* which eats the *Root*; and when the *Plant* is well grown, they suffer Damage by a *Worm* that devours the *Leaf*, called a *Horn-worm* (an *Eruca*, or *Caterpillar*), which is bred upon the *Leaf*; if these *Worms* be not carefully taken off, they will spoil the whole *Crop*.

In the *Year* 1667. in *August*, there happened all over *Virginia* a *Gust*, or Storm of *Wind* and *Rain*, which continued for three *Days* with such Violence, that the like was hardly ever heard of. It began, and continu'd blowing, at *East*, with such Fierceness, that above one *Half* of the *Crop* of their *Tobacco*, which was then standing in their *Fields*, was blown away, and torn apieces; the *Trees* in the *Woods*, all over the *Country*, were blown up by the *Roots* in innumerable *Quantities*: The *Waters* in the *Bay*, in some *Places*, were drove a great way into the *Woods*, and the greatest Part of those that housed *Tobacco*, had their *Tobacco-houses* blown down, and their *Tobacco* spoiled; so that there was not fully *one* Part of *three* saved of what would have been made that *Year*.

The *Planters Houses* are built all along the *Sides* of the *Rivers*, for the *Conveniency* of *Shipping*: They *build* after the *English* *Manner*, *whiting* the *Inside* of their *Houses* with *Morter* made of *burnt Oyster-shells* instead of *Lime*.

They have pure and wholesome *Water*, which they fetch wholly from *Springs*, whereof the *Country* is so full, that there is not a *House* but hath one nigh the *Door*.

XIX. The Vessel in which we set Sail for *Virginia*, being about 200, or 250 *Tuns*, sprung a considerable *Leak*: The *Captain* had tried all *Methods*, that *Seamen* use upon such *Occasions*, to find the *Leak*; particularly, they applied *Cans* to their *Ears* to hear with, but all in vain: The *Working* of the *Ship*, the *Tackle*, and the *Sea*, made such a *Noise*, that they could discover nothing thereby. I then happily bethought myself of a *Speaking-trumpet* I had contrived for some other *Conveniencies*, of a differing *Shape* from the common *Sorts*: I bid him take it, and apply the broad *End* to the *Side* of the *Ship*, the narrow *End* to his *Ear*, and it would increase his *Hearing* as much as it augmented the *Voice* the other *Way*, and would ward the *Ear* too from the *Confusion* of foreign *Noise*. Upon the first *Application*, accordingly, they heard it, though it happened to be at a considerable *Distance*; and when they removed the *Trumpet* nigher, they heard it as if it had been the *Current* of a mighty *River*: So that cutting there the *Cieling* of the *Ship*, they immediately stopped the *Leak*.

In the *Sea* I saw many little *Things* which the *Seamen* call *Carvels*; they are like a *Jelly*, or *Starch*, that is made with a *Cast* of *Blue* in it; they swim like a small *Sheep's Bladder* above the *Water*, downwards there are long *fibrous* *Strings*, some whereof I have found near *half* a *Yard* long. This

I take to be a Sort of *Sea Plant*, and the Strings its *Roots*, growing in the *Sea* as *Duck-weed* does in *Ponds*. It may be reckoned among the *Potential Cauterics*: For when we were one Day becalm'd, the sportful People rubb'd it on one another's Hands and Faces, and where it touch'd it would make it look very *red*, and smart worse than a *Nettle*. In my Return for *England* we struck a *Hawksbill-turtle*, in whose Guts I found many of these *Carvels*; so that 'tis manifest they feed thereon.

The Air.

The Cape call'd *Cape Henry* lies in $36\frac{1}{2}$ of *North Latitude*. The *Air* and *Temperature* of the *Seasons* is much govern'd by *Winds* in *Virginia*, both as to *Heat* and *Cold*, *Driness* and *Moisture*, whose *Variations* are very notable, there being often great and sudden *Changes*: The *North* and *North-west* are very *nitrous* and piercing, cold and clear, or else stormy; the *South-east* and *South* hazy, and sultry hot. Their *Winter* is a fine clear *Air*, and dry, which renders it very pleasant; their *Frosts* are short, but sometimes so very sharp, that it will freeze the *Rivers* over three *Miles* broad: Nay, the *Secretary of State* assured me, that it had frozen clever over *Potomack River*, over-against his *House*, where 'tis near nine *Miles* broad. I have observed, it freezes there the hardest, when, from a moist *South-east*, on a sudden the *Wind* passing by the *North*, a *nitrous* sharp *North-west Wind* blows, not with high *Gusts*, but with a cutting brisk *Air*; and those *Vales*, that seem then to be shelter'd from the *Wind*, and lie warm, where the *Air* is most stagnant and moist, are frozen the hardest, and seized the soonest; and there the *Fruits* are more subject to *blast*, than where the *Air* has a free *Motion*. *Snow* falls sometimes in pretty *Quantities*, but rarely continues there above a *Day* or two. Their *Spring* is about a *Month* earlier than in *England*. In *April* they have frequent *Rains*, sometimes several short and sudden *Gusts*; *May* and *June* the *Heat* increases, and it is much like our *Summer*, being mitigated with gentle *Breezes*, that rise about nine o'Clock, and decrease and incline as the *Sun* rises and falls: *July* and *August* those *Breezes* cease, and the *Air* becomes stagnant; so that the *Heat* is violent, and troublesome. In *September* the *Weather* usually *breaks* suddenly, and there fall, generally, very considerable *Rains*. When the *Weather breaks*, many fall *sick*, this being the *Time* of an *epidemical Sickness*, for *Seasonings*, *Cachexies*, *Fluxes*, *scorbutical Dropsies*, *Gripes*, or the like; which I have attributed to this Reason, That, by the extraordinary *Heat*, the *Ferment* of the *Blood* being raised too high, and the *Tone* of the *Stomach* relax'd; when the *Weather breaks*, the *Blood* palls, and, like over-fermented *Liquors*, is depauperated, or turns eager and sharp, and there's a *crude Digestion*, whence the named *Distempers* may be supposed to ensue. And, for Confirmation, I have observed the *carminative Seeds*, such as *warm*, and whose *Oil* sheaths the *acid Humours* that ever result from *crude Digestions*; but *Decoctions* that retain the *Tone* of the *Stomach*, as I suppose, by making the little *Glands* in the *Tunicles* of the *Stomach* squeeze out their *Juice* (for what is *bitter* may be as well offensive to the *Stomach* as to the *Palate*), and then *Chalybeates*, that raise the decayed *Ferment*, are no bad Practice; after which, I conceive, *Ar-*
moniack

moniack Spirits might be very beneficial. It is wonderful to consider what Influence the *Air* has over Mens Bodies, whereof I had myself sad Assurances: For though I was in a very close warm Room, where was a Fire constantly kept; yet there was not the least Alteration or Change, whereof I was not sensible, when I was sick of the *Gripes*. When a very ingenious Gentlewoman was visited with the same Distemper, I had the Opportunity of making very considerable Observations. I stood at the Window, and could view the Clouds arise; for there small black fleeting Clouds would arise, and be swiftly carried cross the whole Element; and as these Clouds arose, and came nigher, her Torments were increased, which were grievous as a *Labouring Woman's*: There was not the least *Cloud* but lamentably affected her, and that at a considerable Distance; but by her Shrieks it seemed more or less, according to the Bigness or Nearness of the Clouds. The *Thunder* there is attended often with *fatal Circumstances*: I was with my Lord *Howard of Effingham*, the Governor, when they brought Word that one Dr. *A.* was killed therewith, after this Manner: He was *smoaking* a *Pipe* of *Tobacco*, and looking out at his Window, when he was struck *dead*, and immediately became so *stiff*, that he did not fall, but stood leaning in the *Window*, with the *Pipe* in his *Mouth*, in the same *Posture* he was in when struck: But this I only deliver as a Report, though I heard the same Account from several, without any contradicting it. These Things are remarkable, that it generally breaks in at the *Gable-End* of the Houses, and often kills Persons in or near the *Chimney's Range*, darting most fiercely down the *Funnel* of the *Chimney*, more especially if there be a *Fire*. I speak here confusedly of *Thunder* and *Lightning*; for when they do any Mischief, the *Crash* and *Lightning* are at the same Instant, which must be from the Nearness of the Cloud. One Time, when the *Thunder* split the Mast of a Boat at *James-Town*, I saw it break from the Cloud, which it divided into two, and seemed as if it had shot them immediately a *Mile* asunder, to the Eye. It is dangerous, when it *thunders*, standing in a narrow Passage, where there is a Thorough-passage, or in a Room betwixt two Windows; though several have been killed in the open Fields. It is incredible to tell how it will strike large *Oaks*, shatter and shiver them, sometimes twisting round a *Tree*, sometimes as if it struck the *Tree* backwards and forwards, I had noted a fine spreading *Oak* in *James-Town* Island; in the Morning I saw it fair and flourishing, in the Evening I observed all the *Bark* of the Body of the *Tree*, as if it had been artificially peeled off, was orderly spread round the *Tree* in a Ring, whose *Semi-diameter* was four *Yards*, the *Tree* in the Centre; all the Body of the *Tree* was shaken and split, but its Boughs had all their *Bark* on; few *Leaves* were fallen, and those on the Boughs as fresh as in the Morning, but gradually afterwards withered, as on a *Tree* that is fallen. I have seen several vast *Oaks*, and other *Timber-trees*, twisted as if it had been a small *Willow* that a Man had twisted with his Hand, which I could suppose had been done by nothing but the *Thunder*. I have been told by very serious *Planters*, that 30 or 40 *Years* since, when the Country was not so open, the *Thunder* was

more fierce, and that sometimes after violent *Thunder* and *Rain*, the Roads would seem to have a perfect Cast of *Brimstone*; and it is frequent, after much *Thunder* and *Lightning*, for the *Air* to have a perfect *sulphureous Smell*. Durst I offer my weak Reasons, I might here consider the *Nature* of *Thunder*, and compare it with some *sulphureous Spirits* which I have drawn from *Coals*, that I could no way *condense*, yet were inflammable; nay, would burn after they passed through the *Water*, and that seemingly fiercer, if they were not overpowered therewith. I have kept of this *Spirit* a considerable Time in *Bladders*, and though it appeared as if they were only blown with *Air*, yet, if I let it forth, and fired it with a *Match* or *Candle*, it would continue burning till all were spent. An Observance of the *Meteors* there, might perhaps not be impertinent, as both what are more rare, and what are more frequent, as of *Gosmore* in great Abundance, and of those small *Cobwebs* in a Morning, which some have supposed to be *Meteors*. *Ignes fatui*, though there be many boggy *Swamps* and *Marshes*, are seldom, if any are, seen there.

There be frequent little Sorts of *Whirlwinds*, whose Diameter may be sometimes not past two or three *Yards*, sometimes forty, which, whisking round in a Circle, pass along the *Earth*, according to the Motion of the *Cloud* from whence they issue; and, as they pass along, with their *gyrous*, or *circular Motion*, they carry aloft the dry *Leaves* into the *Air*, which fall again, often, in *Places* far remote. I have seen them descend in a calm sun-shine Day, as if they had come from the *Heavens* in great *Showers* thereof, so that all the *Elements* seemed filled therewith; and I could perceive them to descend from on high as far as I could possibly discern a *Leaf*.

I thought this made it manifest, whence many preternatural *Showers* have happened. I remember at Sir *Richard Atherton's* in *Lancashire*, some few *Years* ago, there fell a great Number of the *Seeds* of *Ivy-berries*: At first we admired what they were, for they were covered with a thin *Skin* that was red, and resembled the Figure of a small *Wheat-corn*; but afterwards they fully manifested what they were, for many sprouted, and took *Root*. I suppose they were carried aloft by some such *Whirlwind*, and let fall there. I have purposely gone into the *Place* where I perceived this *Gust*, which is notorious enough by the *Noise* it makes, with rattling the *Leaves* as it carries them aloft, and have found a fine sharp *Breeze* of *Wind*.

The Waters.

Betwixt the two *Capes*, the Southern, called the *Cape Henry*, and the more Northerly, called *Cape Charles*, there runs up a great *Bay*, called the *Bay of Cheesepeak*, nine *Leagues* over in some *Places*, in most seven, dividing *Virginia* into two unequal *Parts*: On the *East Side* of this *Bay* there lies a narrow *Neck* of *Land*, which makes the *Countries* of *Northampton* and *Accomack*; on the *West Side* of the *Bay* there branch forth four great *Rivers*, *James-River*, *York-River*, *Rapabanack*, and *Potomack*.

The *Mouth* of *James-River*, which is the most Southerly of them, to the *Mouth* of *Potomack*, which is the most Northerly, may be 100 *Miles* Distance; but, as I have been credibly informed, the *Falls* of *James-River* are not past thirty *Miles* from *Potomack*, which is a vast large *River*,

nine

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nine *Miles* over, in many Places. I have been told it was *navigable* nigh 200 *Miles*, much higher than any of the other Rivers: Whence I conclude, in future Times it will be the most considerable for Trade, when the Country comes to be inhabited further up into the main Land. The other Rivers are much about three *Miles* over apiece; and *James River* is *navigable*, at the least, eighty *Miles*. Within four or five *Miles* of *James Town*, *James River* and *York River* are not past four or five *Miles* asunder; yea, Sloops of considerable Carriage may sail up the Branches of the two Rivers, till they come within a *Mile* the one of the other.

York River is distant from *Rapahanack*, in some Places, not past ten or twelve *Miles*; and *Rapahanack* from *Potomack* not past seven *Miles* in one Place, though it may be sixty in others. The Heads of the Branches of the Rivers interfere and lock one within another, which I think is best expressed after the Manner that an *Indian* explained himself once to me, when I inquired how nigh the Rivers of *Carolina*, *Virginia*, and *Maryland*, arose out of the Mountains, from those that ran *westerly* on the other Side of the Mountains: He clapt the Fingers of one Hand betwixt those of the other, crying, *They meet thus*; the Branches of different Rivers rising not past 100 Paces one from the other: So that no Country in the World can be more curiously watered. But this Conveniency, at the present, I look on as the greatest Impediment to the Advance of the Country, and the greatest Obstacle to Trade and Commerce; for the great Number of Rivers, and the Thinness of the Inhabitants, *distract* and *disperse* a Trade: So that all Ships in general gather each their Lading up and down 100 *Miles* distant, and the best of Trade that can be driven, is only a Sort of *Scotch Peddling*; for they must carry all Sorts of Truck that trade thither, having one Commodity to pass off another. This (*i. e.*) the Number of Rivers is one of the chief Reasons why they have no *Towns*: For every one being more solicitous for a private Interest and Conveniency, than for a publick, they will either be for making forty *Towns* at once, that is, two in every County, or none at all, which is the Country's Ruin.

The Tides in these Rivers regularly *ebb* and *flow* about two Foot perpendicular at *James-Town*: There is there, as they call it, a *Side* and *half Side*, that is, it *flows* near two *Hours* along by the *Shore*, after that it is *ebb* in the *Channel*, and again it *ebbs* near two *Hours* by the *Shore*, after that it is *Flood* in the *Channel*.

I suppose this is caused by many *Creeks* and *Branches* of the Rivers, which being considerably many, though only three or four *Miles* long, yet as broad as the *Thames* at *London*; others ten *Miles* long, some above twenty, that have little *fresh Water* which they carry of their own, but their *Current* primarily depending upon the *Flux* and *Reflux* of the *Sea*: So that after the *Side* is made in the *Channel*, it *flows* by the *Shore* a considerable Time, being that these *Creeks* are still to fill, and therefore, as it were, draws a Source upwards by the *Shore*; and likewise, when the *Tide* returns in the *Channel*, the *Creeks*, that could not readily disburse their Water, being still to empty themselves, they make an *Ebbing* by the *Shore*, a considerable Time after that it is

Flood, as I say, in the *Channel*. So far as the *Salt-waters* reach, the Country is deemed less *healthy*: In the *Freshes* they more rarely are troubled with the *Seasonings*, and those *endemic* Distempers about *September* and *October*. This being very remarkable, it might perhaps be worthy the Disquisition of the most Learned to give an Account of the various Alterations, and fatal Effects, that the *Air* has on human Bodies, especially when impregnated with a *marine Salt*; more peculiarly when such an *Air* becomes stagnant.

There is one Thing more, remarkable in *Virginia*: Generally *twice* in the *Year*, *Spring* and *Fall*, at certain *Spring-tides*, the most of the Cattle will set on *Gadding*, and run, though it be twenty or thirty *Miles*, to the *Rivers*, to drink the *Salt-water*; at which Time there is scarce any stopping of them.

As for the *Waters* in the *Springs* in general, they are, I think, somewhat more eager than those in *England*; in that I have observed, they require some Quantity more of *Malt* to make *Strong Beer* than our *English Waters*, and will not bear *Soap*. I have tried several, by *infusing* of *Galls*, and found little Difference in the *Colours*; turning much like the *Colour* of common *Sacks* in *Taverns*.

There is a *Spring* in the *Isle of Wight*, or *Nazamond County*, vents the greatest *Source* of Water I ever saw, excepting *Holy Well* in *Wales*.

I could not try any Thing as to their *specific Gravity*, having neither *Aquapoise*, nor those other *Glasses* I had contrived peculiarly for making such Experiments; they being all lost with my other Things. I had *Glasses* blown would hold about five *Ounces*, others about ten *Ounces*, with *Necks* so small, that a Drop would make a considerable Variation: With these I could make much more critical and satisfactory Observations, as to the *specific Gravity* of *Liquors*, having *critical Scales*, than by any other Way yet by me tried. I used this Method to *weigh Urines*, which Practice I would recommend to the inquisitive and critical Physicians; for there are more signal Variations in the *Weights* of *Urines*, than one would at first imagine: And when the Eye can discover little, but judge two *Urines* to be alike, they may be found to differ very much as to *Weight*. By *Weight* I find Observations may be made of *Affections* in the *Head*, which rarely make any visible *Alterations* in the *Urine*. I have found two *Urines*, not much unlike, differ 22 *Grains* in the Quantity of about four or five *Ounces*. But let them that make those *Essays weigh* all their *Urines* when *cold*, lest they be thereby deceived. But to return to the *Spring-waters* in *Virginia*: There is a *Spring* at my *Lady Berkley's*, called *Green Spring* (whereof I have been often told), so very *cold*, that it is dangerous drinking thereof in *Summer-time*, it having proved of fatal Consequence to several.

There be many *petresying Waters*, and, indeed, I believe few of the *Waters* but participate of the *petresying Quality*, though there be few *Pebbles* or *paving Stones* to be found in all the Country. But I have found many *Sticks* with *crusty* Congelations round them in the *Runs* of *Springs*, and *Stones* figured like *Honey-combs*, with many little *Stars*, as it were, shot in the *Holes*.

Mr.

Mr. Secretary *Spencer* has told me of some Waters participating much of *Alum* or *Vitriol* towards *Potomack*: Up beyond the *Falls* of *Rapabanack* I have heard of *poisonous Waters*.

When you make the *Capes* of *Virginia*, you may observe it *low Land*, *The Earth* and so that at some Distance the *Trees* appear as if they grew in the *Water*; *Soil. n. 206.* and as you approach nigher, to emerge thence. For 100 *Miles* up into the *Country* there are few *Stones* to be found, only in some Places *Rocks* of *Iron Ore* appear.

In some Places, for several *Miles* together, the *Earth* is so intermixed with *Oyster-shells*, that there may seem as many *Shells* as *Earth*; and how deep they lie thus intermingled, I think, is not yet known: For at broken Banks they discover themselves to be continued many *Yards* perpendicular. In several Places these *Shells* are much closer, and, being *petrefied*, seem to make a *Vein* of *Rock*. I have seen, in several Places, *Veins* of these *rocky Shells*, three or four *Yards* thick, at the Foot of a Hill, whose *Precipice* might be twenty *Yards* perpendicular, whose *Delf*, I suppose, shot under the Hill. Pieces of these *Rocks* broken off lie there, which, I suppose, may weigh twenty or thirty *Tuns* apiece, and are as difficult to be broken as our *Free-stone*. Of these *Rocks* of *Oyster-shells*, that are not so much *petrefied*, they burn and make all their *Lime*; whereof they have that Store that no Generation will consume.

Often, in the looser Banks of *Shells* and *Earth*, are found perfect *Teeth* *petrefied*; some, whereof I have seen, could not be less than two or three *Inches* long, and above an *Inch* broad, though they were not *maxillary Teeth*; the Part that one might suppose grew out of the *Jaw*, was *polished*, and black, almost as *Jet*; the Part which had been fastened in the *Jaw* and *Gums* was *brown*, and not so shiningly *polished*, or *smooth*. If they were, as they seemed to be, really *Teeth*, I suppose they might have been of *Fishes*. The *Back-bone* of a *Whale*, and, as I remember they told me, some of the *Ribs*, were digged out of the Side of a Hill, several *Yards* deep in the *Ground*, about four *Miles* distant from *James-Town* and the *River*: Mr. *Banister*, a Gentleman pretty curious in those Things, shewed me, likewise, the *Joint* of a *Whale's Back-bone*, and several *Teeth*; some whereof, he said, were found in Hills beyond the *Falls* of *James-River*, at least 150 *Miles* up in the *Country*.

The *Soil* in general is *sandy*. I had designed, and I think it might be worth a critical Remark, to observe the Difference of *Soils* seem appropriated to the several *Sorts* of *Tobacco*; for there are not only the two distinct *Sorts* of *sweet-scented* and *Aranoko Tobacco*, but of each of these be several *Sorts* much different, the *Seeds* whereof are known by distinct Names, they having given them the Names of those Gentlemen most famed for such *Sort* of *Tobacco*; as of *Prior-seed*, &c. nay, the same *Sort* of *Seed*, in different *Earths*, will produce *Tobacco* much different, as to Goodness. The richer the *Ground*, the better it is for *Aranoko Tobacco*, whose *Scent* is not much minded, their only Aim being to have it specious, large, and to procure it a bright *Kite's-foot Colour*.

I conceive *Tobacco* to be a Plant abounding with *nitro-sulphureous* Particles; for the *Planters* try the Goodness of their *Seed*, by casting a little thereof into the *Fire*; if it be good, it will *sparkle*, after the Manner of *Gunpowder*; so will the *Stalks* of *Tobacco-leaves*, and perhaps has something analogous to the *Narcotick Sulphur* of *Venus*, which the *Chymists* so industriously labour after. The World knows little of the Efficacy of its *Oil*, which has wonderful Effects in the *curing* of *old inveterate Sores*, and *scrophulous Swellings*, and some otherwise applied and qualified. The Goodness of *Tobacco* I look on primarily consists in the *Volatility* of its *Nitre*; and hence the *sandy Grounds* that are most impregnated therewith, and whose *nitrous Salt* is most *volatile* (for such Grounds are quickliest spent), yield *Tobaccos* that have the richest *Scent*, and that shortly becomes a *pleasant Smoak*; whereas, in *Tobacco* that grows on *stiff Ground*, the *Salts* seem more *fixed* and locked up in the *Oil*; so that, whilst new, it is very heady and strong, and requires some Time for its *Salts* to free themselves, and become *volatile*; which it manifests by its having an *urinous Smell*. The same Reason satisfies, why *Tobacco* that grows on *low Lands*, as far as the *Salts*, though the Plant be never overflowed with *salt Water*, yet the Ground that feeds the Plant, being impregnated with *salt Water*, that *Tobacco smoaks* not pleasantly, and will scarcely keep Fire, but do all that a Man can, will oft go out, till after it has been kept some considerable Time; which may be assigned to the more *fixed saline* Particles of the *marine Salts* in these Plants, which require more Time ere they be rendered *volatile*. I have observed, that that which is called *Pine-wood Land*, though it be a *sandy Soil*, even the *sweet-scented Tobacco*, that grows thereon, being large and porous, agreeable to *Aranoko Tobacco*, smoaks as coarsly as *Aranoko*: Wherefore it is, that I believe the *Microscope* might make notable Discoveries towards the Knowledge of *good Tobacco*; for the closer the Composition of the *Leaf*, the *better* the *Tobacco*: And therefore the *Planters* and *Merchants* brag of the Substance of their *Tobacco*; which Word, did they always take it in a true Sense, for the *Solidness*, and not mistake it for the *Thickness*, it would be more consonant to a true Observation: For, as I said of the *Pine-wood Tobacco*, some of it is *thick* and not *solid*, and differs from the best *Tobacco*, as *Buff* does from *tann'd Leather*; so that if the *Tobacco* be sound, and not rotten, you may give a great Guess at the *Goodness* of *Tobacco*, when you *weigh* the *Hog sheads*, before you see them; for if an equal Care be taken in the *Packing* of them, the *best Tobacco* will *weigh* the *heaviest*, and *pack* the *closest*. Now I said, that the *sweet-scented Tobacco*, most in *Vogue*, which was most famed for its *Scent*, was that that grew on *sandy Land*; which is true, if you would *smoak* it whilst *new*, or whilst only two or three *Years* old; but if you keep the *stiff Land Tobacco*, which is generally a *Tobacco* of great Substance, five or six *Years*, it will much excel; for though the *sandy Land Tobacco* abounds with a *volatile Nitre* at first, yet the *stiff Land Tobacco* abounds with a greater Quantity of *Nitre*, only that it is locked up in its *Oil* at first, and requires more Time to extricate itself, and become *volatile*; but the *Pine-wood Land* having little of the *nitro-sulphureous*

sulphureous Particles, neither is, nor never will make any Thing of a *rich Smoak*. Discourſing hereof, ſome Days ſince, to a Gentleman of good Obſervation, that has been verſed with *Malting*, he aſſured me, to back this my Suppoſition, or *Hypotheſis*, he had obſerved, that *Barley* that grew on *ſtiff Ground* required more Time conſiderably to mellow and come to Perfection, than that that grew on *light Land*. Having proceeded thus far to ſpeak of *Tobacco*, I ſhall add one or two Things more. The Planters differ in their Judgments about the *Time* of *planting*, or *pitching* their *Crops*: Some are for *pitching* their *Crops* very early, others late, without any Diſtinction of the Nature of the *Soils*; and it is from the different Effects that they find in that, that ſometimes the early, ſometimes the late *planting* ſucceeds; but they have not the Reason to judge of the Cause, to conſider the Accidents of the Year, and the Difference of the *Soils*. In *sandy Grounds* they need not ſtrive ſo much for *early planting*, the Loofeneſs of the Earth, and the kind-natured Soil, yielding all that it can, eaſily and ſpeedily; and *Sand* retaining the *Heat*, makes the *Plants* grow faſter: But in *ſtiff Soils*, if the *Crops* be not *early pitched*, ſo that, during the Season of *Rains*, it have got conſiderable Roots, and ſhot them ſome Depth, if early *Droughts* come, it ſo binds the Land, that the Roots never ſpread nor ſhoot deeper or further than the *Hills* that they are *planted* in. Obſerving this on the *Plantation* where I lived, that it was *ſtiff Ground*, I adviſed them to *plant* their *Crops* as *early* as poſſible; and, in order thereunto, I tried ſeveral Ways to further the *Plants*; and what I found moſt advantageous was, by taking an *Infuſion* of *Horſe-dung*, and putting thereon *Soot*, and then my *Seeds*; this I kept 48 *Hours* in an ordinary *digestive Heat*: When I *sowed*, I mixed *Aſhes* with the *Seed* (having decanted the *Liquor*), that the *Seed* might *sow* the evener; the Effect was, that my *Plants* came up ſooner, grew ſwifter, and I had five *Plants* for *one* more than any of the other *Beds* round about mine.

There be various *Accidents* and *Diſtempers* whereunto *Tobacco* is liable; as the *Worm*, the *Fly*, *Firing to Turn*, as they call them, *Frenckmen*, and the like. I propoſed ſeveral Ways to *kill* the *Worm* and *Fly*, as by *Sulphur*, and the like; but had no Opportunity to experiment it: I ſhall ſet down that I had moſt Hopes of, which perhaps may give a Hint to others to try or improve. *Tobacco-ſeed* is very ſmall, and, by Conſequence, ſo is the *young Plant* at firſt; and, if gleamy Weather happen at that Time, it breeds a ſmall *Fly*, which conſumes the *Plume* of the *Plant*. Now it being early in the *Year* when they *sow* the *Seed*, *viz.* about the fourteenth of *January*, they cover the Ground, to ſecure, as well as they can, their *tender Plants* from the nipping *Froſts* that may happen in the *Nights*; they cover them only with a few *Oak-leaves*, or the like, for *Straw* they find apt to harbour or breed this *Fly*. I therefore would adviſe them to *ſmoak Straw* with *Brimſtone* once in two or three *Nights*, and ſo they might cover them ſecurely, with that which would preſerve them infinitely beyond the Covering with *Oak-boughs*; indeed, I would adviſe them to keep peculiarly ſo much of their *Indian Corn-blades*, which they gather for their *Fodder*,

Fodder, for this very Purpose, being, as I conceive, much the best; there being no Chaff to foul their Beds, and prejudice them when they should weed them.

What they call *Firing*, is this: When *Plants* are of small Substance, as when there has been a wet and very cold Season, and very hot Weather suddenly ensues, the *Leaves* turn *brown*, and dry to Dust; the Cause I conceive to be hence: The *Plant* being feeble, and having a small Quantity of *Oil*, which makes the more *solid* Part of the *Plant*, the *Earth* being suddenly heated by the Sun's fiercer Beams, the *Roots* are rather scorched and dried up in the *Earth*, than nourished; so that the *Plant*, consisting only of *watery* Parts, is consumed, as it were, by Fire: Sometimes hopeful *Plants*, when by a sudden Gust some *Master-veins* are broken, if sudden Heat ensues, they likewise *fire*: For being not come to Maturity, and being deprived of the Supports of *Life* and *Vegetation*, they likewise perish, are dried up, and fall to Dust.

Frenchmen they call those *Plants*, whose *Leaves* do not spread and grow large, but rather spire upwards, and grow tall: These *Plants* they do not tend, being not worthy their Labour. Were they so critical, I believe they might have great Guess what *Plants* were most likely to turn *Frenchmen*, by observing whether the *Roots* of the *Plants* run downwards, as those whose Branches are aptest to spire upwards; for tho' I have not made positive Proof thereof, I have something more than bare Fancy for my Conjecture: I have pulled up some of these *Frenchmen*, and compared them with the *Roots* of some other *Plants*, and found them much longer than others; and it is observable, *loose Soils*, and *sandy Ground*, are more subject thereto than the *stiff Land*.

The Country, of itself, is one intire *Wood*, consisting of large *Timber-trees* of several Sorts, free from *Thickets* or *Under-wood*; the small *Skrubs* growing only on Lands that have been cleared, or in *Swamps*; and thus it is for several *Hundreds* of *Miles*, even as far as has yet been *discovered*.

n. 206. p. 978. As to the River on the other Side the Mountains, said to *ebb* and *flow*, I have been assured by Col. *Bird*, who is one of the intelligentest Gentlemen in all *Virginia*, and knows more of *Indian* Affairs than any Man in the Country, that it was a Mistake; for that it must run into a *Lake* of *fresh Water*, to which the *French* have given the Name of *Lake Petite*, there being several larger *Lakes* betwixt that and *Canada*. The *French* possessing themselves of these *Lakes*, no doubt will, in a short Time, be absolute Masters of the *Beaver Trade*, the greatest Numbers of *Beavers* being caught there.

But to return to the Parts of *Virginia* inhabited by the *English*, which, in general, is a very fertile *Soil*, far surpassing *England*; for their *English Wheat* (as they call it, to distinguish it from *Maze*, commonly called *Virginia Wheat*) yields generally betwixt fifteen and thirty *Fold*, the Ground only once ploughed; whereas it is a good Crop in *England* that yields above eight *Fold*, after all their Toil and Labour: And yet, in Truth, it is only the *barrenest* Parts that they have cultivated, *tilling* and *planting* only the *high Lands*, leaving the richer *Vales* unstirred, because they understand not any Thing of

of *Draining*. So that the richest *Meadow Lands*, which is one Third of the Country, is *Boggy, Marsh, and Swamp*, whereof they make little Advantage, but lose in them abundance of their Cattle, especially at the first of the *Spring*, when the *Cattle* are weak, and venture too far after young Grass. Whereas vast Improvements might be made thereof; for the Generality of *Virginia* is a *sandy Land* with a *shallow Soil*: So that after they have cleared a fresh Piece of Ground out of the *Woods*, it will not bear *Tobacco* past two or three *Years*, unless *Cow-penn'd*; for they *manure* their Ground by keeping their Cattle, as in the South you do your Sheep, every Night confining them within Hurdles, which they remove when they have sufficiently *dunged* one Spot of Ground; but, alas! they cannot improve much thus: Besides, it produces a strong Sort of *Tobacco*, in which, the *Smoakers* say, they can plainly taste the Fulsomeness of the *Dung*; therefore every three or four *Years* they must be for *clearing* a new Piece of Ground out of the *Woods*, which requires much Labour and Toil; it being so thick grown, all over, with massy Timber. Thus their *Plantations* run over vast Tracts of Ground, each ambitious to engross as much as they can, that they may be sure to have enough to *plant*, and for their Flocks and Herds of *Cattle* to range and feed in; so that *Plantations* of 1000, 2000, or 3000 *Acres*, are common; whereby the Country is thinly inhabited, their Living solitary and unfociable, trading confused and dispersed, besides other Inconveniencies: Whereas they might improve 200 or 300 *Acres* to more Advantage, and would make the Country much more healthy; for those that have 3000 *Acres* have scarce *cleared* 600 *Acres* thereof, which is peculiarly termed the *Plantation*, being surrounded with the 2400 *Acres* of *Wood*: So that there can be no free or even Motion of the *Air*, but the *Air* is kept either *stagnant*, or the lofty *sulphureous* Particles of the *Air*, that are higher than the Tops of the Trees, which are above as high again as the Generality of the *Woods* in *England*, descending when they pass over the *cleared* Spots of Ground, must needs, in the *violent Heat* of Summer, raise a preternatural Ferment, and produce bad Effects. Nor is it any Advantage to their Stocks or Crops; for did they but *drain* their *Swamps* and *Low Lands*, they have a very deep Soil, that would endure *Planting* twenty or thirty *Years*; and some would scarce ever be worn out, but be ever longer better: For they might lay them all Winter, or when they pleased, in Water; and the Product of their Labour would be double or treble, whether *Corn* or *Tobacco*.

On the *Plantation* where I lived, I drain'd a good large *Swamp*, which fully answered Expectation; for with three Men, in thirteen Days, I *drained* the whole *Swamp*; and, it being *sandy Land*, soaks and drains admirably well; and, what I little expected, I laid a *Well* dry at a considerable Distance. The Gentlewoman who was Owner of that *Plantation* was in *England* last Year, and I think Dr. *Moulin* was by when she asked me, Now to teach her how she might make her *Tobacco* that grew in that *Swamp* less; for it produced so very large, that it was suspected to be of the *Aranoko Kind*: I

told her, though the Complaint was rare, yet there was an excellent Remedy for that, in letting every *Plant* bear eight or nine *Leaves* instead of four or five, and she would have more *Tobacco*, and less *Leaves*.

There are many other Places as easy to *drain* as this, though of larger Extent, and richer *Soil*: Even in *James-Town Island*, which is much what of an oval Figure, there is a *Swamp* runs diagonalwise over the Island, whereby are lost at least 150 *Acres* of Land, which would be *Meadow*, and would turn to as good Account as if it were in *England*: Besides, it is the great Annoyance of the Town, and no doubt but it makes it much more *unhealthy*. If therefore they but scoured the *Channel*, and made a pretty ordinary Trench all along the Middle of the *Swamp*, and placed a *Sluice* at the Mouth where it opens into the back *Creek* (for the Mouth of the *Channel* there is narrow, has a good hard Bottom, and is not past two *Yards* deep when the *Flood* is out; as if Nature had design'd it before-hand); they might thus *drain* all the *Swamp* absolutely dry, or lay it under Water, at their Pleasure.

And now, since we are speaking of *James-Town*, give me Leave to adjoin some Reflections as to the *Situation* and *Fortifications* of the Place. *James-Town Island* is rather a *Peninsula*, being joined to the *Continent* by a small Neck of Land, not past twenty or thirty *Yards* over, and which, at *Spring-tides*, is overflowed, and is then an absolute *Island*. Now they have built a silly fort of a *Fort*, that is, a Brick Wall, in the Shape of a *Halfmoon*, at the Beginning of the *Swamp*, because the *Channel* of the *River* lies very nigh the Shore; but it is the same as if a *Fort* was built at *Chelsea* to secure *London* from being taken by Shipping. Besides, Ships passing up the *River* are secured from the *Guns* of the *Fort*, till they come directly over-against the *Fort*, by reason the *Fort* stands in a *Vale*, and all the *Guns* directed down the *River*, that should play on the Ships as they are coming up the *River*, will lodge their Shot within ten, twenty, or forty *Yards*, in a rising Bank, which is much above the Level of the *Fort*: So that if a Ship gave but a good Broadside, just when she comes to bear upon the *Fort*, she might put the *Fort* into that Confusion, as to have free Passage enough.

But if they would build a *Fort* for the Security of the Town and Country, I conceive it should be on *Archer's-Hope Point*; for that would stop the Ships from passing up the *River* before they came to the Town, and would secure the Town from being blocked up by Sea. The *Channel* at *Archer's-Hope Point* lies close by the Shore, and makes such an Angle there, by reason of *Hog-Island*, that, going up or down the *River*, let the Wind be where it will, they must there bring the contrary *Tack* on *Board*; and generally, when they *About the Ship*, as they call it, they are so nigh the Shore, that a Man may almost sling a Finger-stone on *Board*. How much this hinders the Motion of a Ship, and what Confusion it must be to them to bring a contrary *Tack* on *Board* whilst they have all the *Guns* of a *Fort* playing so nigh upon them, may readily be conceived. *Archer's-Hope* is a Neck of Land that runs down three *Miles* long, not much past *Half a Mile* broad, betwixt the *main River* and *Archer's-Hope Creek*, which has large
Marshes

Marshes and Swamps; so that a *Citadel*, built upon the *Point*, would almost be impregnable, being it could be attacked no Way but one, which is so narrow a slender Neck of Land, that it would be difficult to take it that Way; and it would secure *James-Town* from being *blocked*, being it would not be past a *Mile* by Water to the Point of *James-Town Island*: And the *Island* is so surrounded with Water and *marshy* Land, that the Town could never be Bomb'd by Hand.

But now, to return to the Reflections of *Improving* and *Manuring* of Land in *Virginia*: Hitherto, as I have said, they have used none but that of *Cow-penning*; yet I suppose they might find very good *Marle* in many Places. I have seen both the *red* and *blue Marle* at some Breaks of Hills. This would be the properest *Manure* for their *sandy Land*, if they spread it not too thick, theirs being, as I have said, a *shallow sandy Soil*; which was the Reason I never advised any to use *Lime*, though they have very good *Lime* of *Oyster-shells*; but that is the properest *Manure* for *cold clay Land*, and not for *sandy Soil*. But as most Lands have one *Swamp* or another bordering on them, they may certainly get admirable *Slitch*, wherewith to *manure* all their *Up-lands*: But this, say they, will not *improve* Ground, but clods, and grows hard. It is true, it will do so for some Time, a *Year* or *two* at the first; but did they cast it in *Heaps*, and let it lie for two or three *Years*, after a *Frost* or *two* had seized it, and it had been well pierced therewith, I doubt not it would turn to good Account. And for this I have something more than bare Conjecture: For discoursing it once with a good notable *Planter*, we went to view a *Heap* thereof, that casually he had cast up betwixt three or four *Years* before; and we found it not very binding, but rather a fine natural *Mould*: Whereupon he did confess, he then remembered, that out of a Ridge of the like *Mould* he had had very large *Plants*, which must have been of the like *Slime* or *Slitch* cast up before. But he said, that himself, and others, despaired of this *Manure*, because they had taken of this *Slitch* fresh and moist out of the *Swamp*, and filled *Tobacco-hills* with it, and in the midst of it *planted* their *Plants*; which so bound the Roots of their *Plants*, that they never came to any Thing.

They neither *House* nor *Milk* any of their *Cows* in Winter, having a Notion that it would kill them; yet I persuaded the Lady, where I lived, to *milk* four *Cows*, the last Winter that I stayed in the Country; whereof she found so good Effect, that she assured me she would keep to my Advice for the future; and also, as I had further urged, *house* them too, for which they have mighty Conveniencies, their *Tobacco-houses* being empty ever at that Time of the Year, and may easily be fitted in two or three Days Time, without any Prejudice; whereby their Cattle would be much sheltered from those pinching sharp *Frosts* that some Nights, on a sudden, become very severe. I had another Project for the Preservation of their Cattle, which proved very successful: I urged the Lady to sow her *Wheat* as early as possibly she could, so that before *Winter* it might be well rooted, to be early and flourishing at the first of the *Spring*; so that she might turn thereon her weak Cattle, and such as should at any Time be *swamped*, whereby they

might be recruited and saved, and it would do the *Wheat* good also. I advised her, likewise, to save, and carefully gather the *Indian Corn*, Tops and Blades, and all her Straw, and whatsoever could be made *Fodder* for her Cattle; for they get no *Hay* (though I was urging her to that too, and to sow *Saintfoin*; for being a *sandy Soil*, I am confident it would turn to a very good Account), and little *Fodder*; but, as they think, *Corn* being more nourishing, feed them with their *Indian Corn*, which they give them Morning and Evening. Thus they spend great Quantities of *Corn*; and, when all is done, what signify two or three Heads of *Corn* to a Beast in a Morning? It only makes them linger about the Houses for more; and after such sweet Food they are not so apt to brouze on the Trees and the coarse Grass which the Country affords: So that their *Guts* shrink up, and they become *Belly-shot*, as they call it. I advised, therefore, never to give them any thing in a Morning, whereby, as soon as they were set forth of the *Cow-pens*, they would fall a feeding; and though they filled their Bellies only with such coarse Stuff as had little Nourishment in it, yet it would keep out their Bellies, and they would have a better *Digestion*; and then when they were come Home at Night, to *fodder* them, beginning with *Straw* and their *coarsest Fodder*, which they would learn to eat by Degrees, before they tasted that that was more delicate; and, whilst their *Digestion* was strong, would yield them *Nourishment* to keep them still so: Afterward, when the *Winter* pinch'd, their fine *Fodder* then would stand them in stead; and hereby they might preserve their weakest Cattle by these Methods, and Help of the *Wheat-patch*. She (the Gentlewoman where I lived) sav'd all her Cattle, and lost not one in two *Winters* after that I stayed there; besides, she saved above twenty *Barrels* of *Corn*, and a *Barrel* of *Corn* is commonly worth ten *Shillings*. Nay, further, the last *Spring* she fed two Beasts, a *Bullock* and a *Cow*, fat upon her *Wheat*, with the Addition only of a little *boiled Corn*, and yet the *Wheat* was scarce eat down enough.

But to return again to the *Nature* of the *Earth*. I have observed, that at five or six *Yards* deep, at the Breaks of some Banks, I have found *Veins* of *Clay* admirable good to make *Pots*, *Pipes*, or the like; and whereof, I suppose, the *Indians* make their *Pipes*, and *Pots* to boil their Meat in; which they make very handsomely, and which will endure the *Fire* much better than most *Crucibles*. I took of this *Clay*, dried, powdered, and sifted, powdered and sifted *Potsherds*, and *Glass*, three Parts, two Parts, and one Part, as I remember, and therewith made a large *Crucible*; which was the best I yet ever tried in my Life. I took it once *red-hot* out of the *Fire*, and clapt it immediately into the Water, and it started not at all. The Country abounds mightily with *Iron-Ore*, that, as I have been assured by some, upon Trial, has been found very good. There are Rocks thereof appear at the Precipice of Hills, at the Foot whereof there runs a River fit for a *Forge*, and there is *Wood* enough to supply it with *Charcoal*. As I have heard, there were formerly some Persons undertook the Work, and when they had made but a small Quantity of *Iron*, which proved very good, the *Indian Massacre* happened; and they being higher seated than the then inhabited

Part of the Country, were all cut off, and the *Works* demolished. Some *Indians* brought Col. *Bird* some *Black-lead*, whereof he has told me there is great Store. There is very curious *Talc* towards the *Falls* of *Rapahanock River*, which they *burn*, and make a delicate *White Wash* of it. The Secretary of State, Col. *Spencer*, has assured me, there were *vitriolick* or *aluminous Earths* on the Banks of *Potomack*.

There are three Sorts of *Eagles*; the largest I take to be that they call the *Grey Eagle*, being much of the Colour of our *Kite* or *Glead*; the second is the *Bald Eagle*; for the Body and Part of the Neck being of a *dark Brown*, the upper Part of the Neck and Head is covered with a *white* sort of *Down*, where it looks very *bald*, whence it is so named: The third Sort is the *Black Eagle*, resembling most the *English Eagle*; they build their Nests much after the Manner that *Dr. Willoughby* describes, and generally at the Top of some tall old Tree, naked of Boughs, and nigh the River-side; and the People fell the Tree, generally, when they take the Young. They are most frequently sitting on some tall Tree by the River-side, whence they may have a Prospect up and down the River, as I suppose, to observe the *Fishing-Hawks*; for when they see the *Fishing-Hawk* has struck a *Fish*, immediately they *take Wing*, and it is sometimes very pleasant to behold the Fight; for when the *Fishing-Hawk* perceives herself pursued, she will scream, and make a terrible Noise, till at length she let fall the *Fish* to make her own Escape, which the *Eagle* frequently catches before it reach the Earth or Water. These *Eagles* kill young *Lambs*, *Pigs*, &c.

The *Fishing-Hawk* is an absolute Species of *King's-Fisher*, but full as large, or larger than our *Jay*, much of the Colour and Shape of a *King's-Fisher*, though not altogether so curiously feathered: It has a large Crop; and, as I remember, there is a little *King's-Fisher*, much the same, in every Respect, with ours.

If I mistake not, I have seen both the *Goss-Hawk* and *Falcon*; besides, there are several Sorts of the lesser kind of *Stannels*.

There is likewise the *Kite*, and the *Ringtail*.

There is both a *Brown Owl* and a *White Owl*, much what as large as a *Goose*, which often kills their *Hens* and *Poultry* in the Night. The *White Owl* is a very delicately feathered Bird, all the Feathers upon her Breast and Back being *Snow-white*, and tipped with a Punctal of *Jet-black*: Besides, there is a *Barn-Owl*, much like ours, and a little Sort of *Scritch-Owl*.

There is both the *Raven* and the *Carrion Crow*.

The *Night-Raven*, which some call the *Virginian Bat*, is about the Bigness of a *Cuckow*, feathered like them, but very short, and short-legged, not discernible when it flies, which is in the Evening, scudding like our *Night-Raven*.

There is a great Sort of *ravenous Bird* that feeds upon *Carrion*, as big, very nigh, as an *Eagle*, which they call a *Turkey-Bustard*; its Feathers are of a *darkish Black*; it has *red Gills*, resembling those of a *Turkey*, whence it has its Name; it is nothing of the same Sort of *Bird* with our *English Turkey-Bustard*,

Bustard, but it is rather a Species of the *Kite*; for it will hover on the Wing something like them, and is *carnivorous*. The *Fat* thereof, dissolved into an *Oil*, is recommended mightily against *old Aches* and *Sciatica Pains*.

The *Pica-Glandaria*, or *Jay*, is much less than our *English Jay*, and of another Colour; for it is all *Blue* where ours is *Brown*; the Wings *marbled* as curiously as ours are: It has both the same *Cry*, and sudden jetting Motion.

There are great Variety and Curiosity in the *Woodpeckers*: There is one as big as our *Magpye*, with *blackish brown* Feathers, and a large *scarlet Tuft* on the Top of the Head. There are four or five Sorts of *Woodpeckers* more, variegated with *green, yellow, and red Heads*; others spotted *Black and White*, most lovely to behold. There's a Tradition amongst them, That the *Tongue* of one of these *Woodpeckers*, dried, will make the *Teeth* drop out, if pricked therewith, and cure the *Tooth-ach*.

There be *Wild Turkeys* extreme large. They talk of *Turkeys*, that have been killed, that have weighed betwixt fifty and sixty *Pounds Weight*; the largest that ever I saw weighed something better than 38 *Pounds*. They have very long Legs, and will run prodigiously fast: I remember not that ever I saw any of them on the Wing, except it were once. Their *Feathers* are of a *blackish shining Colour*, that in the Sun-shine, like a *Dove's Neck*, are very specious.

Hens and *Cocks* are, for the most part, without *Tails* and *Rumps*; and, as some have assured me, our *English Hens*, after some Time being kept there, have their *Rumps* rot off; which I am the apter to believe, being all their *Hens* are certainly of *English Breed*. I am sorry I made no *anatomical Observation* thereof, and Remarks about the Use of the *Rumps* in *Birds*, which at present I take to be a Couple of *Glands*, containing a sort of Juice for the Varnishing of the Feathers; having observed, all *Birds* have much Recourse with their *Bills* to the *Rumps*, when they dress their *Plumes*, whereby they scud through the Air more nimbly in their Flight.

Partridges there are much smaller than ours, and resort in *Covies*, as ours do: Their *Flesh* is very white, and much excels ours, in my Mind: *Sed de Gustibus non est disputandum*.

Their *Turtle-Doves* are of a *duskyish-blue Colour*, much less than our common *Pigeons*; the whole *Train* is longer much than the *Tails* of our *Pigeons*, the *middle Feather* being the longest. There is a strange Story, of a vast Number of these *Pigeons* that came in a Flock a few *Years* before I came thither: They say, they came through *New England, New York, and Virginia*, and were so prodigious in Number, as to darken the Sky, for several Hours, in the Place over which they flew, and break massy Boughs where they lighted, and many like Things, which I have had asserted to me by many *Eye-witnesses* of Credit, that to me it was without doubt, the Relators being very sober Persons, and agreeing in the Story: Nothing of the like ever happened since, nor did I ever see past ten in a Flock together, that I remember.

The *Thrush* and *Feldefare* are much like ours, and are only seen in *Winter* there, accordingly as they are here.

Their *Mocking Birds* may be compared to our *Singing Thrushes*, being much of the same Bigness. There are two Sorts, the *Grey*, and the *Red*: The *Grey* has Feathers much of the Colour of our *Grey Plovers*, with *White* in the *Wings*, like a *Magpye*; this has the much *softer Note*, and will imitate, in its *Singing*, the *Notes* of *all Birds* that it hears, and is accounted much the finest *Singing Bird* in the *World*.

This *Mocking Bird*, having its Name from *mimicking* all other Birds in *Singing*, is a wonderful mettled Bird, bold and brisk, and yet seems to be of a very tender Constitution; neither *Singing* in *Winter*, nor in the *Midst* of *Summer*; and with much Difficulty are any of them brought to live in *England*.

The *Red Mocking Bird* is of a *dusky Red*, or rather *Brown*: It *sings* very well, but has not so *soft* a *Note* as the *Grey Mocking Bird*.

Of the *Virginia Nightingale*, or *Red Bird*, there are two Sorts: The *Cocks* of both Sorts are of a pure *Scarlet*, the *Hens* of a *dusky Red*. I distinguish them into two Sorts; for the one has a *tufted Cop* on the *Head*, the other is *smooth-feathered*. I never saw a *tufted Cock* with a *smooth-beaded Hen*, or on the contrary; they generally resorting a *Cock* and *Hen* together, and play in a *Thicket* of *Thorns* or *Briars* in the *Winter*; nigh to which the *Boys* set their *Traps*, and so catch them, and sell them to the *Merchants* for about *Sixpence* apiece, by whom they are brought for *England*. They are something less than a *Thrush*.

There is a Bird, very injurious to *Corn*, they call a *Black-bird*: I look on it to be a sort of *Starling*, for they cry something like them, but do not *sing*; much what of the same Bigness, have *Flesh blackish*, like theirs. They resort in great *Flocks* together; they are as *black* as a *Crow* all over, their *Bills* and all, only some of them have *scarlet* Feathers in the *Pinions* of their *Wings*.

They have a *Lark* nothing differing from our common *Lark*: They have another Bird, which they call a *Lark*, that is much larger, as big as a *Starling*: It has a *soft Note*, feeds on the *Ground*, and, as I remember, has the specific Character of a *Long Heel*; it is more inclined to *Yellow*, and has a large *Halfmoon*, on its *Breast*, of *Yellow*.

They have a *Martin* very like, only larger than ours, that builds after the same Manner. The Honourable Col. *Bacon* has remarked, for several *Years*, that they constantly come thither upon the 10th of *March*, one or two of them appearing before, being seen hovering in the *Air* for a *Day* or two, then go away, and, as he supposed, returned with the great *Flock*. The Colonel delighted much in this *Bird*, and made *Holes*, like *Pigeon-holes*, at the *End* of his *House*, with *Boards* purposely for them.

Their *Swallow* differs but little from ours.

They have a Bird they call a *Blue-bird*, of a curious *Azure* Colour, about the Bigness of a *Chaffinch*.

There be other Sorts of *Goldfinches*, variegated with *Red*, *Orange*, and *Yellow* Feathers, very specious and beautiful. Spar-

Sparrows not much different from the *English*, but they build not in the *Eaves* of *Houses*, that ever I saw.

The *Snow-Bird*, which I take to be much the same with our *Hedge-Sparrows*; this is so called because it seldom appears about *Houses* but against *Snow*, or very cold Weather.

The *Humming-Bird*, that feeds upon the *Honey* of *Flowers*. I have been told by some Persons, that they have kept of these *Humming-Birds* alive, and fed them with Water and Sugar: They are much the *smallest* of all Birds, have long *Bills*, and curious coloured Feathers, but differ much in Colour.

Herons, three or four several Sorts: One larger than the *English*, feathered much like a *Spanish Goose*; another Sort that only comes in Summer, *Milk-white*, with *red* Legs, very lovely to behold.

The *Bittern* is there less than in *England*, and does not make that *sounding Noise*, that ever I heard.

Curlews, something less than our *English*, though bigger than a *Wimbrel*.

The *Sand-Piper*, much resembling the *English*.

The *Snipe*, two Sorts; one resembling *ours*, the other much less.

The *Tewits* are smaller than the *English*, and have no long *Toppings*, but just like a young one that begins to fly.

There are great Numbers of *Wild-Swans*.

Wild-Geese and *Brent-Geese* all Winter, in mighty Flocks; *Wild-Ducks* innumerable; *Teal*, *Wigeon*, *Sheldrakes*, *Virginia-Didapers*, the *Black-Diver*, &c.

In my Return home for *England*, May 1686. off of the *Banks* of *Newfoundland*, when we were, according to Account, 100 *Leagues* from the Shore, we saw several prodigious floating Islands of the *Ice*, no less our Wonder than our Terror; for they were very dangerous. I got the Master to sail one Day as nigh one of them as we securely durst, which we judged to be full a *League* in Length, and was higher above Water than the Top of our *Main-mast*: The *Snow* drove to and fro upon it, as upon a large Plain. There was a great Flock of small *Black-Divers*, that were not much bigger than a *Feldefare*, came to us a little before; but all of them then left us, and betook themselves to this Island of *Ice*. We saw, as I remember, nigh thirty of these Islands of *Ice*. Captain *Rider*, being some few Days later in his Passage, and bearing more to the *Nore*, told me, he saw many more of those Islands of *Ice*, and some much larger.

There are in *Virginia* a great many *Cormorants*, several Sorts of *Gulls*, and, in and about the *Bay*, many *Bannets*.

The Beasts.

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There were neither *Horses*, *Bulls*, *Cows*, *Sheep*, or *Swine*, in all the Country, before the coming of the *English*, as I have heard, and have much Reason to believe: But now, amongst the *English* Inhabitants, there are good Store of *Horses*, though they are very negligent and careless about the Breed. It is true, there is a *Law*, that no *Horse* shall be kept *stoned* under a *certain Size*; but it is not put in Execution. Such as they are, there are good Store, and as cheap, or cheaper, than in *England*, worth about

five

five Pounds apiece. They never *shoe* them, nor *stable* them in general; yet they ride pretty sharply: *A Planter's Pace* is a Proverb, which is a good sharp Hand-gallop. The *Indians* have not yet learned to *ride*, only the *King of Pomonkie* had got three or four *Horses* for his own Saddle, and an Attendant, which I think should in no wise be indulged; for I look on the allowing them *Horses* much more dangerous than even *Guns* and *Powder*.

Wild-Bulls and *Cows* there are now in the *uninhabited Parts*, but such only as have been bred from some that have strayed, and become *wild*, and have propagated their Kind, and are difficult to be shot, having a great Acuteness of Smelling. The common Rate of a *Cow* and a *Calf* is 50 s. be she big or little; they are never very curious to examine that Point.

Their *Sheep* are of a middling Size, pretty fine fleeced in general, and most Persons of Estate begin to keep *Flocks*, which hitherto has not been much regarded, because of the *Wolves* that destroy them; so that a Piece of *Mutton* is a finer Treat than either *Venison*, *Wild-Goose*, *Duck*, *Widgeon*, or *Teal*.

Elks I have heard of, and there are abundance of brave *Red Deer*; so that a good *Woodfman*, as they call him, will keep a House with *Venison*. The *Indians*, they say, make *artificial* Sorts of *Heads* of *Boughs* of *Trees*, which they consecrate to their *Gods*; and these they put on, to deceive the *Deer*, when they go a *Shooting* or *Hunting*, as they call it, and, mimicking the Feeding of the *Deer*, they, by Degrees, get within Shot.

Swine they have now in great Abundance: *Sboats* or *Porkrels* are their general Food; and I believe they are as good as any *Westphalia*; certainly far exceeding our *English*.

Rackoon; I take it to be a Species of a *Monkey*, something less than a *Fox*, grey-haired, its Feet formed like a Hand, and the Face too has likewise the Resemblance of a *Monkey's*; besides, being kept tame, they are very *apish*. They are very prejudicial to their *Poultry*, as I remember.

An *Opossum*, as big, and something shaped like our *Badgers*, but of a lighter *Dun Colour*, with a long Tail something like a *Rat*, but as thick as a Man's Thumb: The *Skin* of its *Belly* is very large, and folded, so as to meet like a *Purse*, wherein they secure their Young whilst little and tender, which will as naturally run thither, as *Chickens* to a *Hen*: In these *false Bellies* they will carry their Young. They feed on, and devour *Corn*.

Hares; many will have them to be a *Hedge-Rabbit*, but I know not what they mean thereby: I take them to be a perfect Species of *Hares*, because I have seen *Leverets* there with the *white Spots* in the Head, which the Old ones have not; so it is in *England*; and the *Down* is perfectly of the Colour of our *Hares*: They sit as our *Hares* do, and make no *Holes* and *Burrows* in the Earth. True, they are but about the Bigness of an *English Rabbit*, and run no faster: They generally take into some hollow Tree within a little Space, which then the People catch, by gathering the withered Leaves, and setting them on fire within the Hollow of the Tree,

and so smoaking of them till they fall down. Sometimes they take long *Briars*, and twist them in the Down and Skin, and so pull them forth.

Squirrels; there are three Sorts. The *first* is the great *Fox-Squirrel*, much larger than the *English*, and *grey*, almost as a common *Rabbit*. These are very common; I have eaten of them at the best Gentlemens Tables, and they are as good as a *Rabbit*. The *second* is the *Flying-Squirrel*, of a lighter *dun Colour*, and much less than the *English Squirrel*; the *Skin*, on either Side the *Belly* extended, is very large betwixt the Fore-leg and Hind-leg, which helps them very much in their skipping from one Bough to another; that they will leap further than the *Fox-Squirrel*, though much less: Yet this is still rather *Skipping* than *Flying*, though the Distinction be well enough. The *third* is the *Ground-Squirrel*: I never saw any of this Sort, only I have been told of them, and have had them thus described to me; to be little bigger than a *Mouse*, and finely spotted, like a young *Fawn*: By what I further apprehended, they are an absolute Sort of *Dor-Mouse*, only different in Colour.

Musk-Rats; in all Things shaped like our *Water-Rats*, only something larger, and is an absolute Species of *Water-Rats*, only having a curious *musky Scent*. I have kept one for a certain Time in a wooden Chest; two Days before it died, it was extraordinary *odoriferous*, and *scented* the Room very much; but the Day that it died, and a Day after, the *Scent* was very small; yet afterwards the *Skin* was very *fragrant*: The *Stones* also smelt very well. They build Houses, as *Beavers* do, in the *Marshes* and *Swamps* by the *Water-sides*, with two or three Ways into them; and they are finely daubed within. I pulled one in Pieces purposely to see the Contrivance: There were three different lodging Rooms, very neat, one higher than another, as I conceive, purposely made for Retirement when the Water rises higher than ordinary. They are considerably large, having much Trash and Lumber to make their Houses with. I suppose they live mostly on *Fish*.

Bats, as I remember, at least two Sorts; *one* a large Sort with *long Ears*, and particularly-long straggling *Hairs*; the *other* much like the *English*, something larger, I think, very *common*.

I never heard of any *Lions*. They told me of a Creature killed, whilst I was there, in *Gloucester County*, which I conceived to be a Sort of *Pard*, or *Tyger*.

Bears there are, and yet but few in the inhabited Parts of *Virginia*; towards *Carolina* there are many more: They are not very fierce. Their *Flesh* is commended for a very rich Sort of *Pork*; but the *lying Side* of the *Bear*, as I remember, is but half the Value of the other, Weight for Weight.

There are several Sorts of *Wild Cats*, and *Poll-Cats*.

Beavers build their Houses in like manner as the *Musk-Rats* do, only much larger; and with Pieces of *Timber* make *Dams* over Rivers, as I suppose, either to preserve their *Furs* dry in their Passage over the Rivers, or otherwise to catch *Fish*, by standing to watch them thereon, and jumping upon them on a sudden. They are very subtle Creatures; and, if Half the Stories be true that I have been told, they have a very orderly *Government* amongst them: In their Works each knows his proper Work and Station,

Station, and the Overseers beat those young ones that loiter in their Business, and will make them cry, and work stoutly.

Wolves there are great Store; you may hear a Company *hunting* in an Evening, and yelping like a Pack of *Beagles*; but they are very cowardly, and dare scarce venture on any thing that faces them; yet, if hungry, will pull down a good large *Sheep* that flies from them.

Foxes; they are very much like *ours*, only their *Fur* is much more *grizzled*, or *grey*.

Every House keeps three or four *mungrel Dogs* to destroy Vermin; such as *Wolves*, *Foxes*, *Rackoons*, *Opossums*, &c. but they never *hunt* with *Hounds*; I suppose because there are so many Branches of Rivers, that they cannot follow them: Neither do they keep *Grey-hounds*, because they say that they are subject to break their Necks by running against Trees; and any Cur will serve to run their *Hares* into a *hollow Tree*.

They have great Store of *Land* and *Water-Tortoises*, but they are very small: I think I never saw any in that Country to exceed a *Foot* in Length. There is also another Sort of *Land-Tortoise* different from the common Sort, with a higher ridg'd Back, and speckled with *red* sort of *Spots*.

Frogs they have of several Sorts; one of a prodigious Largeness, eight or ten times as big as any in *England*, and it makes a strange Noise, something like the bellowing of a *Bull*, or betwixt that and the hollow-sounding Noise that the *English Bittern* makes. Another very common Sort, which they call *Toads*, because *black*; but, I think, differs nothing from our *black Frog*. They have *Toads* also like ours in *England*, and another small Sort of *Frog*, which makes a Noise like *Pack-horse-bells* all the Spring long. Another little *green Frog*, that will leap prodigiously, which they therefore call the *Flying Frog*. There is frequently heard in the *Woods* a shrill sort of Noise, much like that our *Sbrew-Mouse* makes, but much sharper: I could never learn the Certainty of what it was that made this Noise. It is generally in a *Tree*; and some have asserted to me, that it was made by the *Green Frog*; yet I scarcely believe it. Mr. *Banister* assured me, it was made by a Sort of *scarabeus Beetle*, that is, I think, full as big as the *Humming-Bird*; but neither do I believe that, for this Reason; that I never saw that *Beetle* so low as the *Salts*, but always as high up in the Country as the *Freshes*; and that Noise is frequent all over the Country.

Lizards, that are grey, and very common. The *Snakes* feed much on them; for I have taken several of them out of the Bellies of *Snakes*.

Snakes, about seven several Sorts. The *Rattle-Snake*, so called from certain *Rattles* at the End of the *Tail*; these *Rattles* seem like so many perished Joints, being a dry Husk over certain *Joints*; and the common Opinion is, that there are as many *Rattles* or *Joints* as the *Snake* is Years old. I killed four or five, and they had eleven, twelve, or thirteen *Joints* each; but the young ones have no *Rattles* of a *Year* or two: But they may be known notwithstanding, being very regularly diced or chequered black and grey on the Backs. The *Old ones* shake and shiver these *Rattles* with wonderful Nimbleness, when they are any ways disturbed. Their *Bite* is very deadly, yet not always of the same Force; but more or less mortal, accordingly as the *Snake* is in Force or

Vigour; and therefore in *June* or *July* much worse, and more mortal, than in *March* and *April*. This *Snake* is a Sort of very majestick Creature, and will scarce meddle with any thing, unless provoked; but if any thing offend it, it makes directly at them. An *Indian* being *bit*, by one of these *Snakes*, between the *Fingers*, stretched his *Arm* out as high as he could, calling for a *String*, wherewith he bound his *Arm* as hard as possibly he could, and clapp'd a hot burning *Coal* thereon, and singed it stoutly, whereby he was *cured*, but looked pale a long while after: And I believe this truly one of the best *Ways* in the *World* of *curing* the *Bite* either of a *Viper* or a *mad Dog*. I was with the Honourable *Esquire Boyle* when he made certain *Experiments* of *curing* the *Bite* of *Vipers*, with certain *East-India Snake-stones* that were sent him by *King James II. the Queen*, and some of the *Nobility*, purposely to have him try their *Virtue* and *Efficacy*. For that *End*, he got some brisk *Vipers*, and made them *bite* the *Thighs* of certain *Pullets*, and the *Breasts* of others: He applied nothing to one of the *Pullets*, and it *died* within three *Minutes* and an *half*, as I remember; but I think they all recovered to which he applied the *Snake-stones*, though they turned wonderful pale, their *Combs*, &c. immediately; and they became extreme sick, and purged within *Half* an *Hour*, and the next *Morning* all their *Flesh* was turned *green*, to a *Wonder*: Nevertheless, they recovered by *Degrees*. The *Manner* of the *Application* was only by laying on the *Stone*, and, by two cross *Bits* of a very sticking *Dia-chylum Plaster*, binding it on, which he let not lie on past an *Hour* or two, took the *Stone* off, and put it into *Milk* for some time: Some *Stones* were of much stronger *Virtue* than others. Hereon telling *Mr. Boyle* the *Story* of this *Indian*, he approved the *Method* of *Cure*, and said an *actual Cantery* was the most certain *Cure*. The *Poison*, both of *Viper* and *mad Dog* (as I conceive), kills by thickening the *Blood*, after the *Manner* that *Rennet* congeals *Milk* when they make *Cheese*. *Vipers*, and all the *viperous Brood*, as *Rattle-Snakes*, &c. that are deadly, have, I believe, their *poisonous Teeth fistulous*; for so I have observed that *Vipers Teeth* are, and the *Rattle-Snakes* very remarkable: And therefore they kill so very speedily by *injecting* the *Poison* through those *fistulous Teeth* into the very *Mass* of *Blood*. But the *Bite* of *mad Dogs* is oft of long *Continuance* before it get into, and corrupt the *Mass* of *Blood*, being it sticks only to the *Outsides* of the *Teeth*; and therefore when they *bite* through any *Thickness* of *Cloaths*, it rarely proves mortal, the *Cloaths* wiping the *Poison* off before it comes to the *Flesh*. A *Girl*, that was *bit* about *New-year's-Day*, continued well till *Whitsuntide*; when, coming to see certain *Friends* in our *Parts*, she fell very ill, and, being a poor *Girl*, they came to me. It pleased *God* I recovered her: Some time after she returned, to give me *Thanks* for saving her *Life*, being two *Persons* that were *bit* with the same *Dog* were dead whilst she remained under *Cure*; and therefore she was the fuller convinced she owed her *Life* to me.

But the *Poison* of *Vipers* seems to be like the *injecting* of *Liquors* into the *Veins* of *Creatures*. *Dr. Moulin* and I made many *Experiments* of this *Nature* together, and I have made many more by myself. We once, I remember,

ber, *injected Half a Drachm of Alum* into the *Jugular Vein* of a *Dog* before the *Royal Society* (the *Alum* being only dissolved in a little *Water*), which, within something less than *one Minute's Time*, was so absolutely dead, as not to have the least convulsive Motion; and I have done the like with many other Things besides *Alum*; but with some Things it is more curdled and broken than with others, and will differ much, both as to Colour and Consistence. *Saltpetre* kills much as quickly as *Alum*; but then the *Blood* in the *Heart* looks very florid, smooth, and even.

In the little Time I have spent in these Sorts of Experiments, I easily perceive, notable Discoveries might be made thereby. One *Dog*, that lived, became *lame* and *gouty*; another with *Quicksilver* died, in about sixteen *Weeks* time, *consumptive*; and I discovered *Quicksilver* in the impostumated Parts of his *Lungs*.

Vid. Sup.
Vol. III. Part
I. Chap. V.
Sect. X. 1.

But to return: The *Poison* of *Vipers* and *mad Dogs*, I suppose, kills by thickening the *Blood*, as many *malignant Fevers* also do; in all which Cases, I look on *volatile Salts* to be the properest *Physick*, as keeping the *Blood* from congealing. I had a singular Instance hereof in a Gentleman of *Yorkshire*, bit with a *Greyhound* on the *Thursday*, not three *Minutes* before the *Dog* died mad: He bit him in several Places of the *Hands*, as he was giving him a Remedy. The *Monday* following the Gentleman was very ill, and came to *Wakefield* to an *Apothecary*, his Acquaintance, who, knowing not what to do, desired my Assistance. When I came, the Gentleman could talk; but every two or three *Minutes* he had violent Fits, and would tell us, when they were over, that his *Brains* worked like *Birm* in an *Ale-Fat*, and seemed to froth up at every Fit. The *Apothecary* had no *volatile Salt* of *Vipers*, so I took the *volatile Salt* of *Amber*, and ordered him *ten Grains* in *Treacle-water* every *Half Hour*: He told me, every Dose seemed to clear his *Brain*, and cool it as perfectly as if a *Basin* of cold *Water* was poured on his *Head*, but it returned by *Degrees* again. Having then a *volatile Salt* by me, that vomits very well, I gave him a *Dose* thereof: It worked very well, and he was very much better after it; I then ordered him to continue the *volatile Salts* of *Amber* once every four *Hours*, and at each two *Hours* End (that is, betwixt), *Spec. Pleres Archonticon* and *Rue* powdered, ana *Gr. 15*; whereby he was so well recovered, that within two *Days* he would needs go *Home*, and I heard no more of him for *Half a Year*; when I was fetch'd one *Morning* to him in great *Haste*. He had been *Abroad*, played the *Good-fellow*, and, in his *Return* home, having rode a great *Day's Journey*, being wearied, and, I suppose, finding himself indisposed, he stayed all *Night* in our *Town*, it being fortunately in his *Way*. In the *Morning*, when he should have got up, he could not stand; whereupon the *Apothecary* was sent for, and a *Surgeon* to bleed him, which was accordingly done, but he grew worse; for, in this Case, I look upon *Bleeding* to be very prejudicial, as well as in most *malignant Fevers*; for thereby the *Spirits* are diminished, and the *Blood* congealed the sooner: When they had done all they could, and the *Symptoms* still increased, they at length sent for me. I never saw a *Man* or *Creature* in that *Agony* all my *Life*, that I found him in; senseless and *mad*, when at best, but every *Minute*

minute

nute the fiercest *Shiverings* ran through him: His *Eyes* would first roll, and then set, as if ready to start out of his Head; but, above all, the *Swelling* and *Luxation* at his *Breast* was as if he would burst, which went off with a prodigious *Sigh*. All this I judge the Effects of the *Heart* labouring to discharge itself of the *stagnating Blood*, and the *nervous Convulsions* as Consequents thereof: And I am the more confirmed in this, from what I saw in a *Woman* that was *bite* also with a *mad Dog* in the Leg, and fell ill the very Day that she paid the *Chirurgeon* for her *Cure*; and notwithstanding all that could be done, growing worse, they sent for me: I went, and found her with what is called *Hydrophobia*: She would look earnestly after *Drink* or *Water*, and seemed to desire it; but as soon as she began to drink, away it went, be what it would, with the greatest Violence she could possibly fling it. I gave her the *Vomit* hereafter and also before-mentioned, but she got but little of it down, and I had no more with me; nevertheless, it so brought her to herself, that she could answer Questions: And I asked her, Whether she was afraid of the *Drink* and *Water*, when she flung the Cups in that violent Manner from her? She said, No; but when she offered to drink, her *Breast* and *Heart* would not let her. I asked, Whether through any *Aversion* or *Fear*? She said, No, she was very thirsty; but when she offered to drink, it struck to her *Heart*, and stopped her *Breath*: That is, as I apprehend, the *cold Drink* passing down the *Throat*, struck a *Chilness* in the *Blood*, and made it readier to *stagnate*: Besides, the very *Act* of *Drinking* hindering the *free Breathing*, conduced also much thereto; and therefore the *Heart* was so suddenly oppressed, that she could not forbear flinging away whatever she had in her Hand. She complained also of a great *Rigour* and *Stiffness* or *Streightness* of the *Muscles* of her *Breast*, so that possibly the *spirituous Liquor* that flows in the *Genus Nervosum* may be *congealed*, as well as the *Blood*; or the same Effects may be supposed, notwithstanding, to be the Result of the *condensed Blood* clogging both the *Heart* and *Lungs*, so that the *Breast* may seem to be streightened therewith. The same I judge to be the Cause of all the *violent Luxations* in this Gentleman, whose *Fingers* I looked on, and found the Places where he had been formerly *bite* turned *blackish*, and much inflamed about them; which confirmed me in my Sentiment, that it was a *Relapse* of his former *Distemper*; that is, of the *Bite* of the *mad Dog*. I gave him the former *Vomit* of *volatile Salt*, and he shortly after cried, This *Fellow* in *Black* has done me *Good*; and, after the *first Vomit*, came so to himself, as to know us all. I vomited him every other Day with this *Vomit* for three Times, and made him, in the Interim, to take *volatile Salt* of *Amber*, and the aforesaid Powders, and to wash his *Hands* and *Sores* in a strong *salt Brine*; to drink *Poffet-drink* with *Sage* and *Rue*; and by this Course, and the *Blessing* of *God*, his *Life* was saved, and he perfectly *cured*: For it is now four *Years* since, and he has had no *Relapse*. I have cured several others by the same Method.

Col. *Spencer*, the *Secretary of State* in *Virginia*, a very serious and ingenious Gentleman, told me, that his *Servant* brought him word once, that a

Sow having farrowed, a *Rattle-Snake* was got into the Den, and had killed the *Pigs*: The Colonel went to see the *Snake*, which, they said, was still coiled in the Den; there followed them two or three *Mungrel Curs*, and they set one of the *Dogs* at the *Snake*, which was too quick for the *Dog*, and snap'd him by the Nose; whereupon he set a *howling*, and ran immediately into the adjacent River, and died very shortly after: Another of the *Dogs*, upon the like Attempt, was bit by the *Snake* also, and fell a *howling* and *frotting*, and *tumbling*; but being he died not so soon as the other *Dog*, they fetched some of the *Herb* which they call *Dittany*, as having a great traditional Virtue for the Cure of *Poisons*: They pounded it, and, adding a little Water, expressed the *Juice*, and gave the *Dog* frequently thereof; nevertheless, he died within a Day or two. The *howling* of the *Dogs*, he supposed, gave Notice to the *Sow*, and made her come furiously bristling, and run immediately into her Den; but being likewise bit by the *Snake*, she set up a terrible Squeak, and ran also into the River, and there died.

A Gentlewoman told me, that a Neighbour, being bit by a *Rattle-Snake*, swell'd excessively; some Days afterwards she was sent for, who found him swell'd beyond what she thought it had been possible for the Skin to contain, and very *thirsty*: She gave him *Oriental Bezoar* shaved, with a strong Decoction of the aforesaid *Dittany*, whereby she recovered the Person. Asking him afterwards what he felt when the *Snake* first bit him, he told me, that it seemed as if a *Flash* of *Fire* had run through his *Veins*.

Besides the *Rattle-Snake*, there is the *Blowing-Snake*, an absolute Species of a *Viper*, but larger than I have seen any in *Europe*: It is so called because it seems to *blow* and spread its Head, and swell very much before its *Bite*, which is very deadly. It is remarkable, that there is none of their *Snakes* there that make any of that *hissing* Noise that ours in *England* make, but only shoot out their *Tongues*, shaking them as ours do, without any Noise at all.

There is another Sort of deadly *Snake*, called the *Red-Snake*: They are of an ugly dark-brown Colour, inclining to red: Their Bellies are of a more dusky White, with a large Streak of *Vermilion Red* on either Side. This too is of the *Viper* Kind.

The *Horn-Snake* is, as they say, another Sort of deadly *Snake*: I never saw any of them, unless once, shortly after my Arrival in that Country, which I cannot attest to be the *Horn-Snake*; for I could not distinctly view it. It was perched up about two Foot high in a *Sumach* Branch, its *Tail* twisted about the Shrub, and about a *Quarter* of a *Yard* stood bolt forward, leaning over the forked Branch thereof. I could not see the *Horn* which they say it has in its *Front*, wherewith it strikes, and, if it wounds, is as deadly as the *Rattle-Snake's Bite*. This, I think, may not improperly be referred to the *Dart-Snake*.

The *Black-Snake* is the largest, I think, of all others, but, I am sure, the most common: I have killed several of them full six Foot long. Their *Bite* is not deemed mortal, but it swells, and turns to a running Sore. They
feed

feed upon *Lizards, Mice, Rats, Frogs, and Toads*, which I have taken out of their Bellies. I was once a *Simpling* in the Woods, on a fair Sun-shiny Day, when I saw a *Snake* crawling on a Tree that was fallen, and *licking* with its *forked Tongue* as it moved: I stood still to observe it, and saw it *lick* up small *Insects* and *Flies* with wonderful Nimbleness, catching them betwixt the *Forks* of its *Tongue*.

The *Corn-Snake* is most like the *Rattle-Snake* of all others in Colour, but the *Chequers* are not so regular, neither has it any *Rattles*. They are most frequent in the *Corn-fields*, and thence, I suppose, so called: The *Bite* is not so *venomous* as the *Black-Snake's*. The *Water-Snake* is a small Snake: I never saw any of them above a *Yard* long, though I have sometimes seen forty or fifty at once. They are of an ugly *dark blackish* Colour. They say they are the least *venomous* of any.

An Account of
Maryland, by
Mr. Hugh
Jones. n. 259.
p. 439.

XX. *Cheesepeak-Bay*, which runs N. by W. about 200 *Miles*, or more, divides *Maryland*, as well as *Virginia*, into two Parts, which we call the *Eastern* and *Western Shores*: The whole Province contains 11 *Counties*, 6 on our *Side*, which is the *Western*, and 5 on the *Eastern Shore*; the Land is generally *low* on both Sides; no *Hill*, that I have seen, or heard of among the *Inhabitants*, 50 *Yards* perpendicular: But about 100 *Miles* West of us, towards the *Heads* of the *Rivers*, the Ground rises, and appears in very high *Mountains*, and rocky *Precipices*, running North and South; from the Top of which a Man may have a clear Prospect of *Virginia* and *Maryland*.

All the *Low-Land* is very *woody*, like one continued *Forest*, no Part cleared but what is cleared by the *English*: And though we are pretty close seated, yet we cannot see our next Neighbour's House for Trees. Indeed in a few *Years* we may expect it otherwise; for the *Tobacco-Trade* destroys abundance of *Timber*, both for making of *Hogsheds*, and building of *Tobacco-Houses*, besides *clearing* of Ground yearly for *Planting*. Our *Soil* is generally *sandy*, free from *Stone*, which makes it very convenient for travelling: And we have no Occasion for *shoeing* our *Horses*, except in *frosty* Weather. And what with the Goodness of our little *Horses*, and the Smoothness of the *Roads*, we can travel, upon Occasion, fifty *Miles* in a Summer's Afternoon, and sometimes 100 *Miles* in a Day: Indeed our *Miles* are not accounted so long as in *England*. The rich and plentiful Gifts of Nature add much to the Happiness of the Place; the three Elements affording Plenty of *Food* for the Use of Man; *viz. Deer, Fowl*, both *Water* and *Land*, in Abundance; and, for the preserving of *Health*, many excellent *Herbs* and *Roots*, the Discovery of whose Virtues is chiefly owing to the *Indians*.

We have for *Timber* several Sorts of *Oak*; *viz. the Red, White, Black, Chesnut, Water, Spanish, and Line-Oaks*; which last bears a Leaf like a *Willow*: We have also *Cedar, White and Red*; the *Red* serves only for Posts and Groundsils, the *White* to rive or split into *Boards*, that being the freest from Knots, and goes under the Name of *Cypress*, but I think falsely. Here is a Tree we call *Cypress*, which is extraordinary large in Bulk, and bears

bears a Leaf like the *Sensitive-Plant*: It is soft and spongy, will not rive, and is fit for no Use. We have *Black-Walnut*, which is mightily esteemed by the Joiners for its *Grain* and *Colour*. Here is a Sort of *Poplar* that makes good white Plank; it is a large Tree, and bears a *Flower* like a *Tulip*. We have also Plenty of *Pine*, and *Dog-wood*, which is a fine *Flower-bearing Tree*, *Sassafras*, *Locust*, a Tree of very quick Growth, and very durable in Building; *Hickery*, of which we have two Sorts, *Red* and *White*: This serves chiefly for *Fire-wood*, being the best for that Use. We have also Plenty of *Chestnuts*, and *Cbinquapine*, another Species of *Chestnut*; and a Sort of *Elm*, like a *Dutch Elm*, which we call the *Sugar-Tree*, from the *Sweetness* of its Juice, with which some have made good *Sugar*. Here is also a Sort of *Elder* whose Bark is closely guarded with *Prickles*, like those of a *Brier*, *Tulip-bearing Laurel*, and *Myrtle* of several Sorts; one whereof bears a *Berry*, with which they make, on the *Eastern Shore*, *Green Wax*, very proper to make *Candles*, if mixed with *Tallow*.

Among the Inhabitants of the *Air*, which are very numerous, the *Humming-Bird* is the most curious: They continue with us all Summer, feeding only on *Flowers* like *Bees*; and the *Mocking-Bird*, for *various Notes*, exceeds all the Birds, I believe, in the World.

Of all our *Reptiles*, the *Rattle-Snake* is the most noted; and what is commonly reported of its *charming Birds*, *Squirrels*, &c. is not groundless; for it hath been affirmed to me by several *Eye-witnesses*.

The *Air* is now more *wholsome* than formerly, which, I suppose, proceeds from the Opening of the Country; that giving the *Air* a freer Motion. Our *Summers* are not extreme *hot*, as in the first Seating; but our *Winters* are generally *severe*, towards what they are in *England*. The *North-west Wind* is very sharp in Winter, and even in the Heat of Summer it mightily cools the Air; and too often, at that time, a sudden *North-western* strikes our Labourers into a *Fever*, when they are not careful to provide for it, and put on their Garments while they are at work.

We have little or no *Woollen* or *Linen Manufacture* followed by any of us, except what is done in *Somerset County* over the *Bay*; but *Tobacco* is our Meat, Drink, Cloathing, and *Moneys*: Not but that we have *Money*, both *Spanish* and *English*, pretty plenty, which serves only for *Pocket Expences*, and not for *Trade*; *Tobacco* being the *Standard* for *Trade*, not only with the Merchants, but also among ourselves. Our common *Drink* is *Cyder*, which is very good, and, where it is rightly ordered, not inferior to the best *White Wine*. We have *Wine* brought from *Madera* and *Fayal*; *Rum* from *Barbados*; *Beer*, *Malt*, and *Wines*, from *England*. We have Plenty of good *Grapes* growing *wild* in the Woods, but there is no Improvement made of them.

We are governed by the same *Laws* as in *England*, only some *Acts of Assembly* we have, relating to some particular Cases not under the Verge of the *English Laws*, or where the *Laws* of *England* do not so aptly provide for some Circumstances, under which our Way of Living hath put us. The *Church* of *England*, God be praised, is pretty firmly established among

us. *Churches* are built, and there is an *annual Stipend* allowed to every *Minister* by a *perpetual Law*, which is more or less, according to the Number of *Taxables* in each *Parish*, every *Christian Male* sixteen *Years* old, and *Negroes Male* and *Female* above that Age, pay forty *Pounds* of *Tobacco* to the *Minister*, which is levied by the *Sheriff* among other publick *Levies*; which makes the *Revenues* of the *Ministers*, one with another, about 20000 *Pounds* of *Tobacco*, or *One hundred Pounds Sterling* per *Annum*. It hath been the *Unhappiness* of this *Country*, that they have had no *Protestant Ministers* hardly among them till *Governor Nicholson's* Time (who has been a great *Promoter* and *Encourager* of the *Clergy*), but now-and-then an *itinerant Preacher* of very loose *Morals*, and scandalous *Behaviour*: So that, what with such *Mens* ill *Examples*, the *Roman Priests* *Cunning*, and the *Quakers* *Bigotry*, *Religion* was, in a manner, turned out of *Doors*. But, *God* be praised, *Things* now stand better, and our *Churches* are crowded as full as they can hold, and the *People* are pretty sensible of the *Roman* *Superstition*, and the *Quakers* *Madness*; so that their *Parties*, both joined together, are very inconsiderable to what ours is. Indeed the *Quakers* struggle hard to maintain their *Footing*, and their *Teachers* (especially the *Female Sex*, who are the most zealous) are very free of their *Taunts* and *Contumelies* against us; but it is to little *Purpose*, unless to make their own *Way* more ridiculous and odious.

We have not yet found the *Way* of associating ourselves in *Towns* and *Corporations*, by reason of the *Fewness* of *Handicraftsmen*: There are, indeed, several *Places* allotted for *Towns*, but hitherto they are only *titular* ones, except *Annapolis*, where the *Governor* resides. *Governor Nicholson* has done his *Endeavour* to make a *Town* of that. There are in it about forty *Dwelling-houses*, seven or eight whereof can afford good *Lodging* and *Accommodations* for *Strangers*. There is also a *State-house*, and a *Free-school*, built with *Brick*, which make a great *Shew* among a *Parcel* of wooden *Houses*; and the *Foundation* of a *Church* laid, the only *Brick Church* in *Maryland*. They have two *Market-days* in the *Week*; and had *Governor Nicholson* continued there some *Years* longer, he had brought it to some *Perfection*.

As for our *Predecessors*, the *Indians*, I cannot give you, at present, any further *Account* of them than this; *viz.* That whereas, at the first *seating* of *Maryland*, there were several *Nations* of *Indians* in the *Country*, governed by several petty *Kings*; now I do not think that there are five hundred *fighting Men* of them in the *Province*, and those are most on the *Eastern Shore*, where they have two or three little *Towns*. Some of them come over to our *Side* in *Winter-time* to *hunt* for *Deer*, being generally employed by the *English*. They take *Delight* in nothing else; and it is rare that any of them will embrace our *Way* of *Living* or *Worship*. The *Cause* of their *diminishing* proceeded not from any *Wars* with the *English*, for we have had none with them; but from their own perpetual *Discords* and *Wars* among themselves. The *Female Sex* also have swept away a great many; so that now they are dwindled almost to nothing. One thing is observable in them, though they are

are a People very *timorous* and *cowardly* in *Fight*; yet, when taken *Prisoners*, and condemned, they will *die* like *Heroes*; braving the most exquisite *Tortures* that can be invented, and *singing* all the time they are upon the *Rack*.

XXI. The *Gramen Ischæmon*, called by others *Gramen Dactyloides*, or *Observables Sanguinella*, and the *Gramen Aquaticum cum Longissima Pannicula*, mention'd near Frankfort on the Oder; by *Baubinus*, grow here (about *Frankfort on the Oder*), in great *Plenty*. In by Joh. Chr. Beckman. the *Forest* called the *Hartz* there are very considerable, both *Copper* and *Silver Mines*, Store of *Lapis Fissilis*, and a Sort of *Stone* which, by *Rain*, grows n. 39. p. 773. altogether *soft*; and a Place called *Bowman's-Hole*, like that of *Oky-Hole* about *Wells* in *England*.

XXII. *S. Borelli* pretends to have lighted upon a Way of building *Gallies* Some Communications from Italy; by . . . n. 114. p. 309. with several *Tires* of *Oars* of different *Heights*, which he esteems to be more convenient, more *speedy*, and stronger, than those that are now in use. He thinks also, that he can give an *Account* of the Possibility of the *Gallies* of the *Antients* to a determinate Number of *Tires*.

There is at *Rome* a *Bowl*, which is so counterpoised, that it can stop of itself upon an *inclining Plane*, like *Kepler's Watch*: It stops upon all Sorts of *Matter*, and even upon a *Looking-glass*.

XXIII. I took Notice, in the University of *Bononia*, of this *Inscription*, Observations in Italy; by Dr. Pet. Silvester. n. 265. p. 627. made in Commendation of the deservedly-famous *Malpighi*: It is in the upper *Gallery*, in a large *Basis* painted in *Fresco*, with some *Figures* about it.

D. O. M.

Virtuti & Famæ in Ævum mansuræ Inclyti Viri M. Malpighii, Medicinæ Professoris Celeberrimi, utraque Artistarum Universitas P. Anno Salutis 1683.

And a little lower,

Miraris Breve Lemma? Nomen Ingens Ornari negat: est satis Referri. Jussum Cætera tacere Marmor. Omnis Malpighium Loquetur Ætas.

I have made some *Observations* upon the *Bronchocele*, a *Distemper* very frequent all over *Lombardy* and *Savoy*. By the *Disposition* of this *Tumor*, I am satisfied it has principally its *Seat* in the *Glandulæ Thyroidæ*, and sometimes too, but very seldom, in the *Parotis Conglobata*: I could plainly see the *Parotides Conglomeratæ* were no wise concerned. This I have observed, in several *Bronchoceles*, of a very great *Bigness*. I conceive these *Tumors* (that are generally attributed to the *Water* the People drink, that is, *melted Snow*) do proceed a *Lentore Lymphæ*, which, by degrees, extend the *Folliculi Glandularum Membranosi*, and, being there congealed, hardens them to that *Degree*, that an inveterate *Bronchocele* is almost like a *Stone*. But why these *Swellings* are to be seen no-where else but in these

H h h h 2

Glands

Glands of the *Neck*, it is difficult to give a good Reason: It may be the natural Conformation of the *Glandulae Thyroideae* (which being harder, and of a more solid Substance than other *Glands*, give sooner a Stop to the *Lympha Lenta & Viscida*) is the Occasion of this *Tumor*'s always beginning and settling there.

The *Sal Montis Vesuvii* is found, in pretty large Lumps, after Mount *Vesuvius* has spewed out a vast Quantity of *Ashes*: The great Rains that fall upon these *Ashes* make a Sort of *Lees*, which, left in the hollow Places, are evaporated by the Heat of the Sun, and there remains this *urinous Salt*, whose Taste is something like *Sal Ammoniac*.

At the *Sulfatara*, between *Naples* and *Puzzolo*, they make *Alum* in this Manner: In Summer-time they gather as much as they have Occasion for of an *Earth* that is there in the Middle of a large *Area*, and they keep it in a dry Place; they put it in *Lead Coppers* of a good Thickness, and pour upon it *Rain-water*, which is also impregnated with the same *Mineral*: For that Purpose they take great care to dig some large Holes, to preserve in them the *Rain-water*; and they carry it to a large Cistern by the *Coppers*. They take away the *Earth* when the *Lixivium* is made, and, as it grows stronger by Evaporation, they put it from one Copper into another, till it is sufficiently evaporated; then they take it out, and convey it into a *wooden Tub*, where, after it is cooled, you see the *Alum* stick to the Sides, in the Form of *Crystals*. But the most remarkable Thing is, that these *Coppers* are placed upon some of the great *Spiracula*; and that, without any Expence in *Fuel*, only by the violent Heat of these *Effluvia*, the Evaporation is constantly made sufficient for that *Crystallization*. All this *Laboratory*, where are the *Coppers* and the *Cistern*, with the *Tubs*, is only tied over. The Governors of the great *Hospital* of the *Annunciata*, who have been at the Charge of this ingenious Contrivance, do make now about 3 or 400 *Pounds* a *Year* by it.

All Summer long some Labourers dig up and down, in several Places of the same *Area*, as if it was in a Kitchen-garden; and by those Means they give way to the copious *sulphureous Steams* that are within the Bowels of all this Mountain: Then out of the Superficies of that *Earth*, by the means of earthen *Pots*, they sublime the *Brimstone*.

At the Mouth of the largest *Spiracula*, where is an excessive Heat, and continual *Noise* and *Smoke*, is found a Sort of *native Sal Ammoniac*: It seems the copious *Steams* come out in *Forma Liquida*; for if you put in a Key, or a Sword, or any thing solid, these *Effluvia* will stick immediately to it, and drop down like Water. All this Mountain ought to be extraordinary full of *mineral Substances*; for we see these *Effluvia*, when they are *sublimed* to the Top of the *Spiracula*, do stick there to Tiles or Stones, where they form this *Salt*, of which they gather yearly about Two Hundred *Pounds* Weight. It has much of the Taste of the *faecitious Sal Ammoniac*; and, as a learned Physician told me, being *distilled* in a *Sand Furnace*, it yields a *volatile urinous Spirit*, absolutely like *Sal Ammoniac*, as to the sensible Qualities, and all other Effects: He only observed, that *Spirit* had something *aluminous*

in it; and that, to correct it, they used to add a greater Quantity of *Quick Lime*, or *Sal Tartari*, than in the *common Spirit's* Distillations.

XXIV. 1. There is an Hill nigh *Sarvizza*, two Days Journey on this Side *Larissa*, which consists of an *Earth* of a fine *red* Colour, out of which the *red earthen Vessels* of that Country are made; as also a great Number of *Acidulæ* nigh *Transchin* in *Hungary*, there being 32 plentiful Springs of them; likewise an *Hot Bath* nigh *Bellachergua* in *Bulgaria*, situated far from any Habitation, yet well built by the *Turks*, and very refreshing to Travelers: It hath a *red Sediment*, and maketh a *grey Stone*.

*Observations
in Turkey; by
Dr. Edw.
Brown.
n. 59. p. 1051.*

Being at *Larissa* in *Tbessaly*, where the *Grand Seignior* hath long resided, I understood that he had passed a good Part of the hot Summer of 1669. upon the neighbouring Mount *Olympus*; and by the Interpreters to the *Emperor's* Resident, the *Illustriſſ. Signor di Casa Nova* (who were obliged to attend the *Sultan* upon the Mountain), I was informed, that there was a *Spring* of *whitish Water* upon that Hill, which was drank of by many Persons in the great Heat and Thirst contracted by ascending the Mountain, but proved very destructive to them in three *Days*; they then complaining of an Heaviness, and Coldness of their *Stomachs*, till they died.

2. There is a Disease which reigns in the Country about *Aleppo*, and as far as *Bagdat*, invading both *Sexes*, all Sorts of *Ages*, and Strangers, as well as Natives: 'Tis commonly called *Il Mal d' Aleppo*, and appears to be in the *Skin* a small *Pustula* or *Wheal*, hard and red, the Head whereof is scarce bigger at the Beginning than the Point of a Pin; afterwards growing bigger, and being nourished by five or six little Roots or Fibres, it goes on to its Height for the Space of about six *Months*, and in as many more comes to its Declination; so that the whole Period of this *Disease* is generally comprized within the Space of one *Year*. But this *Pustula* hath hitherto yielded to no *Remedies*, neither in the Beginning, Middle, or Declination; but hath rather been exasperated by them, though they were *Anodyna*. It is wholly to be left to Nature; and, if you do, there is no Pain or Trouble in it. It takes People not once, but often; and it seizeth on several Parts of the Body; and if it do so on the Face (as often it doth), it causes a remarkable *Scar*, which yet, by little and little, vanisheth.

*By
n. 59. p. 6017.*

As to *Fevers* at and about *Aleppo*, though they have the same *Type* there as in *England*, yet there are two Things peculiar in them: One is, that, in *acute Fevers*, *cold Sweat* commonly signifies *Recovery*; but *hot Sweat* portends *Death*: The other is, that, in such *acute Fevers*, even an *intermitting Pulse* denounces no *Danger*.

Touching the *Leprosy*, which was antiently so frequent a Malady in these Countries, it is now scarce to be found there; though at *Damascus* there is still an *Hospital* standing, formerly built for the Relief of Persons thus diseased.

As for the Reason why the City of *Constantinople* is so much subject to the *Plague*, some are of Opinion, that the Multitude of *Slaves*, yearly brought

*Medical Observations
in Turkey; by
Dr. Edw. Brown.
n. 59. p. 1051.*

brought by the *Black-Sea*, and their hard Diet and Usage begets this Corruption. Others judge, that the Commonalty there, feeding, for the greatest Part of the Summer, on *Cucumbers* and *Melons*, and drinking Water upon them, without the Use of Helps to correct the Crudities, fall into *malignant* and *pestilential Fevers*. But the Physicians generally conclude, that the *Air* of *Constantinople* is infected by the *North-East Winds*, which blow commonly for three *Months*, beginning about the *Summer Solstice*, arising from unwholsome Marshes in *Tartary* and *Muscovy*, and, passing over the *Black-Sea* (a Place known to abound with *Fogs*), bring with them certain Dispositions tending to Corruption; which, working upon Bodies already prepared by bad Diet, may well be judged, they say, to be the Cause of this Distemper.

Besides the other Uses of *Opium* in *Turky*, it is common, in *Arabia*, to cure Horfes, with it, of the *Griping* of the *Guts*.

As to the *Turky Way* of *dressing Leather*, it is to be observed, that their *Leather* is nothing so strong and serviceable as that in *England*; an assur'd Proof whereof is, the wearing. And though it be commonly reported, that the *Leather* in these Parts, though thin and supple, will hold out Water; yet this is to be understood, that the *Turks*, in their *Winter-boots*, between the Lining and the *Leather* put a *Sear-cloth*, which, being curiously sewed in the Seams, will keep out Water, though you put them in it for divers *Hours* together. In cleaning of their *Leather*, they use *Lime* and *Album Græcum*, and, instead of *Bark of Trees*, they employ *Valonia*, a Sort of *Acorn* growing on the *Oaks*. I am perswaded that our *Acorns* in *England*, if they could be spared for it, would perform the like Effect, and perhaps better, seeing that, many Times, the *Valonia* burns the *Leather* so much as to make it little serviceable; whereas our *Acorns* are, probably, more temperate, and so might better serve the Turn.

Medical Observations in the Northern Counties; by Dr. Phil. Lloyd. n. 256. p. 310.

XXV. *Baths* are no-where more frequent than in *Lithuania*. Upon going into the *Bath*, after having sweated plentifully, they have *Cupping-glasses* applied to them, or their Backs beat with Rods till they become very red. Amongst the *Cosacks*, likewise, if a Person is very lame, he is put into the *Bath*, and his Body covered with certain *Herbs*; and they apply to the Part pained a kind of *hollow Horn*, in order to raise a *Blister*, which being broke, there flows out an *Ichor* frequently of different Colours, yellow, green, and black; and the Patient recovers. But that Variety of Colours must be owing to the Herbs with which the Patient is covered, or to the Horn's being besmeared with some kind of *Dye*. A great Remedy amongst the *Cosacks* is *Aqua Vitæ*, or four Broths, with Oil and Pepper, to promote Sweating; neither do they abstain from Meat boiled with Vinegar and Onions, which they call *Bigost*. But as *Pharmacy* is not in much Esteem amongst these People, so, on the contrary, they are very fond of *chirurgical Remedies*; such as *Bleeding*, the Use of *Leeches* (which they apply even to the *Palate* and *Gums*), *Issues*, and the *Trepan*; the Use of which is very frequent and successful in *Sweden*; for the *Swedes* have Heads very hard and hairy.

hairy. Amongst the *Muscovites*, upon account of their Neighbourhood with *China*, the Use of *Tea* is frequent, not only in Decoction, but in Powder, taking it to the Quantity of Half a *Drachm* in *Aqua Vitæ*.

These People likewise use certain odoriferous little *Balls*, of a yellow Colour, which they put up the *Nose*, to the Quantity of four *Grains*, keeping the *Mouth* open: For two Hours such a Quantity of *viscid Mucus* flows out, as could scarce be evacuated by means of any *Cathartick*; and with this they cure all Diseases of the Head proceeding from a cold Cause. Some draw up the Smoke of *Tobacco* from a large Tube, swallowing as much of it as they can; which makes them fall down as in the Fit of an *Apoplexy*; but they are soon roused again with Vomiting and Purging: And although this should not happen (which is sometimes the Case), yet, after they awake, they find their Heads easy, and they are every way very well.

The *Tartars*, used from their Infancy to *Milk* and *Horse's Flesh*, seeking their *Medicine* chiefly in continual Riding, make use of very few internal Remedies, some external, and these very *quackish*. For Example; if a Person is taken very ill, and they suspect a *malignant Fever*, they take a *Leveret*, and cut the *carotid Artery*, and the Patient sucks out *Blood* as long as he can; then the *Skin* is taken off, and laid warm over his Head, and he is put to *sleep* and *sweat*. When any of the *Slaves* or *Servants* is taken ill of a *Fever*, they catch hold of him by the Hair, shake him, whirl him round, and throw him into running Water; and in this Manner, by altering the Course of the Humours and Spirits, they procure a *Febrifuge*.

These Accounts I had from a Friend in Camp, who lived a long while in those *Northern* Countries. To crown the Whole, he told me (let whoever pleases believe it), that in *Lithuania*, especially, they are subject to a *Fascination*, communicated only by the Look; where Men, by the subtil *Effluvia* from the Eyes, not only hurt others, but likewise brute Animals. This Disease, or whatever you call it, is named *Uroki*; and, in order to produce it, the Bodies must be placed very nigh one another, and the one must not stand any higher than the other. They are cured chiefly by *hot Balms*, prepared with *Origanum*, *St. John's-wort*, and other Herbs; by *Fumigation* of the *Hair*, *Nails*, and other Parts of the *Inchanter*, if they are to be had; and, last of all, by *Sweats*.

Amongst the *Tartars*, if any one is much hurt by a Fall from a Horse, or otherwise, in the first Place, they force him, as much as possible, to make *Water*; then, after *bleeding* him, they give him to drink burnt *Horse's Bones*, and a kind of *white Bole*, in which that Country abounds.

Mare's Milk, made *sour*, is with them an universal Cooler in all hot Diseases; nay, a *stomachick Balsam*.

In the *Small-Pox* in Children, the *Muscovites*, instead of *Bleeding*, use *wet Cupping* on the Hips, and frequently *Leeches*: They prepare *Emulsions* of *Turnep-seed*, and give them *Album Græcum* in their Drink.

The *Polanders* have a certain kind of nourishing Medium, which they make great use of, and is called *Barst*: By its gentle Acidity it pleasantly recruits the Ferment of the Stomach, and is very useful to these People in
Crapulas,

Crapulas, after drinking largely of *burnt Mead*, or *strong Wine*, or eating plentifully of heating Dishes. This kind of eatable Medicine they prepare of *Bearsfoot*, or of fine white Bread only, fermented after their Manner, in the Form of a watery herbaceous Decoction.

But if any one is taken ill, and complains of a *violent Head-ach*, *Gripes*, the *Wandering Gout*, &c. immediately they begin to suspect the *Plica*, or *Koltum*; and all they endeavour to do is, to bring it out upon the *Hairs* of the *Head*, which they do by a Lotion of *Bearsfoot* and other Herbs, or at least by washing the Head frequently with a Mixture of *Oil* and *Wine*. The *Plica* being thus forced out upon the *Head*, the Disease seems to grow milder, the morbifick Matter being thus critically translated, and the rest is wholly left to Nature: Which plainly shews that this Disease is owing to something else than neglecting to comb the Head. For if any one tries to cut off the Hair, or pull it out with the Comb, he falls into another Disease, and the *Blood* frequently flows from the Hairs that are cut, as from the small Branches of a *Vein*. Nor ought this to appear surprizing, seeing the Hairs are form'd of little Branches of an *Artery*, *Vein*, and *Nerve*, inclosed in a common *Capsula*, and afterwards lengthened out; as is plain to the Eye, by the Help of a *Microscope*, in the Hairs of the *Beards* of *Cats*, and other Animals.

Whatever Authors have wrote concerning the Cause of the *Plica*, is either too general, or imperfect, and insufficient: For as to the Waters in *Russia*, though you were certain that it was occasioned by drinking of them; whence, too, when an Army is marching through these Parts, there are Centries posted at the Fords of the Rivers to hinder the Soldiers from drinking the Waters; I would ask, How those People who live an Hundred Leagues distant, and more, from that Country, come to be subject to the *Plica*? Unless they can persuade us, that that Water is distributed, by proper Veins, from *Russia* to the whole Kingdom of *Poland*.

The intrinsic Cause may be placed in the subcutaneous *Glands*, by which several of their Ducts and Pores are conjoined and oblique, from which a greater Number of *Hairs* growing upon a narrower Surface, assisted at the same time with the too viscid Juice of the *Glands*, are plaited and twisted with one another: But as that Cause may happen elsewhere, as well as in *Poland*, it is not sufficient to account for a Disease which is peculiar to that Country alone. Wherefore the true Cause is partly to be attributed to *Contagion*, and partly to the Abuse of the *Nonnaturals*. There is no-body doubts of a *Contagion* there, seeing it is usual for Travellers in that Country to carry their Beds along with them. The Air is very piercing, abounding with a coagulating *Acid* from the *North*; whence that thick glutinous Fluid sticking at the Roots of the *Hairs* is hindered from flying off, especially as the *Poles* use frequently to walk with their Heads uncovered.

They who are ill of this Disease have their Appetite fixed upon a certain Object: Some desire nothing but Water, others *Crematum*, rejecting other Liquors; and they find Relief in the Scurvy from the same Remedies.

Besides the *malignant Hungarian Fever*, as it is called, there are other *endemical* Diseases, of lesser Note; as the *Czemer*, *Porcellus Cassoviensis*, and *Strumæ*.
The

The *Czemer* is a kind of Tumor on the Sides of the *Wrists*, above the *Arteries*, like a soft kind of Knot, painful to the Touch. It is cured with *Emeticks* and *Sudorificks*.

The *Porcellus Cassoviensis* is a hard Tumor, like a *little Pig*, lying upon the Region of the Spleen, very frequent amongst the Inhabitants of the Country about *Cassaw*; and is a scirrhus Disposition of the *Spleen*, attended with Flatufes in the *Colon*. It is cured by *Aperients*.

There are no *strumous* People in *Hungary* except in the mountainous Parts of it, where are the *Gold Mines*, owing to the *mercurial Waters*, and *mineral Effluvia*. In the Waning of the Moon the *strumous* People receive the Smoke of burnt Sponge by the Mouth, and the Ashes they swallow mix'd with Honey in the Beginning of the Disease; for your inveterate *Strumæ* admit of no Cure.

XXVI. In *Iceland* our *Air* is very healthy all the Year long. The Diseases which the Inhabitants are most subject to are, the *Cholick* and *Leprosy*. We have no *Physicians*; only two or three *Chirurgeons*, that furnish us with some Plaisters for the dressing of Wounds. In our *Air* Iron *rusts* very soon.

An Account of
Iceland; by
Dr. Paulus
Biornonius.
n. III. p. 238.

The Changes of the *Weather* are uncertain, nor do they fall out according to the four Seasons of the Year: Sometimes it *snows*, as well as it *hails*, in the midst of Summer; and the Winds blow now-and-then most furiously at the same Season.

As to the *Frost*, it penetrates, at most, four *Foot* into the Earth; *Spirit* of *Wine* and *Oil* are free from being *frozen*, much more *Quicksilver*. We preserve our *Fish* from Putrefaction by burying them in the *Snow*. Bodies *frozen* do swell, and are changed in Taste and Colour. The Figure of the *Snow* is various, and so is its Size: *Hail* is roundish; the greatest is only of the Bigness of *Hail-shot*, that we kill Fowl with.

Of *Meteors*, I have observed the *Ignis Lambens*, the *Draco Volans*, and frequently two *Mock Suns*, with three *Rainbows* passing through them and the *true Sun*. We have no *stated Winds*.

The *Depth* of our *Sea* varieth; the greatest about our Coast is eighty *Fathoms*. Our *Sea-water*, in clear Nights, being struck with Oars, *shineth* like Fire bursting out of a Furnace. The *Tides* observe the Motion of the *Moon*; the *Sea* *swells* about the *Moon's* *Rising* and *Setting*, and it *falls* when she is *South-erly* and *North-erly*. The ordinary *highest Tides* are not above sixteen *Foot*, except in *Autumn*, when it is very tempestuous; and then they *rise* sometimes to twenty *Foot*. About the *Full* and *New Moon* are the *highest Spring-tides*, and the lowest *Ebbs*.

As for *Lakes* and *Springs*, of the former we have very many, and most of them on high Mountains, which are stored with *Salmons*; of the latter we have innumerable gushing out of Rocks: We abound also with *Hot Springs*, of which some are so hot, that, in a *Quarter* of an *Hour*, they will sufficiently *boil* great Pieces of *Beef*; which is thus ordered: They hang the *Kettles*, with cold Water, over them, in which they put the Meat to be *boiled*, for fear of either burning or throwing up the Meat by the fervent and vehement Ebullition of the *hot Waters*. These Waters do harden and *petresfy* about the Brims of the *Thermæ*.

Our *biggest Hills* are not above a *Quarter* of a *German Mile* high, which how I have measured, I shall give an Account of hereafter. There is a whole *Ridge of Mountains* through all the *Island*. Our People live only in the *Valleys*, and towards the *Sea-shore*. There are other *ignivomous Mountains* besides *Hecla*, yet all covered with *Snow*.

The *Declination* of the *Loadstone* is here to the *North west*.

Our *Soil* is *clayey*, for the most part; in some Places *sandy*, no-where *chalky*. No *Tillage* at all; we are served by imported *Commodities*, of which the chief are, *Barley*, *Wheat*, *Linen*, *Iron*.

Touching *Animals*, we have great Numbers of divers *Birds* in *Summer*; in *Winter*, *Ravens*, *Eagles*, *Wild Ducks*, *Swans*.

We are pretty well stored with *Horses*, *Oxen*, *Cows*, *Sheep*, *Dogs*, and, in some Places, with *Hens*. *Foxes* there are in the *Mountains*; and when the *Greenland Ice* comes upon us, that brings with it those terrible *Guests* that do us so much *Mischief*; I mean, a great many *Bears*. Our *Oxen* and *Cows* live in *Winter* upon *Hay*, but our *Horses* and *Sheep* make a *Shift* to live upon the *Grass* under the *Snow*, and the *Coralin Moss*, called *Muscus Marinus*.

We have no *Minerals*, that we know, only *Store* of *Brimstone*, of which we send out every *Year* two *Ships* *Lading*.

In the *Year* 1642. on the 13th of *May*, all the *Sea*, which beats upon our *Promontories*, was for two *Days* so *pellucid* and shining, that *Shells*, and the least *Stones*, could be seen at the *Bottom*, where the *Sea* was forty *Fathoms* deep; infomuch that the said *Objects* seemed to be no further than three *Foot* distant from the *Sides* of our *Fishermens Boats*; who, when they saw it, were so frightened at it, that they presently came in, and noised this all over the *Country*. It began in the *Morning* about *Nine* of the *Clock*; and the *Whole* is witnessed by divers very honest and credible *Men*.

XXVII. It is sufficiently known how studiously and solicitously the Lords of the *United Netherlands* have laboured to encourage those that should first discover a more compendious and shorter *Passage* by the *North* to *China*, *Japan*, and other *Oriental Countries*: But those who first adventured upon this *Enterprize* found, by sad *Experience*, that the *Success* answered not their *Expectation* and *Hopes*.

Those who immediately succeeded them in that *Adventure* were not much more successful; for, treading the same *Steps* that the former had done, they were involved in the same *Difficulties*; for they were all misled by an *Opinion*, that that *Part* of the *Sea* which lieth betwixt *Nova Zembla* and the *Continent of Tartary* had been *passable*, and that they might have sailed through that to *China*: But the *Arm* of the *Sea*, into which *Men* pass through the *Streights* of *Weygatz*, is too strongly bound up by the *Frost*, especially in the *Winter* season: Nor ought any *Man* to wonder why the *Navigation* of *Will. Barentz* (otherwise a well-experienced *Mariner*) was unsuccessful, who passed along the *Coast* of *Nova Zembla*, as far as the 77th *Degree* of *Northern Latitude*. For it is well known to all that sail northward, that most of these *northern Coasts* are *frozen* up many *Leagues*, tho' in the *open Sea* it is not so;

Vid. sup. Vol. I. Chap. VIII. Sect. XXXIII.

n. 118. p. 417

no, not under the *Pole* itself, unless by Accident: As when, for example, upon the Approach of the Summer, the *Frost* breaketh, and the *Ice*, which was congealed near forty or fifty *Leagues* to the *Shore*, breaks off from the Land, and floats up and down in the Sea; whereby several have been forced to quit their Design, and stand back for their own Country.

There was, some Years since, a Knot of Merchants of *Amsterdam*, who attempted those Seas with much better Success than the former: For being advanced to the 79th or 80th *Degree* of *Northern Latitude*, they passed above an *Hundred Leagues* above *Nova Zembla* toward the *East*: And, though they gave strict Charge to conceal what they had seen and observed, yet it became publickly known, that they had discovered a Sea, beyond *Nova Zembla*, free from all Ice, and very convenient for Navigation.

These, being returned to their own Country, with great Hopes of finding Encouragement to make further Discoveries, petitioned the Lords the *States-General* of the *United Provinces*, that since they had granted the Trade of almost all the World to the Governors of the *East* and *West-Indian Companies*, and that there remained scarce any thing to the rest of the Merchants besides the Trade of the *Mediterranean* and *Baltick Seas*; they would be pleased to grant the Navigation of the *Northern Seas*, and of the *Eastern* (not yet discovered), to them, exclusive, to the *East* and *West-Indian Companies*. But the Governors of the *East-Indian Company*, being sensible how nearly this concerned them, presented likewise their Cross-Petition, desiring, That the Petition of the said Merchants might for the future be referred to them, and their Consideration.

The Merchants, finding their Petition thus crossed, address themselves to the King of *Denmark*, who immediately granted their Demands. Under his Protection, therefore, they equipp'd two or three Ships, such as they judged most proper for this Voyage; which when the *Governors* of the *Dutch East-Indian Company* had Information of, they raised a considerable Sum of Money, and easily persuaded the Mariners to desist from so dangerous (for so they represented it) a Voyage: And yet, that the Merchants might have no just Cause to complain against the said *Company*, the Mariners went to Sea; but, neglecting the Directions and Orders of those Merchants, they steered their Course directly for *Spitzberg*, took in their Lading of *Fish*, and return'd Home.

Upon which, the *East-Indian Company* of the *United Netherlands* omitted neither Study nor Care to find out a Passage through the *North-eastern Sea* for those that were to return into *Europe* from the *East-Indies*. There was then much Discourse of the *Gulph* of *Anian*, by which a Passage was said to be open into the *Tartarian Sea*; and something they understood from the People of *Japan*, and the *Portuguese* of the Country of *Jezzo*, which lay above *Japan*. But, not resting satisfied with the bare Relation, in the Years 52. and 53. they sent out some dextrous Persons to discover those Coasts; who, passing beyond *Japan*, in the 50th *Degree* of *Northern Latitude*, arrived upon the Coast of *Jezzo*, where they fell into a narrow Sea, yet broad and convenient enough to lead into the *Northern Ocean*. The opposite Shores they called *Het Compagnie Land*,

Land, and an Island seated in the Middle of the *Gulph* they called *Het Staten Eyland*.

Whether this *Land* of *Jezzo* be annexed to *Japan*, or not, the Inhabitants of both Countries doubt, because vast and inaccessible *Mountains* interpose, which hinder the Communication: Neither doth it, as yet, clearly appear, whether this *Land* of *Jezzo* is a Part of *Tartary*; or whether, by an Arm of the Sea, divided from it. The *Chinese* affirm, That *Tartary* runs 300 *China Leagues* eastward beyond their famous *Wall*: So that, if we follow these, the Country of *Jezzo* and *Japan* may seem to be annexed to *Tartary*: But those of *Jezzo* say, That there runs an Arm of the Sea betwixt them and *Tartary*: Which Opinion may seem to receive some Confirmation from what these *Hollanders* affirm who shipwreck'd (some Years since) upon *Corea*, a *Peninsula* of *Cbina*. They say, they saw there a *Whale*, upon whose Back stuck a *Harping-iron* of *Gascony*. And the Credit of this Assertion not being questioned by any, it is most probable to be conjectured, that this *Whale* pass'd from *Spitzberg* through the nearest Arm of the Sea, rather than through the more remote. Be it how it will, we may hence safely conclude, that the Sea which lies beyond *Japan* and *Spitzberg* is *passable*, and that through more, perhaps, than one Arm or Chanel, by which they communicate.

But to go on: After the Experiments made by the Governors of the *East-India Company*, in the *Years* 52. and 53. they resolv'd to proceed no farther upon the Discovery; as well because the Emperor of *Japan* interdicted the Navigation of Foreigners into *Jezzo*, in regard (as they say) of the vast Tribute which he raiseth annually upon the *Silver Mines* there, as because they think it may little conduce to their Advantage to have this compendious Way of Navigation discovered: And therefore they have thought fit to *prohibit* all farther Search into the Navigation of *Jezzo*, and the Countries adjacent; upon which very Reason they have also endeavour'd to conceal their *austral Plantations*.

Now concerning that Tract or Space which lieth betwixt *Spitzberg*, *Nova Zembla*, and the *Streights* of *Jezzo*, we have no Reason, for ought I see, to entertain any Doubt; because many of the *Muscovite* Itineraries assure us, that the Coast of *Tartary* runs not *northward* from *Nova Zembla*, but turns up very much towards the *East*; so that the Head-land of *Nova Zembla* is far the most *northern* Part of all *Tartary*. This may likewise be collected out of the Histories and *Maps* of *Cbina*, which affirm, that those which pass from the *Wall* of *Cbina* northward, may, in the Space of fourteen *Days*, reach the *Sea*. And the Coast of *Tartary*, which lies beyond the *Samojeds*, sufficiently testifieth the Neighbourhood of the Sea; forasmuch as the farther any *Man* advanceth towards the *East*, the *Muscovites* have there observed large and navigable Rivers, and fair Cities abounding with Plenty of all manner of Things.

It remains now that we should inquire by what Course, and in what Season of the Year, this Voyage is chiefly to be undertaken. It is hardly to be doubted, but that the *Streight* which lies betwixt *Spitzberg* and *Nova Zembla* may be pass'd; and the *Course* is to be directed to 78, 79, and even to the 80th *Degree* of *Northern Latitude*. If any *Man* shall, holding the

same Course, proceed farther, he will find the Passage shorter: For if we draw a Line to pass from our Seas through the 78th or 79th Degree of *Latitude* to the *Streight* of *Jezzo*, it will be very near a strait Line; but if any would from the same Degree of *Latitude* (having passed *Nova Zembla*) choose to decline toward the Coast of *Tartary*, and coast along by it till he meet with some *Streight*; he would find his Course somewhat longer, but, peradventure, safer and better; since many *Streights* would seasonably present themselves to him, and he might safely neglect the Measure of *Longitude*, which in open Seas (and especially those that are near the *Pole*) is found difficult to be observed. Neither ought this to be any Hindrance; but that the other may be frequented: For though, in Places near the *Pole*, the Moments of *Longitude* have great Variety in a little Space; yet there ariseth not any great Difficulty from thence, since the Error may more easily be rectified in lesser Circles: For the Error cannot be very great which falls out in *Longitudes* so much contracted.

As to the *Time* of the *Year* wherein this Navigation ought to begin, it may be considered two Ways: In the Beginning of the Spring, *viz.* in the Month of *March*, it is confessed, by most Men, that the Winds and Seas are favourable to those that sail to *Spitzberg*, and the Places near the *Pole*; and that they may run all that Course from these Parts in 12 or 13 *Days* Space: But, when they have passed so far, if any Man would design to sail to the *Streights* of *Jezzo*, he must steer his Course towards the *South*: But then these Motions of the Winds and Seas, which were favourable to those who sailed *northward*, will be contrary to those who stand *southward*; and they may long enough expect northern Gales, which seldom blow till towards the latter End of *Summer*; *viz.* in the Month of *August*. If, therefore, any Man would contrive to dispatch his Voyage in the shortest Time, it were his safest Rule to make choice of that *Time* of the *Year* wherein he might soonest make to *Spitzberg* to and again, which I conceive would be in the *Beginning* of *Summer*; yet it would be safer to set out sooner, if the Wind permit. And although this Course should happily succeed, it follows not that I should advise them to observe the same in their Return homeward; for Things of that Nature must be left to the Prudence and Conduct of discreet Pilots and Mariners: Who are yet to be advertised, That since the greatest Part of this Navigation is to be fought through unknown Seas, they shun, as much as in them lieth, all near *Approach* to the Coasts and Islands which they shall encounter, for fear of the *Ice*; and that they may always make choice of the most open Seas, which are least infested with it, and in which the *Colds* are most moderate. For Experience hath sufficiently taught, that whole large Seas are never known to be frozen, but the Borders of the Seas near Land only; and these, by reason of the Plenty of *fresh Waters* that run into the Ocean, or the *Snows* melted in it. And the same Experience hath taught, that there is not that Danger from the fluctuating *Ice*, as is vulgarly apprehended, especially in Seas not subject to violent Storms, and within the sixth, or rather the eighth Month of the *Year*.

When

When the Nature of this Sea, and of its several Streights, shall be more perfectly discovered, it is not to be doubted but that the whole Voyage betwixt *Us* and *Japan* may be performed in the Space of five or six *Weeks*, at the most: But in case it should, either by Accident or gross Error, so fall out, that the Ships should be forced to *Winter* there before they could recover Home; this, likewise, might be done without much Danger, provided that they avoided the unadvised Proceedings of the *Dutch*; who being caught, and necessitated to pass the *Winter* in the most *Northern Climates*, planted themselves there, upon the highest Lands, in Huts framed of thin Boards (whereas in *Lapland* itself it is impossible to live so); but they ought to sink their Houses under-ground, and to heap much Earth over them: Since it is not possible, or, at least, extremely difficult, for Men to subsist in such an excessive Severity of *Winter*, unless they nest themselves under the Earth.

Observations
in two Voyages
to the East-Indies;
by Mr.
Ric. Smithson.
n. 50. p. 1003.

XXVIII. From *England* to *Cape Finis Terræ*, in 44 *Deg. N. Lat.* the *Bay of Biscay* is subject to Storms, the Sea rough, and the Waves running very high.

From thence to 34 *Degrees* the *Wind* is variable; but if you be within 100 *Leagues* of the *European Continent*, it is generally inclined to *North-east*.

From 34 *Degrees*, if you be inclining for the Coast of *Africa*, or about the Meridian of the *Canaries*, the *Wind* is so certain, and constantly at *North-east* (or within two *Points*), that it is rare to find it otherwise; yet in *Winter*, upon the Coast of *Africa*, there are sometimes *westerly Storms*, that are violent, but of no long Continuance: And in *Summer*, when it is sometimes calm, the Air will come *variably*. These *North-east Winds* hold most commonly to 8 *Deg. North Lat.* and then begin the *Tornado Winds*, which are most part confined between 8 and 4 *Deg. North Latitude*: They are seldom or never more *southerly*; but on this Side the *Line* they have sometimes been met between 11 and 12 *Degrees North Lat.* These *Tornadoes* are *uncertain Winds*, blowing from all *Points* of the *Compass* in the same Hour, and sometimes the *Wind shifts* thus without being *intermitted*, and otherwhiles it will be stark calm almost between every Puff. They are so confused, that let four or five Ships sail together as near as is fitting for Ships that keep Company, at the same Instant, many times, every Ship shall have a *several* and *contrary Wind*: And this Place is almost always infested with horrible *Thunders*, *Lightnings*, and *Rain*. And the nearer you are to the *Africk Shore*, so much more dreadful is the *Thunder* and *Rain*; but the farther *Westward* you go, the *Thunder* and *Rain* will be less, and the *Wind* not so *uncertain*: So that if you go as far *West* as the Meridian of the *East Side of Brasil*, there is little *Thunder*, neither doth the *Wind* come down in such Puffs and *Flaws*; but between 4 and 8 *Deg.* it is most inclined to *Calms*, and very great and thick *Fogs*, and the *Rains* come not in such violent Showers.

Likewise

Likewise this is a sure Rule, that near the *Africk Shore*, and so for 100 or 200 *Leagues West*, the *North-east Winds* commonly incline more and more to the *East*; so that, by that time you come to the *West* of the Meridian of the *Azores*, but twenty *Degrees*, the *Trade* or *Constant Wind* will be mostly *E. N. E.*

Now as from 34 to 44 *Deg.* near the Continent of *Europe*, the *Winds* are commonly between *E.* and *N.* so, after you come so far *West* as the Meridian of the hithermost of the *Azores*, they are commonly between *S. W.* and *N. W.* and, for this Reason, Ships that are outward-bound to the *Streights* keep near the Coast of *Portugal*, but homeward-bound they are many times forced to run far *West* to fetch a *westerly Wind*: Likewise, Ships bound to *Barbados* go by the *Canaries*, but come Home a great Way to the *North-west* of the *Azores*; and the *Virginia* Ships are twice as long in going out, as they are in coming Home, and, many times, longer: For they come Home before the *Wind* directly, but go out round about as far as the *Tropick*, or, at least, 28 *Degrees Latitude*, for the Benefit of the *North-east Wind*; and when that hath carried them far *West*, they come back to the *Northward* again: And then, as the *westerly Wind* hangs more or less *southerly*, they have a good or bad Passage.

Between 3 and 4 *Degrees Northern Latitude*, the *South-east Wind* begins to take Place between the *Æquator* and the *Tropick* of *Capricorn*; but the nearer you are to the Coast of *Africa* it is so much more *southerly*; and, as you approach to the Coast of *Brazil*, it inclines more and more *easterly*. And there is not only a *Variation* in the *Wind* in respect of *Longitude*, but also in respect of *Latitude*; for near the *Æquator* the *Wind* is more *southerly* than it is, in the same Meridian, near the *Tropick* of *Capricorn*. As for example; in the great Bay of *Guiney* (which our Seamen call the *Bight* of *Guiney*) the *Wind* (as I have been credibly informed) is mostly *South*, and inclines as much to the *West* as to the *East*; but in the same Meridian, near the *Tropick* of *Capricorn*, I am sure it is constantly between *S. E. by E.* and *S. E. by S.* and, on the contrary, in that Meridian, which may be about 100 *Leagues* to the eastward of *Brazil*, near the *Æquator* the *Wind* is between *South-east* and *East South-east*; and in the same Meridian the *Winds* near the *Tropick* are more *variable*, but most part about *North-east*. In our latter Voyage from the *Line* to the *Tropick* of *Capricorn*, we had many *Calms*, and what *Winds* we had were very small, which was in the latter Half of *April*, and the former Half of *May*; but in our first Voyage, in the latter Half of *May* 1657. great Storms. The stormy Days were *May* 16, 17, 18. especially the 17th, in 7 *Deg. Southern Lat.* also the 20th and 21st, in the *Lat.* of 12 and 13 *Deg.* and the 27th at Night in *Southern Lat.* of 22 *Deg.* which Storm was the most sudden and unexpected that ever I saw: For all Day it was very fair Weather, and so till 8 at Night, and the *Wind* at *North-east*; but, on a sudden, came a violent Storm of *Wind* at *South-west*, and, in a Moment, the whole Heavens were become black, and prodigiously dark, which continu'd till Four the next Morning,

ing, with intolerable *Rain*; and then the *Wind* came again at *North-east*, and it was presently *fair*.

Near *Africa* the *South-east Winds* hold to 28 or 29° *Southern Lat.* but towards *Brasil*, from the *Tropick of Capricorn* to 32°, they are *variable*, and to the *southward* of 32° *westerly*; as you may perceive by this following Account: *May 29. Lat. 24° 27' Longit.* (by the *plain Sea Chart*) from the *Lizard 11° West*; *Variation 10° 7' East: Fair Weather*; the *Wind* from *S. W. to W.*

June 1. Little Wind, at S. W.

June 2. Lat. 26°, Calm all Day, and a great Storm all Night at South.

3. *Strong Wind at S. S. E.* At 1 at *Night* it came to *E. by S.* and blew with the same *Violence* till next *Day Noon.*

4. *Lat. 26° 15' South, Longit. from the Lizard 9° 24' West*; the *Wind* moderate at *E. by S.*

5. *Lat. 27° 32'.* A *fresh Gale* at *E. by N.* dark and cloudy, but no *Rain.*

6. and 7. The same.

8. *Dark Day, and calm all Day and Night.*

9. *Calm till Midnight*; then a little *Wind* at *N. W.*

10. *Lat. 32°.* *Calm* all *Day, and till Midnight*; then a *fresh Gale* at *N. W.* This *Day* we saw a great *Number* of *Whales* sporting themselves.

11. *Lat. 32° 43'.* The first clear *Day* we had in a *Fortnight.* *Strong Wind* at *N. W.*

12. *Lat. 33° 44', Long. 5° West, Variation 9° 40' East, Clear Weather,* till the latter *End* of the *Night*; then it *rained: Strong Wind* at *W. N. W.* and a *smooth Sea*; so that we sailed this *Day 177 Miles*; the most that our *Ship* sailed in 24 *Hours* in all the *Time* of the two *Voyages*, that I sailed in her.

13. *Lat. 34° 15' South, Longit. 2° 7' West, Violent Wind.* At 4 *P. M.* it shifted suddenly from *W. N. W.* to *W. by S.* at 10 at *Night* to *S. W. by W.* after *Midnight* to *S. W. by S.* about 4 to *S. S. W.*

14. *Very great Wind* at *S. S. W.* About *Midnight* it shifted to *W.* and immediately followed a very terrible *Storm* of *Wind* and *Rain*, and a great over-grown *Sea.*

15. At 7 in the *Morning* the *Wind* came back again to *S. S. W.* the whole *Day* was a very dreadful *Storm* of *Wind.* At *Noon* (by *Account*) we were in 34° 42' *South Latit.* and 3° 20' to the *eastward* of the *Meridian* of the *Lizard*: The *Sea* was exceedingly rough. At 4 *P. M.* fell a great *Storm* of *Hail*: At *Night* was a great *Eclipse* of the *Moon*: She began to be *totally dark* about *Half a Quarter* past 8, and began to *recover* some of her *Light* 2 *Minutes* before 9; as we reckoned the *Time* by our *Glass.*

16. A little before *Noon* the *Wind* came to *West*, and continued a strong *Gale*, but with *fair Weather.*

17. *Lat.* 35° *South*, *Longit.* (from the *Lizard*) $7^{\circ} \frac{1}{2}$ *East*, *Variation* $2^{\circ} 30'$ *East*, We saw many great Heaps of *Weeds* in the *Sea*, and a great rolling *Sea* came out of the *South*. A strong *Wind* (without *Gusts*) all these 24 Hours at *W*.

18. A very strong *Wind* at *West*. We sailed 170 Miles.

21. Was the first *clear* Day we had this Month, *Latit.* $35^{\circ} 40'$ *South*, *Longit.* $17^{\circ} 40'$ *Eastward* from the *Lizard*, *Variation* $1^{\circ} 4'$ *West*. The *Wind* at *North-west* till 4 *P. M.* then it came to *West* with a thick *Sky*, and cold *Rain*. At 8 to *W. S. W.* At 3 in the Morning to *S. W.* and at 6 to *S. S. W.* At 9 the next Day to *South*; all strong *Winds*.

22. Dark and cloudy. At 2 of the Clock the *Wind* came to *S. S. E.* At 4 to *E. S. E.* At 10 to *East*, and there continued till the 24th in the Morning; which all accounted very strange.

24. In the Morning, it fell *calm*, and was pretty *warm*, having been bitter *cold* the last 10 Days. At 3 o'Clock in the Night a fresh *Gale* at *N. N. W.*

25. *Lat.* $36^{\circ} 10'$, *Longit.* $21^{\circ} 25'$, *Variation* $3^{\circ} 40'$ *West*, Fair Weather, *Wind* *N. N. W.*

26. A clear Day, *Wind* *N. N. W.* *Variation* $4^{\circ} 30'$.

27. In the Morning, *calm*; about 9 *Wind* and *Rain* out of the *S. W.* at Night *calm* and *fair*.

28. A fair Day, and most part *calm*. At 10 at Night, heaving the *Lead*, we had *Ground* 130 *Fathoms*, the *Sand* like *Calais Sand*: The *Variation* was $7^{\circ} 10'$. This was off *Cape Aguthas*, the most *Southerly* Land of all *Africa*, lying 90 Miles *E. S. E.* from the *Cape of Good Hope*.

In our latter Voyage, after we came to 32° *South Latitude* (to which Place from the *Line* we were much *becalmed*), we had fair Weather, and a constant *Wind* between *W. N. W.* and *W. S. W.* all along to the *Cape* (and so it is most commonly). I have therefore noted the *Weather* in the former Voyage, because it was *unusual*, in that vast Space between *Rio de la Plata* and the *Cape*, the *Wind* being all the Year *westerly*; but about the *Cape*, from the End or Middle of *September* to the Beginning of *April*, the *Winds* are *variable*, as in *England*: The rest of the Year they are *westerly*, and intolerable *Storms*.

I can give no Account of any thing to the *Southward* of 37 Degrees; those few Ships that have adventured to 38 Degrees, reporting the *Winds* and *Seas* so raging, that none dare go farther.

XXIX. I. The greatest Length of Time that *Pearl-divers*, in these Parts, can hold *under Water*, is about a *Quarter* of an *Hour*, and by no other Means but *Custom*; for *Pearl-diving* lasteth not above six *Weeks*; and the *Divers* stay a great while longer *under Water* at the End of the Season, than at the Beginning. Here, at *Batavia*, is an expert *Diver*, who receives Wages for nothing else but for *diving* for *Anchors*, *Guns*, &c. lost in the *Road*. I have seen him several times go down, holding my *Breath* as long as I could, but he stayed 10 Times as long *under Water* as I could hold my *Breath*.

Observations in the East-Indies, by Sir Phi. Vernatti. n. 43. p. 863:

But he will not go down unless you give him a whole *Pint* of *Strong Water*.

2. The *Oil* drawn out of the *Roots* of *Cinamon-trees*, and resembling *Campfire*, is thence extracted; the *Roots* being dried, bruised, and steeped in *Water*, and then drawn over by an *Alembick*.

3. The *Lignum Aloes* is Part of a *living Tree*, but commonly found when it is *withered*. The *Tree* itself is of a white soft *Wood*, giving a *milky Juice*, which is so *venomous* withal, that if, in cutting the *Tree*, any of the *Milk* light in your *Eye*, you grow blind; if on any other Part of the *Body*, it becomes scabby, and noisomely sore. The *Lignum Aloes*, or *Calambac*, is found within the white *Wood*, but not every-where. When the *Tree* decays, the white *Wood* soon withers, and grows *Worm-eaten*; and the *Milk* so dries up, that you may easily rub it asunder with your *Hand*. The best is found in the midst of the *Tree*, nourished by the *Heart-root*, which goes strait down into the *Ground*.

4. The *Wood*, stinking like *human Excrement*, grows thus naturally in the *Isles* of *Solor* and *Timor*, and thereabouts.

5. There are, indeed, such *Serpents* in these Parts, which have an *Head* on each End of their *Body*, called *Capra-Capella*. They are esteemed *sacred* by these *People*, and fortunate to those in whose *Houses* and *Lands* they are found; but pernicious to whosoever doth them *Harm*.

Observations
in the East-
Indies, by . . .
n. 243. p. 273.

XXX. It does not appear that the *Maldiva* *Islands* were ever joined to the main *Land*, there being no *Soundings*, as they call them, between the *Island* and the *Main*; and the *Earth*, *Sand*, and *Shells*, of the one, much differing from the other. The small *Shells* call'd *Cowries*, which pass for *Money* in *Bengal*, and other *Places*, are chiefly found there.

The *North* and *South Poles* are not visible under the *Line*; for, in the clearest *Night*, the *Horizon* is overcast with a thick mighty *Darkness*, that no *Star* can be seen.

Gum-lack is the *House* of a large Sort of *Ants*, which they make on the *Boughs* of *Trees*, which serves to keep them from the *Weather*, &c.

It is certain that *Cloves* will attract *Water* at some *Distance*, which is daily experienced amongst the *Dutch* in this *Country*, who make a considerable *Advantage* thereby. I have known a *Bag* of *Cloves*, laid over *Water* one or two *Foot* distant, which has, in a *Night's Time*, imbibed a considerable *Quantity* of *Water*; and grown so moist, that the *Water* might be pressed from them.

There has been an *Oyster-shell* in *Bantam* that has been about 18 *Inches* *Diameter*, and several in *Maccao* that have been 18 *Inches* long, and 5 or 6 *broad*; whose *Meat* within has been proportionable to the *Shell*.

I am well informed, by the *Persons* that did see it, that at *Batavia* a whole *Duck* was taken out of the *Belly* of a *Snake*; and that in *Achaia* they did kill a *Snake* that had a whole *Deer* in its *Belly*, which they took out, being fresh and good; and that they did dress and eat Part of the *Deer*.

They draw their *Wire* in Moulds of several Sizes, gradually, as we do.

The *Chinese* gild Paper with *Leaf-gold* and *Silver*, laid on with a very good Sort of *Varnish* they have, which is the same wherewith they *varnish* their *lacker'd Wares*; all which, after it is thoroughly dry, they put in a Screw-press, and, with an Instrument like our *Plane*, shave it as fine as they please: And so they cut their *Tobacco*, which is as fine as a Hair.

Ambergris is found, more or less, in most Parts: Great Quantities are found at *Japan*, and to the eastward of *Java*, and at *Maldiva* Islands; which, they say, they find, generally, fastened to the *Roots* of *Trees* that grow in the Sea near the Shore; and that, while it is kept under Water, it is soft and pliable like Wax, and sometimes like Jelly. There is now a Piece in *India*, which I have seen, that weighs above 2000 *Ounces*.

The People of *Java* marry, and have *Children*, at nine or ten *Years* of Age; and generally leave *Child-bearing* at or before thirty. At *Tonquin* there are Women common to any that will hire them, at eight or nine *Years* of Age.

The *Japan* and *Cbina Varnish* is made of *Turpentine*, and a curious Sort of *Oil* they have, which they mix and boil to a convenient Consistence, which never causes any *Swelling* in the Hands or Face, &c. of those that make or work it. The *Swelling* that often happens to those that work the *lacker'd Ware*, and sometimes to those that pass only by the Shops and look on them at Work, is from the *Lack*, and not the *Varnish*; which *Lack* is the *Sap* or *Juice* of a *Tree*, which runs out slowly by cutting the *Tree*, and is catched by Pots fastened to the *Tree*: It is of the Colour and Subsistence of *Cream*; the Top, that is exposed to the Air, immediately turns *black*, and the Way that they make it *black* and fit for Use is, to put a small Quantity into a Bowl, and stir it continually with a Piece of smooth Iron for 24 or 30 *Hours*; which will both thicken it, and make it *black*; to which they put a Quantity of very fine Powder of any Sort of burnt Boughs, and mix it very well together, and then, with a Brush, lay it smooth on any thing they design to *lack*; then let it dry very well in the Sun, which will then be harder than the Board it is laid on: When it is thoroughly dry, you must rub it with a smooth Stone and Water till it is as smooth as Glass, and on that lay your *Varnish* made of *Turpentine* and *Oil*, boiled to a due Consistence, for *black Lack*; but if you would have *red*, or any other coloured *Lack*, you must mix your Colour, in fine Powder, with your *Varnish*, and take care to lay your *Varnish* on as smooth as possibly you can, for therein lies the Art of *lacking* well. If you would paint in *Gold* or *Silver*, &c. you must, with a fine Pencil dipped in the said *Varnish*, draw what Flowers, Birds, &c. you please, and let it lie till it begins to be dry; then lay on your *Leaf-gold* or *Silver*, or *Pin-dust*, &c.

It is well known that there is, amongst the *Bramines*, a Language called the *Sanscreeet*, writ in a different *Character* from what is now in Use; in which Language are written the *Porane*, or sacred History; the *Sbastram* being to them what the *Bible* is to *Christians*; and the *four Beads* (whereof one is lost) containing their *Divinity*, *Law*, *Physick*, &c. and some other Books. This Language is not understood by all *Bramins*, but only by

the Studious and Learned among them. I asked one of the most eminent among them in this Place, how long it was since the said Language was lost. Who answered, That it was spoken in the Age of the Gods, or when they lived upon Earth; which, by their Calculation, continued many Thousand Years, and ended so many Years past, as we reckon from the *Flood*, or thereabouts: But they have little Knowledge in *Chronology*. It is evident, that several of the Languages now spoken in *India* are derived from the *Sanscreeet*; and one of the *Bramines* writ a Book to shew that the present *Hindoestan*, or Language spoken by the *Moors*, in particular, is derived from thence.

I have inquired of two of the most knowing *Bramines* in this Town, and they both agree, that our *Sunday* in every Week was a *Holy-day*, or Day of Rest, with them; and, for fear they should abuse me, I have asked a *Mowla*, or *Mabometan* Priest, a Native of *India*, and one that always lived amongst them, and he gave me the same Account. Besides this, they have their *monthly Holy-days*; for the 8th Day after the *Change* of the *Moon* is always a Day of *Devotion*, as also the 14th; and the 11th Day from the *Change* a strict *Fast*, called *Jaka Dasee*, or *Yaka Dasee*: So likewise the 8th Day from the *Full Moon*, and the 14th, are *Days of Devotion*, and the 11th a *Yaka Dasee*. Besides these, they have, throughout the Year, several *festival Days* and *Times*, as in other *Religions*.

Upon the *Death* of any Person, the next of Kin, especially a Husband for a Wife, a Father for a Child, & *vice versa*, as also a Brother for a Brother or Sister deceased, do *mourn* fifteen *Days*; during which Time they eat only Rice and Water; and are not either to eat Beetle, or mark their Foreheads, but use several Washings, and Variety of other Ceremonies: As carrying Victuals to Gardens, Groves, and Tanques; to distribute, and make several Prayers that God would grant the deceased Party a good Place in the other World, forgive him his Sins, be favourable unto him, &c. and upon the 16th Day they make a *Feast* to all their Friends and Relations, and those of their own Coast, as they are able; and likewise *yearly*, upon the Day of his Death, they give *Alms*, *i. e.* Victuals, to more or less poor People, as they are able, with whom they make Prayers for the *Dead*.

Observations
in Japan; by
M
n. 49. p. 983.

XXXI. 1. The *Japonese* doubt not at all of their Country's being an *Island*, though it be separated from the *Continent* by such narrow Channels, that no Vessel, of any considerable Burden, can pass them.

2. The *Air* is very *salubrious*, but of another Temper on this, than on that Side of the *Mountains* which divide *Japan*. The *Plague* hath never been heard of there, but the *Small Pox* and *Fluxes* are very frequent.

3. Their *Mountains* are fertile almost to the very Top.

4. There are found almost all *European* Sorts of Fruit; *Peaches*, *Apricocks*, *Cherries*, *Prunes*, *Apples*, *Pears*; and, particularly, *Pippins*, *Bon Cbretien Pears*. Besides these, there is an Infinity of other Fruit, but almost none but what is found in some Part or other of *India*.

5. *Silver* is there in its highest Perfection, but not used in Trade, in which is seen nothing but *Gold*, and some small *Coin* of *Brass*; which latter they spoil by refining it too much. *Steel* also is there, very good.

6. The Temper of their Metals was formerly better than it is now; but yet they make *Courtelasses*, or short Swords, exceeding good.

7. The great *Mountain* of *Japan* is higher than the *Pico* in *Teneriff*, since, being above eighteen *Leagues* distant from the Sea-side, it may be seen above forty *Leagues* off at Sea. There are eight *Vulcanos*, or *Fire-spitting Mountains*, in *Japan*; and you cannot go into the *Campagne*, but you discover one or other of them.

8. There are many *Medicinal Waters*, and *Hot Springs*, which the Inhabitants use in their Distempers. They have particular Medicines, but they let no *Blood*. They make much use of *Causticks*, by applying upon some *Nerve* or other the Powder of *Artemisia*, or *Mugwort*, and *Cotton*, which they set on Fire. They always drink their *Liquors* warm.

9. There is so great a Store of *Venison* in *Japan*, that they care little for Cattle, though there be no want of them. They employ most *Oxen* for Ploughing, and they make no *Butter*, nor *Cheese*; nor are they Lovers of *Milk*. They have great Plenty of *Corn* and *Rice*.

10. The *Japanese* are proper enough of Stature, and not uncomely in *Features*; they have somewhat prominent *Bellies*; they are exceeding active, and want no *Judgment*: They are also military and valiant.

11. No *Arts* are to be met with amongst them that are not known in *Europe*, except that of making *Lacca*; of which there is some so fine and curious, that whereas, in this Country, one may buy an ordinary small Box for three or four *Crowns*; one of the same Size, when made in *Japan*, of exquisite *Lacca*, will sell for more than eighty *Crowns*. The Author of this Account hath four *Cabinets* of this Workmanship, which he affirms to have cost him above Forty thousand *Crowns*, which he will not sell under Eighty thousand *Crowns*.

12. The *Colours* with which they dye their Stuffs never fade: I have seen one of them, which our *Vermilion* and *Couleur de feu* come not near to. It is extracted out of a Flower like to *Saffron*, and one *Pound* of it costs an incredible Price. To try whether the *Colour* will not change by *Lixivium*, or *Lye*, they apply an hot *Iron* to it; and if there it holds, they assure themselves of the Durableness of the *Colour*.

13. They have *Mathematicians* amongst them, and believe *Judiciary Astrology*; insomuch that the *Grandees* undertake nothing without preconsulting those that make Profession of the same.

14. *Japan* yields divers Sorts of good merchantable Commodities, but chiefly all Sorts of silken Stuffs, unwrought *Silk*, *Amber*, precious *Stones*, *Musk*, *Copper*, *Steel*, *Lack-work*.

15. The Country is very well peopled, and exceeding rich, but exceedingly stored with *Gold Mines*; and I have seen some of the *Gold Ore*, which, of 10 *Ounces*, yields 8 of the highest *Fineness*, and Pieces of the Weight of 120 *Marks*.

16. Their

16. Their *Buildings* are very good and commodious. The Apartments are all below on the Ground, separated from one another by Partitions of *Cartoon* painted and gilt, which may be folded and removed like *Screens*. Their Floors are covered with *Mats*, and sometimes with *silken Stuff*, embroidered *Velvet*, and *Cloth of Gold*.

17. They have no other Conveniencies to defend themselves from *Heat* and *Cold*, but such as are usual in *Italy* and *Spain*.

18. They use the *Divertisements* of *Comedies*, which are more brave than those of *Europe*. The Spectators are about 200 Paces distant from the *Theatre*, which, being covered with a *Vault*, makes the Voices of the Actors to be understood to the very End of the *Theatre*. They love *Hunting* and *Gaming*, as *Dice*, *Cards*, *Chefs*, &c. At all Times of the Day, and in all their Visits, they take *Tea* and *Tobacco*.

19. Their *Language* is altogether different from the *Chinesse*, but their Priests and Courtisans, that is, the Learned amongst them, which bear the Offices of the Court, understand the Tongue of *Cochin China*, and, by this means, that of *Tunquin*, *China*, *Corea*, &c. They write neither from the Right to the Left, nor from the Left to the Right, but *downward*.

20. Their Government is *despotick*; the Religion *Pagan*; the *Christian* hated upon no other Account, but that some of those that there professed it, would persuade the *Japonese* to acknowledge a Superiority above the Dignity *Royal*, disposing of Crowns and Sceptres. Their *Morals* are very good, their *Faults* being punished as their *Crimes*; even *Lying* and *De- traction*. Their *Left Hand* is the more honourable, and they take Horse on that Side.

*Observations
in Hollandia
Nova, by
Mr. Wittsen.
n. 245. p. 361.*

XXXII. In a late Voyage to the *South Land*, called *Hollandia Nova*, it hath been discovered, that the *Soil* of the Country is very barren, and as a Desert. No *Fresh-water Rivers* have been found, but some *Salt-water Rivers*; as also no *Four-footed Beasts*, except one as great as a *Dog*, with long Ears, living in the *Water*, as well as on the *Land*.

Black Swans, *Parrots*, and many *Sea-cows*, were found there; as also a *Lake*, whose Water seemed to be *red*, because of the *Redness* of the Bottom of it; and round along the Shore there was some *Salt*. Our People saw but twelve of the *Natives*, all as *black* as Pitch, and *stark naked*; so terrified, that it was impossible to bring them to Conversation, or a Meeting. They lodge themselves, as the *Hottentots*, in Pavilions of small Branches of Trees. By Night our People saw *Fires* all over the Country, but when they drew near, the *Natives* were fled. The Coast is very low, but the Country far from the Sea is high.

Upon the *Island*, near the Coast, were seen *Rats* as great as *Cats*, in an innumerable Quantity; all which had a kind of Bag or Purse hanging from the Throat upon the Breast downwards. There were found many *well-smelling Trees*, and out of their Wood is to be drawn *Oil* smelling as a *Rose*; but for the rest, they are small and miserable Trees. There were also found some *Birds Nests* of a prodigious Greatness; so that six Men could

could not, by stretching out their Arms, encompass one of them; but the *Fowls* were not to be found.

There were great Store of *Oysters*, *Lobsters*, and *Crabs*; as also of strange Sorts of *Fish*.

There were also Millions of *Flies*, very much troubling Men. They saw a great many Footsteps of Men and Children, but all of an *ordinary Bigness*. The Coast is very foul, and full of Rocks.

XXXIII. In *Brasil* there are certain little Animals called *Poux de Pharon*, which enter into the Feet betwixt the Skin and the Flesh. They grow, in one Day, as big as *Beans*; and, if they are not presently drawn out, they make an unsupportable Ulcer, and all the Foot corrupts.

In the Kingdom of *Congo* there are Serpents 25 Foot long, which will swallow at once a whole *Sheep*. The Manner of taking them is thus: When they lie, to digest what they have eaten, they stretch themselves forth in the Sun, which the *Blacks* seeing, kill them; and, having cut off their Heads and Tails, and imbowell'd them, they eat them, and ordinarily find them as fat as Hogs.

There are here a great Number of *Ants*, and of that Bigness, that the Author, being one Day sick in his Bed, was forced to order himself to be carried out of his Room, for fear of being devoured by them, as it often happens to those of *Angola*; where you may also find, in the Morning, the Skeletons of *Cows*, devoured by these *Ants* in one Night.

Amongst other fair *Fruit-trees* in *Brasil*, there is one, whose Fruit is called *Niceffo*; which hath this remarkable, that it hath but *two Leaves*, whereof each is able to cover a Man.

XXXIV. *Oct.* 3. 1687. The King of *Feton*, *Aben Penin Ashrive*, died here at *Cape Corfe*, where he had been long sick. The *Fetishers* had done all they could to save his Life, which was nothing at all to Purpose: Their *Physick* scarce extends to any thing but the *Flux*, and what we call the *French Disease*; his was a *Consumption* and an *Asthma*, of a great Continuance. So they fled to the Aid of their *Religion*, and according (it seems) to the Rules of that, they made several *Pellets* of *Clay*, which they set in his Room, in Rank and File, all sprinkled with *Blood*, besides the several Muttons which they eat to his good Health: But that was of too little Force. So the Man died, having delivered his Sword to the *Dey*, who, in the *Interregnum*, was to be the principal Man (for the Kingdom is *elective*), and commanded him to be constant to the *English*, of whom himself had been a great Favourer; with a Threat, if he was not, of haunting him after his Death: He also appointed one of his *Wives*, whom he thought worthy of that unlucky Honour, to accompany him to the other World. The next Day he was carried to *Feton*, and buried there, *Nov.* 2. with the poor Woman we spoke of; presently after, they that were considerable, or had a Mind to seem so, sent in them that they had a Mind to murder, in Honour of the King: How many there were, it is hard to say; the highest Account

Observations in Brasil, and in Congo; by Mich. Angelo de Guattini and Dionysius of Placenza. n. 139 p. 977.

Observations at Cape Corfe, by Mr. J. Hillier. n. 232. p. 687.

Account gives 90, the lowest 50, the middle 70. The *Blacks* do not understand *Arithmetick*; so the Numbers they give, in all Cases, are very uncertain. I think there were about eight from this Town, which will not hold Proportion to the highest Rate; but it is like near *Feton* there might be more: They say also, that many more will follow at *Half a Year's* Distance from his Death. The Manner of the Execution of these poor Creatures I have not yet learnt; only, that they make them drink and dance, with a great deal of Bravery, all the Beginning of the Day, and towards Night cut off their Heads: But whether, by that, they mean the common Way of their *Executions*, I am yet to seek.

After the *King's Funeral*, the next Thing was, to choose a *Successor*: So the People were called together at *Feton* (I suppose by the Authority of the *Dey*), without inquiring any thing of their *Freehold*: They pitched upon Mr. *Dey*, though he was not of the *Blood Royal*; the Reason was, as they said, because he had *Power* enough to do what he pleased, and they could do nothing against him: But he refused the Honour, because of the Charge it would put him to; and proposed the *Brother* of the *deceased King*. So the Business stuck some time; but at last it was accorded, and King *Asbrive's Brother* declared King, Nov. 18. His Name is *Abenaco*.

The Manner of their ordinary *Executions* is thus: The Creature that is condemned is made to drink abundance of *Palm Wine*, and to dance, every body that will, in the mean time striking or pushing him; when that is over, as is said, he is thrown down, his Face into the Sand, which whether it stifles him, or not, I cannot tell; then his *Legs* are cut off below the *Knees*, and his *Arms* below the *Elbow*; afterwards his *Thighs*, and his *Arms* below the *Shoulder*; lastly, his *Head*.

When any one has new *Drums* or *Trumpets*, it is necessary that they be consecrated with *human Blood*: I have known but one happen of this kind, which was Jan. 7. 1686-7. when, after a Man had been *executed*, after the former Rate, about *Eight* in the Morning, at *One* in the Afternoon they drank *Palm Wine* out of the upper Part of his *Skull*, and this in the Sight of all the *Factors* at *Cape Corse*.

The *Shore* lies almost *East* and *West*, exposed to the Sea wholly upon the *South*; the Country is *hilly*, the Hills not very high, but thick, clustering together, the Vallies between extremely narrow; the Whole, in a Manner, covered with certain *Sbrubs*, low, but very thick. What the People *Till*, comes not to above a tenth Part of their Ground; and where they do *Till*, it hinders not that within *Half a Year* the Ground is overgrown as before; for they do not root up the *Sbrubs*, but only cut, and sometimes burn them somewhat close to the Earth: So they spring again, in a very little Time. This is sufficient for planting their Corn, which they do by making little Holes in the Earth at a competent Distance, and putting Seeds into them.

It may be, that, if those *Sbrubs* were destroyed, the *Unhealthiness* of the *Place* might be mended; which yet is not to be hoped for but by bringing the People to some kind of *Industry*; and that will not be easy, they are so

so wholly given to Laziness, and so intirely bred up in it, that there must be the greatest Change imaginable, before they become any whit tolerable. A Man may see their Temper by this, that though their *Tillage* be very easy, and the Earth yields many Hundreds for One; yet so little is the Use they make of it, that one scarce Year brings them to Danger of starving: And though there be People enough, and every Man has Power of choosing what he will, that is not already *tilled* by some other; yet not the *tenth* Part, as we have said, is employed: So that a Man would wonder what came in the *Frenchman's* Head to fancy them industrious. But *subtle* they are, and diligent to *cheat* any Man that is not cautious enough to avoid it.

So that the *Fault* of the *Wood* is (by the Laziness of the People) without any Remedy. But there may be something in the *Earth* itself; the Water which they have here in *Pits* (Rain-water for the most part, but yet strained through the *Earth*) has a kind of Taste mixed of *sweet* and *subacid*, if I understand what I say: I am told it is of *Vitriol*; whether that be mischievous, you know better than I do; but I take this for certain, since I have had it from good Hands, that at *Widdab*, which is one of the most *unhealthy* Places in *Guiney*, but it is not upon the *Gold Coast*, he that opens the *Ground*, though it be but to dig a Grave, runs the Hazard of his Life; so mischievous are the *Steams* from thence arising. It is possible there may be some such *Steams* here, only not so violent; though in *England*, I think a *Gravel* or a *Sand* (which here are always uppermost, for as much as I have seen) are esteemed very wholesome *Soils*; under them is a kind of *whitish* *Marle* almost like *Fullers Earth*.

The *Age* of the *Inhabitants* is very uncertain, because none of them keep an Account of it; there are some of them very *grey*: But if the Country be to them *unhealthy*, *grey Hairs* may come early. I think there be many more *Funerals* here than at *Oxford*, though that be a much larger Place, especially in the *Rain Times*, which to us are always *healthful*.

I think that much of the *Mortality* (not all) that happens among *Strangers*, is the Effect of their ill Diet, and ill Government of themselves: For they eat but little, having neither Stomach, nor Money to buy what they want; but they drink excessively, being, for that, more readily trusted, and of *Liquors* very hot and spirituous; and if any choose the *cold* rather, his Stomach is chilled, and he is in Danger of a *Flux*, or an *extreme Looseness*, and that immediately.

There is another Thing; Men guard themselves less from the *Air* than in any other Places, trusting to the *Heat* of the *Climate*, and receive the *Cool* of the Evening with only a Shirt. Now I think, that the *Air*, though not so *cold*, is much more *subtil* and *piercing* here, than in *England*. It corrodes Iron much more, not by the *Moisture*, for it is not so *moist*; and, besides, it does it in the *dry Weather* too. The last Year, from *Nov.* 1686. to *Nov.* 1687. has had the most *Rain* of any that can be here re-
 membered; yet the *Mortality* was much less than the Years before: So that
 perhaps *Wet* is not that which makes the Country *unhealthy*; though

we had very many *sick*, especially in *June* and *July*, whose Diseases were not mortal.

*Observations
in West Bar-
bary, from
Cape Spartel
to Cape De
Geer; by Mr.
Jezreel Jones.
n. 254. p. 248.*

XXXV. The *Mauritanian*, or *Barbarian Moor*, when he rises in the Morning, washes himself all over, and dresses; then goes to their *Jiama*, or Church, says his *Prayers*, and returns Home, where his Wife, Concubine, or Slave, hath his Breakfast provided for him; which is sometimes made of *Barley* or *Wheat-gruel*, for I have known both. It is made something thicker than ours, till it be ropy; they put *Origan*, and other Herbs, powdered, into it, which, for such Uses, they keep dried all the Year: Some will put in a little *Pepper*, and other *Spice*. I have often been treated with *warm Bread*, *fresh Butter*, and *Honey*, in a Morning, which is not seldom used amongst themselves an Hour or two after they have had *Gruel*; as also *Hasty-pudding*, with *Butter*, and sometimes *Butter* and *Honey*: Some, again, give *Cuscusoo* with *Milk*, others with *Flesh*, a third with *Roots*. When any one hath a Guest or Guests in his House, the Neighbours bring their Dish to welcome him or them, on account of the Respect and Love they bear to their Neighbour, as well as to shew their Readiness to entertain the *Stranger*. This Practice is found constantly used throughout the whole Country amongst the *Moors*, one towards another, reciprocally; and I have as often found the like Civility, as I had Occasion to take up my Lodging at any Place where I was acquainted with any of the Inhabitants. The *Jews* likewise shew great Civility to any *Christian*, and treat him with what they have; as *stewed* or *baked Hens*, *Capons*, *hard Eggs* boiled or roasted (which they press flat with *Pepper* and *Salt*), *Wine*, *Brandy*, &c. They have generally the best *Bread*, and every thing else of the Kind, that they can get: They put *Annis*, and two or three other Sorts of *Seeds*, in their *Bread*; one is black and angled, tastes almost like *Carrot-seeds*, and, I think, I have seen these sometimes used in *Bread* in *Spain*. They esteem *Honey* as a wholesome *Breakfast*, and the most delicious that which is in the *Comb*, with the *young Bees* in it, before they come out of their *Cases*, whilst they still look Milk-white, and resemble (being taken out) *Gentles*, such as *Fishers* use: These I have often eat of, but they seemed insipid to my Palate; and sometimes I have found they gave me the *Heart-burn*.

In *Suse* I had a Bag of *Honey* brought by a Friend, who made a Present of it, as being of great Esteem: This he told me, I was to eat a little of it every Morning, to the Quantity of a Walnut. It was as thick as *Venice Treacle*, and full of small *Seeds*. It always made me *sleepy*, but I found myself well, and in very good Temper of Body, after it. The *Seeds* were about the Bigness of *Mustard*; and, according to the Description of them to me, and the Effects I found by eating the *Honey* and them, they must be a large Sort of *Poppy-seed*. The *Honey* was of that Sort they call, in *Suse*, *Izucancee*, or *Origanum*, which the *Bees* feed on; and these *Seeds* were mixed with.

Cuscus, or *Cuskfoo*, is the principal Dish among them, as the *Olla* is in *Spain*. This is made of *Flour* of *Wheat*, and, when that is scarce, of *Barley*, *Millet*, *Indian Corn*, &c. They shake some *Flour* into an earthen Pan, made on purpose,

purpose, which is not *glazed*, sprinkling a little Water on the Bottom of the Pan first, then working it with both their open Hands flat, turning them backwards and forwards to grain it, till they make it much resembling *Sago* which comes from the *East-Indies*. They *stew* their *Flesh*, keeping their Pots close covered, which are made of Earth, put the *Cuskfoo* into an earthen *Cullender*, which they call *Caskafs*, and this *Cullender* into the Mouth of the Pot, that so all the *Steam* which rises from the Meat may be imbibed by the *Cuskfoo*, which causes it to swell, and makes it fit to be eaten. When it is enough, they put this *Cuskfoo* out into a Dish; and the *Cuskfoo* being heaped up, they make (as it were) a Bed, or Place for the Meat to lie in; then they put good Store of *Spice*, as *Ginger*, *Pepper*, *Saffron*, &c. This *Dish* is set upon a Mat on the Ground, and four Men may easily sit about it; though I have seen six, and more, at one Dish: They sit with their Buttocks upon the Calves of their Legs, with the Bottoms of their Feet on the Ground. If there are many to eat of this Meal, there are more *Dishes*. This *Dish* they have in Use sometimes at *Breakfast*, as well as *Dinner* and *Supper*, but it is commonly used for the two last Meals.

At a stately Entertainment they will have a Sheep roasted whole, sometimes a Half, or a Quarter, on a *wooden Spit*, or the most convenient Thing they can find. They do not continually keep turning it, as we do, but leisurely let one Side be almost roasted before they turn the other. The Fire is commonly of *Wood* burnt to clear Coal, and made so that the Heat ascends to the Meat. They baste it with *Oil*, and a little *Salt* and *Water* incorporated. They let it be thoroughly roasted, then they say *Bismiillab*, *In the Name of God*; after they have washed their *Right Hands*, and pulled the Meat in Pieces, they fall to eating. It is to be noted, that they never use but their Right Hand in eating, and one holds, while the other pulls it asunder, distributing the Pieces to the rest, as he pulls them off. They seldom use a *Knife*, and a *Fork* is a strange Thing amongst them. They are dextrous at this Way of *Carving*, and never flinch at the Heat or Warmth; for that would look mean, and might occasion one more bold to take his Office upon him to perform. When they have done, they lick their Fingers, and, as often as they have a hot Dish, they wash their Hands afresh: Then they have *Alfdoush*, or *Virmezzelli*, with some Meat on it, stewed Meat, well spiced, with savoury Broth; and, after they have eat the Meat, they dip their Bread in the Sauce, or Broth, and eat it. They are cleanly in their Cookery; and if a Hair be found, it is a capital Crime, but a Fly not, because it has Wings, and may get in after it passes from the Cook's Charge or Management.

Cubbob is small Pieces of Mutton, with the Cawl of a Sheep wrapped on them: Some make good *Cubbob* of the Liver, Lights, and Heart. They *pepper* and *salt* them, and put *sweet Herbs* and *Saffron* into them, then roast them; and, when they dish them up, squeeze an Orange or two on them.

Elmorofia is another: This is Pieces of Beef, of Cow, or Camel, stewed with Butter, Honey, and Water; some will put *Rob* of *Wine* amongst it:

they add Saffron, Garlick, or Onions, a little Salt, and, when it is enough, serve it up. They esteem this a delicious Dish, used mostly in the Winter, and say it is good against Colds, notwithstanding they say Beef is cooler than Mutton: Then they will treat you with Hare stewed, stewed and roasted Hens and Partridges; these they disjoint, and let stew in Water and Oil, or Butter, if they are not fat enough of themselves. When they are almost enough, they beat a Couple of Eggs, mix them with the Liquor, with Juice of Lemon, or Vinegar, which they usually have very good, and serve it up.

Then you may have more baked and roast, and another Dish of stewed Meat, which, for its Goodness, would be esteemed amongst us: They take a Leg of Mutton, cut off the fleshy Part, leave out the Skin and the Sinews; this Flesh they mince very fine; they also mince some Suet, Parsley, Thyme, Mint, &c. then they take Pepper, Salt, and Saffron, beaten together, and some Nutmeg, and these they add to the rest, with about Half a Handful of Rice: They cut an Onion, of the best Sort, Half through, and take off the first Lay, as not so fit for Use, unless it be thick (they that are curious take out the inner Skin, saying, it is not wholesome, and bad for the Eyes, it being the worst thing in an Onion, which otherwise would be the best of Roots); this Lay they fill with Forc'd-meat, then the next, and so on, which makes them look like so many Onions; some they put up in Vine-leaves, of the best they can find for their Purpose: Whilst this is doing, the Bones, and Residue of the Leg of Mutton, being in moderate Pieces, are stewing, with as much Water as will just cover them; then they put on their Forc'd-meat Balls a-top of the Meat, and a green Bunch of Grapes upon them, cover it, and let it boil till thoroughly enough: This, I think, is one of their best Dishes, which they often use in *Fests*, and other Cities.

Pillowe, or *Piloe*, is a Dish very well known, made with Rice boiled, with a good Hen, Mutton, and Spice, the Flesh and Fowl being put on the Rice in a Dish, as *Cuskfoo*, and so served up.

A *Bustard*, which they roast and stew, and make an excellent Dish of its *Guts* (I eat of it once), to me seem'd very pleasant and savoury, and very grateful to the Stomach. This Bird is fit for their King's Table, as likewise the *Hedgehog*. Then they have *Ragous*, made with *Sparrows*, *Pigeons*, &c.

Their *Drink* is plain Water or Milk, and sometimes *Rob* of *Wine* mixed with Water. I was once treated with this by the Bashaw of *Suse*, *Abdo-meleck Ben Alchotib*, and there was brought to me a great Bowl which held above 3 *Quarts*; he told me, there was not above Half a Pint of this *Rob* in it, and the rest was filled with Water. It was very generous and pleasant; and though I did not drink a Quarter of it, yet I found the Strength in *Half an Hour*. This, they say, is a Remedy against *Cold* likewise, and pretend to take it *medicinally*; though *Rob* of *Grapes* is lawful, according to *their Law*. Under this Pretext, many *Fessée* Merchants, to make *Rob* or *Vinegar*, press all the *Grapes* in their Vineyards, put it up in Jars under-ground, and keep

keep it long; so that it proves excellent *Wine*. When four or five merry Companions, with every one his Mistress, appoint to be merry, they go out to their Vineyard or Garden, have Musick, and all, or most of those Dishes, and there sit and carouze over a great earthen Bowl full of *Wine*, of about four or five Gallons, and so drink round in a Cup that will hold almost a *Pint*, like a large *Tea-dish*, till there is none left: It often happens, that they do not part till they have made an End of the whole Jar, which seldom is less than a *Week's* Time; I have known some that have been nine *Days*, successively, *drunk*. Those that are known to *drink Wine*, or *piss standing*, their *Testimony* will not be valid in Law. In a Morning, during this Time of Merriment, they are for some savoury Bit, *pickled Fish*, or *Eschaveche*, or *Elcholle*. They are great Lovers of *Fish*, and have great Variety, and very good, which they fry in *Origan Oil*, stew, roast, and bake, with good Store of Spice, Onions, Garlick, Cumin, Parsley, and Coriander. The *Eschaveche*, or *fried Fish*, is cut in thin Slices, and put into Vinegar, with the aforesaid Spices, adding Saffron and Pepper, &c. It will keep above a Month; and this they have commonly; as also *pickled Limes*, *Olives*, *Capers*, &c. They eat parched *Garavancas*, parched *Almonds*, and *Beans*, which they parch in a Pan with Water and Salt; these, and other Things, they have to relish their Glafs of *Wine*, or give them a fresh Appetite to *drink*.

The *Hedgehog* is a princely Dish amongst them; and, before they kill him, they rub his Back against the Ground, by holding his Feet betwixt two, as Men do a Saw that saws Stones, till it has done squeaking; then they cut its Throat, and, with a Knife, cut off all its Spines, and singe it: They take out its Guts, stuff the Body with some Rice, Sweet-herbs, *Garavancas*, Spice, and Onions; they put some Butter and *Garavancas* into the Water they stew it in, and let it stew in a little Pot, close stopped, till it be enough, and it proves an excellent Dish. The *Moors* do not care to kill *Lamb*, *Veal*, nor *Kid*; saying, it is a Pity to part the *Suckling* from its *Dam*.

They eat with their boiled Meat, many times, Carrots, Turneps of two or three Sorts, Cabbage, Beans and Peas, &c. of which they have Plenty, and very good. I have eat of *Porcupine* stewed, which much resembled *Camel's Flesh* in Taste, and that is the nearest to *Beef* of any thing I know.

I come now to give an Account of the *Alchollea*: It is made of Beef, Mutton, or *Camel's Flesh*, but chiefly Beef, which they cut all in long Slices, salt it well, and let it lie twenty-four Hours in the Pickle; then they remove it out of those Tubs, or Jars, into others with Water; and when it has lain a Night, they take it out, and put it on Ropes in the Sun and Air to dry; when it is thoroughly dried, and hard, they cut it into Pieces of two or three *Inches* long, and throw it into a Pan, or Caldron, which is ready, with boiling Oil and Suet, sufficient to hold it, where it boils till it be very clear and red, if one cuts it; which taken out, they set to drain: When all is thus done, it stands till cool, and Jars are prepared to put it up in, pouring the Liquor they fried it in upon it; as soon as it is tho-
roughly

roughly cold, they stop it up close. It will keep two Years. It will be hard, and the hardest they look on to be best done. This they dish up cold, sometimes fried with Eggs and Garlick; sometimes stewed, and Limons squeezed on it. It is very good any way, either hot or cold.

Before I conclude, I willingly give an Account of their *Travelling Provision*, viz. Bread, Almonds, Raisins, Figs, hard Eggs, cold Fowls, &c. but what is most used by Travellers is, *Zumeet*, *Tumeet*, or Flour of parched Barley for *Limereece*: These are not *Arabian*, but *Shicka* Names; so I believe it is of a longer standing than the *Mahometans* in that Part of *Africk*. They are all three made of parched *Barley-flour*, which they carry in a leathern Satchel. *Zumeet* is the Flour mixed with *Honey*, *Butter*, and *Spice*; *Tumeet* is the same Flour done up with *Origan Oil*; and *Limereece* is only mix'd with *Water*, and so drank. This quenches Thirst much better than *Water* alone, satisfies an hungry Appetite, cools and refreshes tired and wearied Spirits, overcoming those ill Effects a hot Sun, and a fatiguing Journey, might occasion. This, amongst the Mountaineers of *Suse*, is used for their Diet, as well at Home, as on their Journey.

All Things taken in Game, as *Hawking*, *Hunting*, and *Fowling*, are *lawful* for them to eat, if they take it before it be dead, so that they can have time to cut its Throat, and say *Bismiillab*; or if he is known to be an expert Man at the Game, and says these Words before he lets the *Hawk* take its *Flight*, lets *slip* the *Grey-bound*, or *fires* his *Gun*, it is *lawful*; all (I say, but *Swine's Flesh*, and what *dies of itself*) they have Liberty to eat, and may sell it. They tell us, there is but one Part about the *Hog* or *Swine* that is *unlawful*, which they do not know, and are obliged to *abstain* from the Whole: But if they knew it, they would let us have but little to our Share. They eat *Snails* boiled with Salt, and praise their Wholsomeness. *Fish*, of all Sorts, are *lawful*. In *Tafflet* and *Dra* most of their Food is *Dates*; there are ten or a Dozen Sorts.

They have good *Capons* all the Country over; no *Turkeys*, *Ducks*, nor *Geese*, but *Wild*; and those they have of two Sorts; *Ducks*, *Teal* and *Mallard*, *Corlews*, *Plovers*, *Snipes*, *Oxbirds*, *Pipers*, a Sort of *Black Crow* with a *bald Pate*, and long crooked Bill, is good Meat; and an Hundred other Sorts of *Fowls*. I have eat *Antelope*, which we have killed in *Hunting*, and are very good Food: They are as large as a *Goat*, of a *Chestnut* Colour, and White under the Belly; their Horns are almost quite strait from their Head upwards, tapering gradually, with Rings at a Distance from one another, till within an *Inch* and an *Half* of the Top; fine large black Eyes, long and slender Neck, Feet, Legs, and Body, shaped somewhat like a *Deer*; they have two Cavities between their Legs, I think, the Male, as well as the Female: There are many in a *Herd*, when, at the same time, they have *Scouts*, or those who, by running, give them Notice of an approaching Foe. When two lie down together, they lay themselves so, that their Backs are towards each other, and the Head of one towards the Tail of the other, that they may see every way. Their *Dung* is sweet and pleasant enough. They are taken sometimes by the *Hawk*, sometimes by the *Shot*; for they are too *swift* for a *Greyhound*.
Partridges

Partridges in *Suse* commonly roost on *Trees*, there are so many *Foxes*, which would otherwise destroy them.

The *Moors* will eat *Fox*, if it be fat, either stewed or roasted, but they do not care for it lean; which has occasioned a Proverb amongst them on that Account; to wit, *Hellel deeb*, *Harom deeb*; alluding to the Scruple might be made of its *Lawfulness*. Those Words signify, *A Fox is lawful, and a Fox is unlawful*; i. e. Fat, *lawful*; Lean, *unlawful*.

Fruits and *Sweetmeats* they have, of many Kinds; as of three or four Sorts of *Pumpkins*, *Macaroons*, *Almonds* prepared many ways, *Raisins*, *Dates*, *Figs* dry and green, excellent *Melons* of two or three Sorts, and *Water-Melons*; *Pomegranates* of several Kinds, *Apples*, *Pears*, *Apricocks*, *Peaches*, *Mulberries* white and black, *Plumbs* and *Damascus-Cherries*, *Grapes* of many Kinds, and very good. I have known *Grapes* in *Messia* (*Lat. 30 Deg.* or thereabouts) as big as a *Pigeon's Egg* (but they do not make *Wine*); and if they would assist Nature, they might have every thing in Perfection.

Their *Salating* is *Lettuce*, *Endive*, *Carduus*, *Parsley*, *Apium*, and other *Sweet-Herbs*; *Onions*, *Cucumbers* of several Kinds, some about a *Yard* in Length, and two or three *Inches* thick, and hairy (this is esteemed the wholesomest); *Radishes*, *Fumates*, or *Apples of Love*; all which they cut, and put Oil, Vinegar, and Salt, with some Red Pepper: This *Salad* they eat with Bread.

They have a Fruit called *Baranêên*, in *Spain* *Baragenas*; these they stew with their Victuals, and sometimes cut them in thin Slices, and fry them: It makes a pretty Dish.

When the *Moors* have feasted, every one washes his Hands and Mouth, thanks God, and blesses the Hosts and Entertainers from whom they had it. They talk a little, and tell some Story; and then lie down to rest.

XXXVI. Papers, of less general Use, omitted.

1. **G**eneral Heads for a *Natural History of a Country*, great or small; by n. 11. p. 186.
Mr. Rob. Boyle.
2. Directions for Observations and Experiments to be made by Masters of n. 8. p. 140.
Ships, Pilots, and other fit Persons, in their *Sea Voyages*; by Mr. Rook: n. 24. p. 432.
Enlarged by Sir Rob. Murray and Dr. Rob. Hook.
3. Inquiries and Directions for the *Ant-Isles*, or *Caribee* Islands; by n. 33. p. 634.
4. Inquiries for *Virginia* and the *Bermudas*; by n. 23. p. 420.
5. A Catalogue of several *Curiosities* found in *Virginia*; by Mr. Jo. Ba- n. 198. p. 667.
nister; and mentioned in some of his Letters to Dr. Lister.
6. Inquiries for *Hungary* and *Transylvania*; by n. 25. p. 467.
7. Directions and Inquiries concerning the *Mines*, *Minerals*, *Baths*, &c. n. 58. p. 1189.
of *Hungary*, *Transylvania*, *Austria*, and other Countries neighbouring to
those; by
8. Inquiries for *Turky*; by Mr. H. n. 20. p. 360.
9. Promiscuous Inquiries sent to *Dantzick*; by n. 19. p. 344.
10. Inquiries for *Greenland*; by n. 29. p. 554.

- n. 23. p. 420. 11. Inquiries for *Persia*; by
- n. 23. p. 415. 12. Inquiries for *Suratte*, and other Parts of the *East-Indies*; by
- n. 180. p. 39. 13. A Voyage of the Emperor of *China* into the *Eastern Tartary*, An.
1682.
Ib. p. 52. A Voyage of the Emperor of *China* into the *Western Tartary*, An. 1683.
Ib. p. 62. An Explication, necessary to justify the *Geography* supposed in these *Letters*; by
- n. 25. p. 470. 14. Inquiries for *Egypt*; by *Tho. Henshaw*, Esq;
- n. 25. p. 472. 15. Inquiries for *Guiney*; by *Abraham Hill*, Esq;
- n. 23. p. 422. 16. Inquiries for *Guaiana* and *Brazil*; by

XXXVII. Accounts of *Books* omitted.

- n. 127. p. 671. 1. *TH. Bartholinus* de *Peregrinatione Medica, &c. Hassniae*, 1674. in *Fol.*
- n. 81. p. 4030. 2. *Caroli Claromontij*, M. D. &c. de *Aëre, Solo & Aquis Angliæ*; deque *Morbis Anglorum Vernaculis* Dissertatio: Nec non *Observationes Medicæ Cambro-Britannicæ*. *Lond.* 1672. in 12mo.
- n. 135. p. 875. 3. The *Natural History of Oxfordshire*, being an *Essay* toward the *Natural History of England*; by *Rob. Plott*, LL. D. *Oxford*, 1677. in *Fol.*
- n. 184. p. 207. 4. The *Natural History of Staffordshire*; by *Rob. Plott*, LL. D.
- n. 165. p. 795. 5. *Scotia Illustrata*; sive *Prodromus Historiæ Naturalis, &c.* Auth. *Rob. Sibbaldo*, Equite Aurato. *Edinburgi*, 1684. in *Fol.*
- n. 262. p. 543. 6. An *Account of the Islands of Orkney*; by *Ja. Wallace*, M. D. To which is added, an *Essay* concerning the *Tibule* of the *Antients*. *Lond.* in 8vo.
- n. 141. p. 1030. 7. A *Discourse of the State of Health in the Island of Jamaica*, with a *Provision* calculated for the same, from the *Air*, the *Place*, and the *Water*; the *Customs* and *Manner of Living, &c.* By *Tho. Trapbam*, M. D.
- n. 85. p. 5021. 8. *New England's Rarities* discovered; together with the *Remedies* used by the *Natives* to cure their *Diseases, Wounds* and *Sores, &c.* By *J. Josselin*, Gent. *Lond.* 1672. in 12mo.
- n. 170. p. 980. 9. *Description de la Lovisiane*, nouvellement decouverte au *Sud Ouest* de la *Nouvelle France*; par *Louis Hennepin*, Missionnaire Recollect. &c. à *Paris*, 1683. in 8vo.
- n. 91. p. 5170. 10. *Observations Topographical, Moral, and Physiological*, made in a *Journey* through Part of the *Low-Countries, Germany, Italy, and France*; by *J. Ray*, F. R. S. Whereunto is added, a *brief Account of Fran. Willoughby*, Esq; his *Voyage* through a great Part of *Spain*. *Lond.* 1673. in 8vo.
- n. 66. p. 2017. 11. *Jo. Battista Donius* de *Restituenda Salubritate Agri Romani*.
- n. 149. p. 258. 12. *Historia Naturalis Helvetiæ Curiosa*. Auth. *Job. Jacobo Magnero*, M. D. *Tiguri*.
- n. 94. p. 6049. 13. A *brief Account of some Travels in Hungaria, Servia, Bulgaria, Macedonia, Theffaly, Austria, Styria, Carinthia, Carniola, Friuli, &c.* by *Edward Brown*, M. D. *Lond.* in 4to.
14. An

14. An Account of several Travels through a great Part of *Germany*; by *n. 130. p. 767.*
Edw. Brown, M. D. Lond. 1677. in 4to.

15. A Collection of curious Travels and Voyages, in two Tomes: The first containing Dr. *Leonhart Rauwolff's* Itinerary into the *Eastern Countries, &c.* The second taking in many Parts of *Greece, Asia Minor, Egypt, Arabia, &c.* from the Observations of *M. Belon, Mr. Vernon, Dr. Spon, Dr. Smith, Dr. Huntingdon, Mr. Greaves,* and others. To which are added three Catalogues of *Plants* growing in the *Levant.* By *J. Ray.*

16. The History of *Poland*, in several Letters to Persons of Quality; *n. 238. p. 98.* giving an Account of the *antient and present State* of that Kingdom, Historical, Geographical, Physical, Political, and Ecclesiastical, *&c.* with several Letters relating to Physick. Vol. I. To which is added a new Map of *Poland.* By *Bern. Conner, M. D. Lond. 1697. in 8vo.*

17. A Description of the Islands and Inhabitants of *Feroë, &c.* written in *n. 119. p. 456.*
Danish; by Lucas Jacobson Debes, A. M. Englished by J. S. Doctor of Physick, in 12mo.

18. *Johannis Schefferi Laponia, &c. Francofurti, 1673. in 4to. n. 102. p. 31.*

19. A Narrative of some Observations made upon several Voyages undertaken to find a Way for sailing about the *North* to the *East-Indies*, and for returning the same Way from thence hither: Together with Instructions given by the *East-India Company* for the Discovery of the famous Land of *Jezzo*, near *Japan.* To which is added a Relation of sailing through the *Northern America* to the *East-Indies; by Dirick Rembrantz van Nierop, at Amsterdam, 1674. in 4to, abridged here. n. 109. p. 197.*

20. Beschrijving der Oost Indische kusten, *Malabar, Coromandel, Ceylon, &c.* Door *Philippus Baldæus. T. Amsterdam, 1672. in Fol. n. 80. p. 3088. n. 14. p. 248.*

21. Relations of divers curious Voyages; by *M. Thevenot. n. 89. p. 5128.*

22. Relation du Voyage de l' Evesque De *Beryte*, par la *Turquie, la Perse, les Indes, &c. jusques au Royaume de Siam, & autres Lieux; par M. de Bourges. n. 18. p. 327.*

23. A Continuation of the Memoirs of *M. Bernier*, concerning the Empire of the *Great Mogul. Englished out of French. Lond. 1671. in 8vo. n. 75. p. 2263.*

24. The six Voyages of *John Baptista Tavernier*, Baron of *Aubonne*, through *Turky* into *Persia* and the *East-Indies.* In *English. Lond. 1678. in Folio. n. 129. p. 711. n. 130. p. 751. n. 137. p. 942.*

25. A New Account of *East-India* and *Persia*, in eight Letters; being nine Years Travels; begun 1672. and finished 1681, *&c.* by *J. Fryar, M. D. Lond. 1698. in Fol. n. 244. p. 338.*

26. Voyage de *Siam* des Peres *Jesuites*, Envoyez par le Roy aux *Indes à la Chine, à Paris, 1686. in 4to. n. 185. p. 249.*

27. *Athanasii Kircheri China Illustrata. n. 26. p. 484.*

28. Hebdomas observationum de Rebus *Sinicis; Auth. Andrea Mullero Greiffeinbagio. Coloniae Brandenburgiae, An. 1674. n. 136. p. 919.*

29. Nouveaux Memoires sur l'Etat Present de la *Chine; par le L. P. Louis le Conte S. J. Amsterd. 1697. in 12mo. 2 Vols. Translated into English, in 8vo. n. 229. p. 585.*

- n. 48. p. 973. 29. An historical Essay, endeavouring a Probability that the *Language of China* is the *Primitive Language*; by *J. Webb, Esq*; Lond. 1669. in 8vo.
- n. 71. p. 260. 30. *Relatione dello Stato Presente dell' Egipto* scritta dal. *Sig. Gio. Michaele Vanstebio*. In *Parigi*, in 1670. in 12mo.
- n. 48. p. 972. 31. *Historia General de Etiopia a Alta*; per lo *Padre Baltasar Tellez*. Em *Conimbra*. An. 1660. in *Fol*.
- n. 14. p. 251. 32. *The Causes of Inundations of the Nile*; by *M. De la Chambre*.
- n. 8. p. 145. 33. *H. Vossius de Nili & aliorum Fluviorum Origine*.
- n. 17. p. 304. 34. *Die Africanische Landschaft Fetu* beschrieben; durck *Wilhelm. Joban. Muller von Hamburg*; Gedruckt zu *Hamburg*, 1673. in 12mo.
- n. 108. p. 182. 35. An Account of several late Voyages and Discoveries to the South and North, towards the *Streights of Magellan*, the *South Seas*, the vast Tracts of Land beyond *Hollandia Nova*, &c. also toward *Nova Zembla*, *Greenland* or *Spitzberg*, *Groyland* or *Engronland*, &c. By *Sir J. Narborough*, *Capt. Tasman*, *Capt. J. Wood*, and *Fred. Marten of Hamburg*. To which are annexed, a large Introduction and Supplement. The whole illustrated with *Charts and Figures*. Lond. 1694. in 8vo.
- n. 211. p. 166. 36. *Voyages and Discoveries in South America*: The first up the *River of Amazons* to *Quitto* in *Peru*, and back again to *Brasil*; performed at the Command of the *King of Spain*, by *Christ. D' Acugna*. The second up the *River of Plate*, and thence by Land to the *Mines of Potosi*; by *M. Acarete*. The third from *Cayenne* into *Guaiana*, in search of the *Lake of Parima*, reputed the richest Place in the World; by *M. Grillet* and *Bechamel*. Done into *English* from the Originals; being the only Accounts of those Parts hitherto extant, with *Maps*. Lond.
- n. 225. p. 426. 37. An Account of a New Voyage round the World; by *Will. Dampier*. Lond. 1697. in 8vo.

C H A P. IV.

Miscellaneous Papers.

- A New Lamp*; I. 1. *ABCD* is a *Vessel of Latten*, well soldered every-where.
by *Mr. Rob. Boyle. Ph.*
Coll. n. 2.
p. 33.
Fig. 76.
- BC, EF*, are two *Bottoms*, soldered to that *Vessel*.
FG is a *Pipe* soldered to the *Bottoms* aforesaid, and whose *Aperture* is in the *great Cavity FA*.
H is a *Hole* in the *Pipe FG*, opening between the two *Bottoms BC, EF*.
I is another *Hole*, to which is soldered a *Pipe IG*, bended upwards at *G*.
PP is a little *Vessel* fit to receive the *Wick* of the *Lamp*.
LM is a slender *Pipe*, open at both Ends, and soldered to the *Cover AD* in *L*, and to the *Bottom EF* in *M*; so that, by that *Pipe*, the external

ternal Air may communicate, between the two *Bottoms*, without penetrating into the *Cavity*, *AF*.

N is a short *Pipe*, folder'd to a *Hole* in the *Cover AD*, so that thereby one may pour *Oil* into the *Cavity AF*, and stop it afterwards very close with a *Cork*.

For the *filling* up of this *Engine*, you must stop the *Aperture G*, of the *Pipe IG*, with a long *Pin* fitted for that Purpose; and the upper End of the *Pipe LM* must be stopped too: Then pour in your *Oil* by the *Aperture N*, which done, this same *Aperture N* is to be *shut* up exactly, and both the other to be *opened*, viz. *G* and *L*. Then it will come to pass, that the *Oil*, through the *Pipe IG*, will run and fill the *Vessel P*, till its *Superficies* be in the same *Level* with the *Hole H*, and no more, as might be easily demonstrated.

Now it is easy to see, that this *Lamp* is free from all *Inconveniencies* the *Lamp* of *Cardan* is subject to: For,

1. The *Air* doth not get into it by Starts or Gluts, as it doth in *Cardan's Lamp*; but when the *Oil* in *PP*, being *wasted* by the *Flame*, comes to have its *Superficies* lower than the *Hole H*, the *Oil* from the *Cavity AF* runs into *PP* gently, because its Place left in the *Cavity AF* is easily supplied by the *external Air*, which, through the *Pipe LM*, and the *Hole H*, gets up into the said *Cavity AF*.

2. When the *Air* contained in the *Cavity AF* comes to be *rarefied* by some *Heat*, it drives out much *Oil*, and so is able to choak *Cardan's Lamp*; but in this, the *Oil* being so driven out, gets into the Space between the two *Bottoms*, as well as into the *Vessel PP*. Now the said Space between the two *Bottoms*, by reason of its Largeness, receiving *twenty* or *thirty* times more *Oil* than the *Vessel PP*, it follows, that the *Superficies* of the *Oil* therein riseth 20 or 30 times less than if all the *Oil* had been driven into the said *Vessel*: Therefore, when we *fill* the *Lamp*, we must take care that the *Pipe L* may be well *shut*, so that the *Air* between the two *Bottoms*, finding no Issue, may keep the *Oil* from filling that Space, which by that means, when the *Hole L* is open, will be fit to receive the *Oil* driven out by the *Rarefaction* of the *Air* in the *Cavity AF*.

3. The *Oil* being always kept at the same Distance from the *Flame*, the *Wick* will not be quickly *consumed*.

4. You have the *Conveniency* to put *new Oil* into the *Lamp*, without moving or extinguishing the same; for you need but shut up *G* and *L*, and pour the *Oil* through *N*, as hath been said in the Beginning.

2. Let a *Lamp*, made two or three *Inches* deep, with a *Pipe* coming from the Bottom, almost as high as the Top of the *Vessel*, be filled first with *Water*, so high as to cover the *Hole* of the *Pipe* at the Bottom; to the end the *Oil* may not get in at the *Pipe* (and so be lost); then let the *Oil* be poured in so as to fill the *Vessel* almost brim-full, which must have a *Cover* pierced with so many *Holes* as are designed to be *Wicks*: When the *Vessel* is thus filled, and the *Wicks* are lighted, if *Water* falls in by Drops at the *Pipe*, it will keep the *Oil* always at the same *Height*, or very near, the

Another, by
Dr. Rob.
St. Clare.
n. 245. p. 380.

Weight of *Water* to that of *Oil* being, according to *Kircher's Table*, $20\frac{3}{11}$ to 19, which in two or three *Inches* will make no considerable Difference. If the *Water* runs faster than the *Oil* wastes, it will only run over at the *Top* of the *Pipe*; what does not run over, will come under the *Oil*, and keep it to the same Height.

Perpetual
Lamps in Imitation of the
sepulchral
Lamps of the
Antients; by
Dr. Ro. Plott.
n. 166. p. 806.

Vid. Vol II.
Chap. III.
Sect. XCII.
& XCIII.

II. I have often heard it asserted, that a *metalline Wine*, especially of the best refined *Gold* (whose Prerogative is, not to be *diminished* by *Fire*) will lick up *Oil*, and so make a *perpetual Flame*, provided it be supplied with a *perpetual Oil*: But I found (upon *Trial*) in a *Faggot* of *Wire* made of annealed *Iron*, of a suitable Bigness for a *Wick*, it would not succeed by any manner of Means I could readily think of; nor have I much Reason to think it will, either in *Wire* of *Silver* or *Gold*, the Nature of them all seeming not much different, as to this Particular. If, therefore, it be necessary that we must have a *perpetual Wick* for the making such *perpetual sepulchral Lamps* as were used by the *Antients*, I think we must make use of *Linum Asbestinum*, *Earth Flax*, or *Salamanders Wool*, which will do the Office of a *Wick* tolerably well; and if it can any way be supplied with a *perpetual Oil* (as I shall presently shew you), I hope you will not judge me far from effecting the Matter. Now that there may be such a *Bitumen*, or *inexhaustible Oil*, I will carry you no farther than *Pitchford* in *Shropshire* to shew you: For there is a *Naphtha*, or *liquid Bitumen*, that constantly issues forth with a *Spring* there, and floats upon the *Water*: This I would have *separated*, before it joins with the *Water*, into a *Ductus* of its own, and so conveyed to the Place thought most convenient for such a *Lamp*, into which it should as *perpetually* distil, as it does now into the *Fountain*; which, I doubt not, may be done without any great matter of Difficulty; and, if so, we have an *Oil* as *everlasting* as our *Wick*: Nor need we to fear any *Extinction* if inclosed in a *Tomb* or *Vault* under-ground, in never so damp or moist a Place; it being the *Characteristick* of a *Bitumen*, to burn best where there is Moisture; as is evident, upon Affusion of *Water* upon *Sea-coal*. And this is one Way I have thought of that such a *perpetual sepulchral Lamp* might possibly be contrived.

But if you will be so strict with me, as not to allow this to be a *perpetual Wick*, or that it is probable one should be made any other Way; as unlikely may it seem, that there was ever any such thing as a *perpetual Lamp*, notwithstanding the Testimonies of *St. Austin*, *Plutarch*, *Pliny*, *Ludovicus Vives*, *Baptista Porta*, *Licetus*, *Pancirollus*, and divers others; whereof some are said to have burnt 1000, some 1500 *Years*. But I dare not think so many, and so very good Authors, have all imposed upon us; or that it is almost possible that so many notable Instances as are brought for them, should all be false: Much rather, therefore, shall I determine (than wholly explode the Thing), that the *Liquor* of these *Lamps* did burn without any *Snuff* or *Wick* at all; as we see *Camphire* and most *Bitumens* will; it not being expressed (that I remember) in any of the Relations of these *Lamps*, that they were found with any *Wicks*: Whence both the In-

conve-

conveniencies above-mentioned attending a *Wick, ipso facto*, cease. It only therefore remaining, that we find out an *inexhaustible Oil*, which, conveyed to a fit Vessel, might cause such a *Lamp*; why may not our *Bitumen* at *Pitchford* serve the Turn? Which, no question, will *burn* without a *Wick*, as well as any other *liquid Bitumen*. All the Objection I can foresee that is likely to obtain Advantage against such an Experiment is, that such a *Lamp* as this would as likely *burn* in the *open Air*, as in an *inclosed damp Vault*; whereas the *Lamps* of the *Antients* did nourish their *Flame* best where there was most *Want* of *Air*, only in *close Vaults* and *Tombs*, and were presently *extinguished* upon the least Immission of *external Air*; these being Qualities necessary, and almost always asserted as Concomitants of the *antient sepulchral Lamps*. To which I answer, first, that some of the *Lamps* of the *Antients* did as well *burn* in the *open Air*, as in *close damp Vaults*; as that mentioned by *St. Austin* in his Book *De Civitate Dei*, which hung in the *Temple* of *Venus* always exposed to the *open Weather*, yet was never either *consumed* or *extinguished*. The *Lamp* also found in the *Tomb* of *Pallas* the *Arcadian*, slain by *Turnus* in the *Trojan War*, was of this Kind, which remained *burning* after it was taken forth, notwithstanding either *Wind* or *Water*, with which some did endeavour to quench it. Now admitting our *Lamp* at *Pitchford* should thus *burn* indifferently, under both Circumstances, what are we the worse? Since I never heard that the *Lamp* mentioned by *St. Austin*, or of *Pallas*, were ever the less esteemed or admired, because they could not be *extinguished* by the *open Air*, as most of the rest have been said to be.

But if any-body be so nice, that he must have an *Oil* in all Particulars answerable to that other Sort of the *Antients*, that *burns* best where there is *want* of *Air*, and is destroyed by its Admission; let him but go with me into *Flintshire* to the *Coal-works* of *Sir Roger Mostyn* of *Mostyn* in that County, and he may have Satisfaction; where the *Miners*, when they have dug so deep, that they begin to perceive a *Want* of *Air*, find a *blueish Flame* to begin to kindle of itself in the *Fissures* of the *Coal* (they sometimes light their *Candles*), which *blazes*, and moves up and down *continually*, and sometimes *shines* too upon the *Surface* of the *Water* in the *Bottom* of the *Pits*, shewing all the *Colours* of the *Rainbow*; which yet, upon drawing up of the *Water* that annoys the *Works*, and thereby stirring the *Air*, will leave off *burning*: But as they sink lower, and are more remote from the *Day*, or *superterraneous Air*, it still increases upon them. Whence it plainly appears, that this is a Sort of *Fire* that so little requires *Air* for the Maintenance of it, that it *burns* best when there is least *Air*, and is *extinguished* when disturbed by the Motion of it; as the *antient Lamps* are said to be upon the Immission of *external Air*. The same Sort of *Fire* has also been taken notice of, in the *Coal works* of *Somersetshire*, by the ingenious *Mr. Beaumont*, and by *Mr. George Sinclair* in the *Coal-works* of *Scotland*. This I doubt not but you will readily allow me to be as probable a Material for the *Oil* of this *second Sort* of *perpetual Lamps*, as that of *Pitchford* was for the

Vid. Vol. II.
Chap. III.
Sect. VII. 4.

the former: But how this or that shall be so managed as to be put into a *Lamp*, and this *Lamp* perpetually supplied, and placed where-ever it shall be desired, as it seems the *Lamps* of the *Antients* might, this *Fire* being sometimes found in little *Pots*, *Glasses*, or *Urns*, without any such *Ductus* to them, as we required at *Pitchford*, or might do here, is a Difficulty perhaps not so easily conquered. To which I must confess that I have only this to say, that unless there can be a Preparation chymically made out of these *bituminous* Materials, which thus naturally *take fire* of themselves, or preserve it without a *Wick*, a small Quantity whereof shall maintain so tenuous a *Flame* as that there shall be no considerable Consumption of the Matter in many *Years* (such as the *Flame* over the *Well*, and *Earth* about it, in one Mr. *Hawkley's* Ground in *Lancashire*, that, like the *Fire* of *Plato*, only *shines*, and does not *burn*); we must be contented to be tied to the Places where these Materials are.

Vide Vol. II.
Chap. III.
Sect. VIII.

But if we can be content to quit these Materials, and to think that these *Lamps* (as many have done) did not *shine* or *burn* for all the Time they were inclosed in those *Tombs*, but were only *inkindled* by the Admission of *Air*, when opened; I have thought of a Way not at all liable to any of the Defects or Inconveniencies of the two former Ways, whereby a *Glass* of *Liquor*, inclosed in another (like the *Urns* of *Olybius*), upon Immission of *external Air*, shall certainly *shine*, though it did not so before: And it is this; Take a small Phial, into which put a little of the *liquid Phosphorus* (which, you all know, if the Phial be *stopt*, *shines* not at all); include this in the *Recipient* of an *Air-Pump*, out of which if the *Air* be well *exhausted*, the *solid Phosphorus* itself will leave off *shining* in ten Hours time, though in the *Summer Quarter*, and the *liquid* in fewer; so that it shall shine no more, than when the Bottle containing it is *stopt* with a *Cork*. Now let such an *exhausted Recipient*, with the included *Phosphorus*, be placed in a *Tomb* or *Vault*, which are commonly dark, and, if ever found, and the outer *Glass* broken (as usually such Things are, by ignorant Men employed in digging), possibly there will appear, upon Immission of the *Air*, as good a *perpetual Lamp* as some that have been found in the *Sepulchres* of the *Antients*; though, in all Probability, of a different Kind from all, or most of them.

An Account of
an Engine that
consumes
Smoke; by
M. Justel.
n. 181. p. 78.

III. M. *Dalesme* has found out a *Machine*, which, though very little, and portable, *consumes* all the *Smoke* of all Sorts of *Wood* whatsoever, and that so, that the most curious *Eye* cannot discover it in the Room, nor the nicest *Nose* smell it, although the *Fire* be perfectly open. This *Engine* is composed of several Hoops of hammered *Iron*, of about four or five *Inches* Diameter, which shut one into the other; it stands upright in the Middle of the Room, upon a sort of *Trevet* made on purpose: *A* is the Place where the *Fire* is made, where, if you put little Pieces of *Wood*, it will not make the least *Smoke* neither at *A*, nor *B*, over which you cannot hold your Hand within *Half a Foot*, there comes out so great a *Heat*. If you

Fig. 77.

take one of these Pieces of *Wood* out of the *Fire* at *A*, it *smokes* presently; but ceases immediately, so soon as it is cast into the *Fire* again. The most fetid Things, as a *Coal* steep'd in *Cats-piss*, which *sinks* abominably when taken out of the *Fire*, notwithstanding in this *Engine* makes not the least ill *Scent*; the same did *Red Herrings* broiled thereon. On the other Side all *Perfumes* are lost in it, and *Incense* makes no *Smell* at all, when burnt therein. We learnt, that this is not shewn but when the *Fire* at *A* is well kindled, and the *Tunnel B D* very hot, so that the *Air* that feeds the *Fire* cannot come that Way, but must all press in upon the open *Fire*, whereby the *Smoke* and *Flame* is all forced inwards, and must pass through the Heap of burning *Coals* in the *Furnace A*; in which Passage the Parts thereof are so dispersed and refined, that they become *inoffensive* both to the *Eye* and *Nose*.

IV. The best Remedies against *Cold* are such as retain *Heat*, or continue *Fire* longest. To this Purpose some have taken Notice, That *Joiners* use *Leaden Pots* for their *Glue*, alleging for a Reason, that *Lead*, being a close Metal, retains the *Heat* longer than other Metals. *Cary's Warming-stone* promised a Warmth for six or eight *Hours*; if it performed but for two or three *Hours*, it would be of great Use. It is found by sad Experience, how hurtful *bright Fires*, and especially of *Stone-coal*, are to the *Eyes*.

Some Suggestions for Remedies against Cold; by
n. 21. p. 379.

To retain *Fire* long, certain *black Earths* are useful, as we were lately informed by the inquisitive Dr. B. That a Gentleman in *Somersetshire*, called Mr. *Speke*, had bountifully obliged *Ilminster*, and his Neighbourhood, by a *black fat Earth* lately found in his *Park*: But the same Correspondent adds, that he never saw any parallel to a *Sea Weed*, which he and his Fellow Students had in *Cambridge*, in the Mouth of a *Barrel* of good *Oysters*. It was smaller than *Peas-balm*, yet cut, it lasted two very great *Fires* of *Sea-Coal*, burning bright in the midst of the *Fire*; and by a *Stroke* of the *Tongs* it fell into the *Hearth*, jingling like *Metal*.

V. *May 5. 1665.* Fresh *Mackrels* were boiled in *Water*, with *Salt* and *Sweet Herbs*; and, when the *Water* was perfectly cold, the next Morning, the *Mackrels* were left in the *Water* for *Pickle*.

Observations on shining Fish; by Dr. Beal. n. 13. p. 226.

May 6. More fresh *Mackrels* were boiled in like *Water*, and *May 7.* both *Water* and *Mackrels* were put into the former *Water*, together with the former *Mackrels* (which Circumstances I do particularize, because whether the Mixture of the *Pickle* of several Ages, and a certain Space of Time, or whatever else was necessary and wanting, the Trial did not succeed with the like Effect at other Times).

But now on *May 8. Evening*, the Cook stirring the *Water*, to take out some of the *Mackrels*, found the *Water*, at the first Motion, become very *luminous*, and the *Fish* shining through the *Water*, as adding much to the *Light* which the *Water* yielded. The *Water*, by the Mixture of *Salt* and

Herbs

Herbs in the Boiling, was of itself thick, and rather *blackish*, than of any other Colour; yet, being stirred, it *shined*, and all the *Fish* appeared more brightly *luminous*, in their own Shapes.

Where-ever the Drops of this Water (after it was stirred) fell on the Ground, or Benches, they *shined*; and the Children took Drops in their Hands, as broad as a *Penny*, running with them about the House; and each Drop, both near and at a Distance, seemed, by their *shining*, as broad as a *Sixpence*, or a *Shilling*, or broader.

The Cook turned up the Side of the *Fish* which was lowest, and thence came no *shining*; and after the Water was for some good time settled, and fully at Rest, it did not *shine* at all.

On *Tuesday* Night *May* 9. we repeated the same Trial, and found the same Effects: The Water, till it was stirred, gave no *Light*, but was thick and dark, as we saw by *Day-light*, and by *Candle-light*; as soon as the Cook's Hand was thrust into the Water, it began to have a *Glimmering*; but being gently stirred by the Hand moving round, it did so *shine*, that they who looked on it at some Distance from the further End of another Room, thought verily it was the *shining* of the *Moon* through a Window upon a Vessel of *Milk*; and by brisker Circulation it seemed to *flame*.

The *Fish* did then *shine* as well from the Inside as the Outside, and chiefly from the *Throat*, and such Places as seemed a little broken in the boiling. I took a Piece that *shined* most, and fitted it as well as I could devise in the Night, both to my great *Microscope*, and afterwards to my little one; but I could discern no *Light* by any of these *Glasses*, nor from any Drops of the *shining* Water, when put into the *Glasses*. And *May* 10. in the brightest Rays of the *Sun*, I examined, in my great *Microscope*, a small broken Piece of the *Fish*, which *shined* most the Night before; we could find nothing on the Surface of the *Fish* very remarkable: It seemed *whitish*, and, in a manner, dried, with deep Inequalities; and others, as well as myself, thought, we saw a Stream, rather *darkish* than *luminous*, arising, like a very small Dust, from the *Fish*; and rarely, here and there, a very small and almost imperceptible *Sparkle* in the *Fish*: Yet of these *Sparkles* we are certain; we numbered them, and agreed in the Number, Order, and Place. Of the *Steam* I am not confident, but do suspect our *Eyes* in the *bright Sun*; or that it might be some *Dust* in the *Air*.

The great *Microscope* being fitted in the *Day-light* for this Piece of *Fish*, we examined it that Night, and it yielded no *Light* at all, either by the View of the *Glass*, or otherwise.

Finding it *dry*, I thought that the Moisture of *Spittle*, and touching of it, might cause it to *shine*: And so it did, though but a very little, in a few small Sparks, which soon *extinguished*. This we saw with the *bare Eye*, not in the *Glass*.

The *Fish* were not yet *fetid*, nor insipid to the best discerning Palates; and I caused two *Fishes* to be kept, for further Trial, two or three *Days* longer, till

till they were *fetid* in very hot Weather; and then I expected more *Brightness*, but could find none, either in the *Water*, by stirring it, or in the *Fish* taken out of the *Water*.

VI. 1. *March* 15. 167 . When I was about to go to Bed, an *Amanuensis* of mine informed me, that one of the Servants of the House going, upon some Occasion, into the *Larder*, was frighted by something of *luminous* that she saw (notwithstanding the *Darkness* of the Place) where the *Meat* had been hung up before: Whereupon I presently sent for the *Meat* into my Chamber, and caused it to be placed in a Corner of the Room, being made considerably dark; and then I plainly saw, both with Wonder and Delight, that the Joint of *Meat* did, in divers Places, *shine* like *rotten Wood* or *stinking Fish*. The chief Circumstances and *Phænomena* that I had Opportunity to take Notice of, at so inconvenient an Hour, were these:

*Observations
about shining
Flesh; by Mr.
Rob. Boyle.
n. 89 p. 5103.*

1. That the Subject we discourse of was a *Neck* of *Veal*, which had been bought of a Country Butcher on the *Tuesday* preceding.

2. In this one Piece of *Meat* I reckoned distinctly above twenty several Places that did all of them *shine*, though not all of them alike, some of them doing it but very faintly.

3. The Bigness of these *lucid* Parts was differing enough, some of them being as big as the *Nail* of a Man's middle *Finger*, some few bigger, but most of them less; nor were their Figures at all more uniform, some being inclined to a *round*, others almost *oval*, but the greatest Part of them very irregularly shaped.

4. The Parts that *shone* most were, some *gristly* or soft Parts of the *Bones*, where the *Butcher's Cleaver* had passed; but these were not the only Parts that were *luminous*; for, by drawing to and fro the *Medulla Spinalis*, we found, that a Part of that also did not *shine* ill; and I perceived one Place in a *Tendon* to afford some *Light*; and, lastly, three or four Spots in the *fleshy* Parts, at a good Distance from the *Bones*, were plainly discovered by their own *Light*, though that were fainter than in the Parts above-mentioned.

5. When all these *lucid* Parts were survey'd together, they made a very splendid Shew; so that, applying a printed Paper to some of the more *resplendent* Spots, I could plainly read divers consecutive *Letters* of the *Title*.

6. The Colour that accompanied the *Light* was not in all the same; but in those which shone liveliest it seem'd to have such a fine *greenish Blue*, as I have divers Times observed in the *Tails* of *Glowworms*.

7. But notwithstanding the Vividness of this *Light*, I could not, by the Touch, discern the least Degree of *Heat* in the Parts whence it proceeded; and, having put some Marks on one or two of the most *shining* Places, that I might know them again when brought to the Light, I applied a *sealed Weather-glass*, furnished with *tincted Spirit* of *Wine*, for a pretty While, and could not satisfy myself that the *shining* Parts did at all sensibly warm the *Liquor*.

8. Notwithstanding the great Number of *lucid* Parts in this *Neck* of *Veal*, yet neither I, nor any of those that were about me, could perceive, by the *Smell*, the least Degree of *Stink*, whence to infer any *Putrefaction*; the *Meat* being judged very fresh, and well conditioned, and fit to be dressed.

9. The Floor of the *Larder*, where this *Meat* was kept, is almost a Story lower than the Level of the Street, and it is divided from the Kitchen but by a Partition of Boards, and is furnished but with one Window, which is not great, and looks towards the Street, which lies *northward* from it.

10. The *Wind*, as far as we could observe it, was then at *South-west*, and blustering enough; the *Air*, by the *sealed Thermoscope*, appeared hot for the Season, the *Moon* was past its *last Quarter*; the *Mercury* in the *Barometer* stood at $29\frac{1}{10}$ Inches.

11. We cut off with a Knife one of the *luminous* Parts, which proved to be a tender *Bone*, and, being about the Thickness of a *Half Crown* Piece, appeared to *shine* on both Sides, though not equally; and that Part of the *Bone* whence this had been cut off, continued joined to the rest of the *Neck* of *Veal*, and was seen to *shine*, but nothing near so vividly as the Part we had taken off did before.

12. To try whether I could obtain any *Juice* or moist Substance from this, as I have several Times done from the *Tails* of *Glowworms*, I rubbed some of the softer and more *lucid* Parts, as dextrously as I could, upon my Hand; but I did not at all perceive any *luminous Moisture* was thereby imparted; though the *Flesh* seemed, by that Operation, to have lost some of its *Light*.

13. I caused also a Piece of *shining Flesh* to be compressed betwixt two Pieces of *Glass*; but I did not find the *Light* to be thereby *extinguished*.

14. I put a *luminous* Piece of *Veal* into a *crystalline* Phial, and, pouring on it a little pure *Spirit of Wine*, after I had shaken them together, I laid by the *Glass*, and in about a *Quarter* of an *Hour*, or less, I found that the *Light* was *vanished*.

15. But *Water* would not so easily quench our seeming *Fires*; for having put one of them into a *China* Cup, and almost filled it with *cold Water*, the *Light* did not only appear, perhaps, undiminished, through that *Liquor*, but, above an *Hour* after, was vigorous enough not to be *eclipsed* by being looked upon at no great Distance from a burning *Candle*.

16. While these Things were doing, I caused the *pneumatical Engine* to be prepared in a Room without Fire (that the Experiment might be tried in a greater Degree of *Darkness*); and having conveyed one of the largest *luminous* Pieces into a small *Receiver*, we caused the *Pump* to be plied in the *Dark*; and perceived, upon the gradual withdrawing of the *Air*, a gradual *lessening* of the *Light*, which yet was never brought quite to *disappear* (as I long since told you, the *Light* of *rotten Wood* and *Glowworms* had done), or to be so near *vanishing* as one would have expected. But by the

the hasty Increase of *Light*, that disclosed itself in the *Veal* upon this letting in of the *Air* to the *exhausted Receiver*, it appeared more manifestly than before, that the Decrement, though but slowly made, had been considerable. This Trial we once more repeated with a not unlike Success, which, though it convinced us that the *luminous* Matter of our included Body was more vigorous or tenacious than that of most other *shining* Bodies; yet it left us some Doubts, that the *Light* would have been much more impaired, if not quite made to *vanish*, if the Subject of it could have been kept long enough in our *exhausted Receiver*.

17. It was also found, that a *Leg* of the same *Veal* had some *shining* Places in it, though they were but very few, and faint, in Comparison of those that were conspicuous in the above-mentioned *Neck*.

18. *March* 16. Between Four and Five in the Morning, I looked upon a clean *Phial*, that I had laid upon the Bed by me after a Piece of our *luminous Veal* had been included in it, and found it to *shine* vividly. I looked upon it again the third *Day* (inclusively) after we had first observed the *Meat*, it was cut off from, to be *luminous*; and I found it to *shine* in the Dark as vigorously as ever: The fourth *Day* its *Light* was also conspicuous, so that I was able, in a dark Corner of the Room, to shew it, even in the *Day-time*, to three or four very ingenious Physicians; but before the Night following the *Light* began to decay, and the offensive *Smell* to grow somewhat strong; which seems to argue, that the Disposition, upon whose Account our *Veal* was *luminous*, may very well consist both with its being and not being in a State of *Putrefaction*, and, consequently, is not likely to be derived merely from the one or the other. The fifth *Day*, in the Morning, looking upon it before the Curtains were opened, it seemed to *shine* better than it had done the *Day* preceding; the same Night, also, it was manifest enough, though not vivid, in the Dark: When I awaked the sixth *Day* in the Morning, after the *Sun* was *risen*, I could, within the Curtains, perceive a glimmering *Light*; but the seventh *Day* I could not, late at Night, discern any *Light* at all.

19. I shall only add, and conclude with, one Observation more, which may possibly take off our Thoughts from striving to deduce the *shining* of our *Veal* from the peculiar *Nourishment*, or *Constitution*, or *Properties* of that *individual Calf*, whose *Flesh*, &c. were *luminous*: For, having several Nights sent purposely into the Larder, to observe whether any *Veal*, since brought thither, or any other *Meat*, did afford any *Light*; a negative Answer was always brought me back, save at one Time, which happened to be within less than forty-eight *Hours* of that at which the *Luminousness* of the *Veal* had been first taken Notice of; for, at this Time, there was in the same *Larder* a conspicuous *Light* seen in a *Pullet*, that hung up there; which having caused to be brought up in a darkened Place in my Chamber in the Night-time, I perceived four or five *luminous* Places, which were not indeed near so large as those of the *Veal*, but very little less *vivid* than they: All of these I took Notice to be either upon or near the *Rump*; and that which appeared

most like a Spark of *Fire*, *shone* at the very Top of that Part: Yet was not this Fowl *mortified*, nor at all *ill-scented*, but so fresh, that the next Day I found it very good Meat.

By Dr. J. Beal.
n. 125. p. 599.

2. 1. Upon *Friday* (*Feb. 25. 1675-6.*) a Woman of *Yeovil* in *Somersetshire* bought in the Market a *Neck of Veal*, which seemed well coloured, and well conditioned in every Respect: The *Calf*, a *Cow calf*, was killed in the Evening the Day before; it was hung to a Shelf in a little Chamber, where she and her Husband lay; upon the following *Saturday*, about Nine in the Night, the *Neck of Veal shined* so bright, that it did put the Woman into a great Affrightment: She calls up her Husband; he hastens to the *Light*, as fearing *Fire* and *Flames*, and seeing the *Light* come only from the *Flesh*, he caught the *Flesh* in his Left Hand, and beat it with his Right Hand, as endeavouring to extinguish the *Flame*, but without Effect: The *Flesh shined* as much, if not more, than before, and his Hand, with which he beat the *Flesh*, became all in a *Flame*, as bright and vivid as the *Flesh* of the *Veal* was; and so it continued, whilst he went from Place to Place, shewing it to others. Then he thrusts his *blazing* Hand into a Pail of pure *Water*: This could not extinguish the *Flame* at all, but his Hand *shined* through the *Water*. At last he took a Napkin, and wiped his Hand, till he wiped off all the *Light*. The next Day (being *Feb. 27.*) the *Veal* was dressed, and some of the Neighbours, who saw it *shining*, were invited to eat of it; all esteemed it as good as any they had eaten. A Part of it was kept for *Feb. 28. and 29.* in which Time it lost nothing of its *Sweetness*.

2. And now I want not a Parallel in Consort for that Part of this Relation, which seemeth strangest: For on *Tuesday* (being *April 4. 1676.*) a fat *Pork* was killed for my Family; within two Days the *Guts*, or (as some call them) the *Chitterlings* and *Feet* of the *Pork* were boiled, and after they were thoroughly cold they were put, in due Order, in *Souse-drink*, or *Pickle*, in a low Room on the North-side, which had little *Light* at Mid-day, and was very dark as soon as Night began. *April 8.* all those Parts of the *Guts*, and the *Claws* of the *Feet*, which floated on the Top of the *Pickle*, began to *shine*, and the Parts immersed under Water gave no *Light*; the *Light* increased daily more and more in all the Parts that floated. *April 13.* the *Light* seemed as bright as the brightest *Moon-shine*: Thus it continued to *shine* (but fainter and fainter, and in fewer Parts) almost a *Week* longer; for, being often tumbled up and down, by slow Degrees all sunk into the *Pickle*, and then all the *Light* expired. Whilst the *Light* was vivid, I caused a Maid-servant to rub one of her Hands upon the *shining* Part, after which she came through three Rooms into the Place where I sat, between a great *Fire* on one Side, and a *Candle* or two on a Table near at Hand, on the other Side; and in this Place she shewed me her Hand, all over *shining*, as bright as *Moon-shine*: One, indeed, stood between her Hand and the *Fire*, another between her and the *Candles*. Thence I went into another Room, where there was but a small *Fire*, and no *Candle*, but (at that Time) a little *Moon-shine* through a Window; there the *shining* Parts of her Hand, or indeed her Hand all over, appeared to be very bright *Flames*. Then I
caused

caused some of the *shining Pork* to be brought into the same Room, and examined, whether the *Pickle* did not *shine*, and so might give the *flaming Tincture* to the Maid's Hand; but by wiping the *Pork* diligently with a Napkin, till it was perfectly dried, we found, that the *Flame* of the *Pork* was rather increased (as we all thought) than diminished. Then I desired all the Company (whereof some were young Children, which have the tenderest *Touch*) to try, whether the most *flaming* Parts had any perceptible Degree of *Tepidity*: All agreed, that they could feel no Warmth, and that all the Parts of the *Pork* were manifestly *gelid*; but some thought that they perceived the *luminous* Parts less *gelid* than the *dark* Parts, others denied it: For my own Part, I found not so much Difference as could clear me from suspecting a prepondering Fancy. After these Trials, the Maid wiped off the *Light* from her Hand, by rubbing her Hand strongly with a Napkin, three or four times over.

3. I took Notice, that, by this acquired *Blaze*, the Face and Hands would appear a great deal larger than they were; and the Manner how it was done being concealed, the Learned and Ingenious might be at a Loss to discover what it might be; so that it might fitly serve for an *Imposture*.

4. Histories report, of a sudden and short *Fulgor* about the Countenance of the *Living*, which they interpreted to presage something extraordinary, by which those Persons became illustrious; but of *dead Carcases*, which became thus *luminous*, I have read nothing in old *Records*: That *Mackrels* in their *Pickle* did cast a *shining Blaze*, some Days before they were *ill-tasted*, or *ill-scented*, I gave you Notice *May 5. 1665.* since which Time I tried often to obtain the like, but without Success; though I know not what Circum-
Vid. sup.
Sect. V.

5. The *Pickle* in which the *Pork* was put was made only of *pure Water*, *Bran*, and *Bay-salt*, and was so far from *shining*, that it quenched the *Light*, by Degrees, of the *shining Flesh*. The *Mackrel-pickle* (which was boiled with a Mixture of *Sweet-berbs*), by a little stirring, became so *luminous*, that a Drop of it in the Palms of Childrens Hands appeared as broad as a *Sbiling*, or broader; so that a Wash of it might also fitly serve for an *Imposture*.

6. I think *shining Worms* are seldom found in *Oysters*, as was formerly observed by *M. Azout*: And perhaps one may wait a long Day before he shall see such a long lasting *Light* in the *Iceland Seas*, as was remarked by *Biornonius*: So that I cannot wonder if expert *Chymists* do, by some *Chance*, obtain more than by *Art*, and much *Diligence*, they can repeat again; since they deal with such fickle Agents as *Fire* and *Flame*. I have heard of some *Dews* on Meadows, *shining* in the early Morning, before Day-light; but those more frequently: These, and much better, some of *Mr. Boyle's* Instances in his *Pneumatical Experiments*, and more in his Discourse of *Luminous Gems*, at *Ep. 37.* the End of his elaborate Treatise of *Colours*, may, at least, by Resemblances, instruct us to apprehend the Nature of some *shining Meteors* among the *Clouds*, or in our *lower Region*, of which, they say, some have a *singeing Heat*, and do *blast*; and that some are to the Touch *gelid*, yet do *poison*, or *corrupt* our *Flesh*.
Vid. Vol. II.
Chap. VI.
Sect. LXIII.
Vid. sup.
Chap. III.
Sect. XXVI.

7. I shall only add, that I gave full Warning to observe whether the *Light*, in my two Instances, had any *blueish* or *greenish Tincture*: All that saw both affirmed the *Light* to be as clear as the brightest *Moon-shine*, and so it appeared to my own Eyes; and I can perfectly remember, that I really thought the Beams which came from the *Mackrel*, and the stirred Pickle, to be bright *Moon-shine*, till a Servant brought me to the *Vessel*, to see the contrary.

Postscript. We had a Report (whether true or false you may best know) of *shining Beef* in the *Strand*, about the same Time when the *Neck of Veal*, first mentioned, shined here: And it was here observed, that the *Stars* had a glaring Brightness, and Largeness, more than ordinary; and for some *Months* before, and ever since, the *Weather* hath been more gentle, warm, and dry, than is usual in these *Months*; but it is above my Skill to demonstrate how this belongs to the Matter in Hand. *Note*, That the *Mackrel-pickle* was thick, and not transparent, till it was stirred, and *flaming*; the *Pork-pickle* was clear, or transparent, yet *shined* not in any Part.

Observations
about the Re-
semblances and
Differences be-
tween a burn-
ing Coal and
shining Wood;
by Mr. Ro-
bert Boyle.
n. 32. p. 605.

Refem-
blances.

Vid. Vol. II.
Sect. LXXVI.

VII. The Things wherein I observed a Piece of *shining Wood* and a *burning Coal* to agree or resemble each other, are principally these *five*:

1. Both of them are *Luminaries*, that is, give *Light*, as having it (if I may so speak) *residing in them*; and not like *Looking-glasses*, or *white Bodies*, which are conspicuous only by the *incident Beams* of the *Sun*, or some other *luminous Body*, which they *reflect*.

This is evident; because both *shining Wood* and a *burning Coal* shine the more vividly, by how much the Place wherein they are put is made the *darker*, by the careful Exclusion of the *adventitious Light*.

2. Both *shining Wood* and a *burning Coal* need the Presence of the *Air* (and that too of such a *Density*) to make them continue *shining*.

This has been proved as to a *Coal*, by what I long since published in my *Physico-Mechanical Experiments*; and as to the *shining Wood*, the Experiments I have lately sent you, make it needless for me to add any other Proof of the Requisite, not only of *Air*, but of *Air of such a Thickness* to make its *Light* continue.

3. Both *shining Wood* and a *burning Coal*, having been deprived, for a Time, of their *Light*, by the withdrawing of the contiguous *Air*, may presently recover it by letting in fresh *Air* upon them.

The former Part of this, particular Trials have often shewn you to be true, when *kindled Coals*, that seem to be *extinguished* in our *exhausted Receivers*, were presently *revived*, when the *Air* was restored to them; and the latter Part is abundantly manifest, by the *Experiments* above-mentioned.

4. Both a *quick Coal* and *shining Wood* will be easily quenched by *Water*, and many other *Liquors*.

The Truth of this, as to *Coals*, is too obvious to need a Proof; and therefore I shall confirm it only as to *Wood*: For which Purpose you may be pleased to take the following Transcript of some of my *Notes* about *Light*.

I took a Piece of *shining Wood*, and, having wetted it with a little common *Water* in a clear *Glass*, it presently lost all its *Light*.

The like Experiment I tried with strong *Spirit of Salt*, and also with a weak *Spirit of Sal Ammoniac*; but in both the *Light* did, upon the *Wood's* imbibing of the *Liquor*, presently disappear.

I made the like Trial with *rectified Oil of Turpentine*, with a not unlike Success. The same Experiment I tried, more than once, with high *rectified Spirit of Wine*, which did immediately destroy all the *Light* of the *Wood* that was immersed in it; and, having put a little of that *Liquor*, with my Finger, upon a Part of the whole Piece of *Wood* that shone very vigorously, it quickly did, as it were, quench the *Coal* as far as the *Liquor* reached; nor did it in a pretty While, if at all, regain its *Luminousness*.

5. As a *quick Coal* is not to be extinguished by the Coldness of the *Air*, when that is greater than ordinary; so neither is a Piece of *shining Wood* to be deprived of its *Light* by the same Quality of the *Air*.

As much of this Observation as concerns the *Coal*, will be readily granted; and for Proof of the other Part of it this one Trial may suffice, which I shall now relate.

I took a small Piece of *shining Wood*, and put it into a slender *Glass Pipe*, sealed at one End, and open at the other, and placed this Pipe in a *Glass Vessel*, where I caused to be put a strongly *frigorifick* Mixture of *Ice* and *Salt*; and, having kept it there full as long as would be requisite to freeze an *aqueous Body*, I afterwards took it out, and perceived not any sensible Diminution of its *Light*. But though the *Light* of *shining Fish* be usually (as far as I have observed) more vigorous and durable than that of *shining Wood*, yet I cannot say that it will hold out against *Cold* so well as the other: For having ordered one of the Servants to cut off a good large Piece of a *luminous Whiting*, and bury it in *Ice* and *Salt*; when I called for it, in less than *Half an Hour* after, I found it much stiffened by the *Cold*, and to have no *Light*, that I could discern in a Place *dark* enough: And for fear that this Effect may have proceeded not barely from the Operation of the *Cold*, but also from that of the *Salt*, I caused, another Time, a Piece of *Whiting* to be put in a Pipe of *Glass* sealed at one End, and, having seen it shine there, I looked upon it again, after it had stayed but a *Quarter of an Hour*, by my Estimate, in a *frigorifick* Mixture, which the *Glass* kept from touching the *Fish*; and yet I could not perceive, in a *dark Place*, that it retained any *Light*.

1. The first Difference I observed betwixt a *live Coal* and a *shining Wood* is, Differences. that whereas the *Light* of the former is readily extinguishable by Compression (as is obvious in the Practice of suddenly extinguishing a Piece of *Coal* by treading upon it), I could not find that such a Compression as I could conveniently give without losing Sight of its Operation, would put out, or much injure the *Light*, even of small Fragments of *shining Wood*; one of my Trials about which I find thus set down:

I took

I took a Piece of *shining Wood*, and, having pressed it between two Pieces of clear Glass (whereof the one was pretty flat, and the other convex), so that I could clearly see the *Wood* through the Glass, I could not perceive, that the *Compression*, though it sometimes broke the *Wood* into several Fragments, did either *destroy*, or considerably alter the *Light*.

2. The next *Unlikeness* to be taken Notice of betwixt *rotten Wood* and a *kindled Coal* is, that the latter will, in very few *Minutes*, be totally *extinguished* by the withdrawing of the *Air*; whereas a Piece of *shining Wood*, being eclipsed by the Absence of the *Air*, and kept so for a Time, will immediately *recover* its *Light*, if the *Air* be let in upon it again within *Half an Hour* after it was first withdrawn.

The *former* Part of this Observation is easily proved by the Experiments that have been often made upon *quick Coals* in the *pneumatical Engine*; and the Truth of the *latter* Part appears, by the Experiments about *shining Wood* mentioned above: Neither is it improbable, that, if I had had Conveniency to try it, I should have found, that a Piece of *shining Wood*, deprived of its *Light* by the Removal of the ambient *Air*, would retain a Disposition to recover it upon the Return of the *Air*, not only for *Half an Hour*, but for *Half a Day*, and perhaps a longer Time.

3. The next *Difference* to be mentioned is, that a *live Coal*, being put into a small close Glass, will not continue to *burn* for very many *Minutes*; but a Piece of *shining Wood* will continue to *shine* for some whole *Days*.

The *first* Part of the Assertion, I know, you will readily grant; the other Part of it may be easily made out by what I have tried upon *shining Wood*, sealed up *hermetically* in very small Glasses, where the *Wood* did for several *Days* retain its *Light*.

4. A *fourth Difference* may be this; that whereas a *Coal*, as it *burns*, sends forth Store of *Smoke* or *Exhalations*, *luminous Wood* does not so.

5. A *fifth*, flowing from the former, is, that whereas a *Coal* in *shining* wastes itself at a great Rate, *shining Wood* does not.

These *two Unlikenesses* I mention together, because what concerns the *Coal* in both will need no Proof; and as for what concerns *rotten Wood*, it may be verified by an Observation that I made in a Piece of it *hermetically sealed* up in a small clear Glass; where, after it had continued *luminous* some Days, I looked on it in the *Day-time* to perceive if any Store of *Spirits* or other *Steams* had, during all that While, *exhaled* from the *Wood*; but could not find any on the Inside of the Glass, save that in one Place there appeared a kind of *Dew*, consisting of such very small Drops that a Multitude of them would go to the making up of one ordinary Drop. But in Pieces of *shining Fish* I found the Case much otherwise, as was to be expected.

6. The *last Difference* I shall take Notice of betwixt the Bodies hitherto compared is, that a *quick Coal* is actually and vehemently *hot*; whereas I have not observed *shining Wood* to be so much as sensibly *lukewarm*.

What is said of the *Coal's Heat*, being as manifest as its *Light*, I shall need only to make out what relates to the *shining Wood*; to assist me wherein, I meet, among my *Notes*, this following:

I put upon a large Piece of *Wood*, which was partly *shining*, and, as near as I could, upon one of the most *luminous* Parts of it, one of those *Thermoscopes* that I make with a *pendulous Drop of Water*; but as I had formerly tried that by laying the Tip of my Nose or Finger upon it, when it *shone* vividly enough to enable me to *discern* both the one and the other at the Time of a *Contact*, I could not perceive the least Degree of *Heat*, but rather an *actual Coldness*; so by this Trial I could not satisfy myself that it did visibly raise the pendulous Drop, though the Instrument was so tender, that, by approaching one Finger near it, yet, without actually touching it, it would manifestly be impelled up; and, upon the removal of my Finger, would presently descend again.

And I remember, that, having put such an *Instrument* upon a *shining Fish*, that was pretty large, I could not thereby perceive that it had any Degree of *Heat*, but rather the contrary: For having divers times taken off the *Glass*, to apply it with the more Advantage to several Parts of the *luminous Fish*, I divers times took Notice, that, upon the removal of the *Glass* into the *Air*, the *pendulous Drop* would manifestly rise a little, and subside again when the *Glass* was applied to the *Fish*. But whether this Part of the Experiment will hold in all Temperatures of the *Air*, I had not Opportunity to try.

VIII. The *Great Pier* is quite demolished, and filled up with *Rubbish*, and the *Rocks* that lay about forty *Yards* off in the *Sea* at the *Pier-head* are risen above *Water*; so that there are no Hopes of making good that *Pier* again. And the *Ways* leading from that *Pier* to the *Quarry* are turned upside-down, and sunk, at several Places, about thirty *Foot*: Also, the *Way* leading to the *North Pier* is under the same Circumstances, and the *Pier* cracked in several Places; which *Pier*, with some Charge, may be repaired. The *Earth* is slid into the *Sea*, between the two *Piers*, near an hundred *Yards*, and is yet working off into the *Sea*, whereby the *Island* is damnified several *Thousand Pounds*, besides the Number of poor People that depend upon their daily Labour in the *Quarry*; the Work ceasing till Reparation be made, and continues yet dreadful to behold: Which, as is conjectured, proceeded from a great Quantity of *Rubbish* thrown over the *Cliff* upon a *clayish Foundation*, that, by the Violence of *Rain*, was made soft, and gave way; and not by an *Earthquake*, as some report.

*An Account of
Damage that
happened at
Portland, Feb.
2. 1695-6.
communicated
by Sir Rob.
Southwell.
n. 231. p. 659.*

The Death of
a Dog on firing
some Volleys of
Small-shot; by
Mr. Rob.
Clarke.

n. 235. p. 775.

IX. In Nov. 1697. upon proclaiming the Peace, *two Troops of Horse*, dismounted, were drawn in a Line, in order to fire their *Vollies*: The Centre of their Line was against a Butcher's Door, who kept a very large *Mastiff-dog*, the biggest in our Town; a *Dog* of great Courage for fighting: This *Dog* was laid by the Fire-side asleep, by the Servants; but, upon the *first Volley* the Soldiers made, he immediately started up, ran into a Chamber, and hid himself under the Bed. The Maid-servant going to beat him down (he never using to go up Stairs), as she was about so doing, a *second Volley* came; which made the *Dog* rise, run several times about the Chamber with violent *Tremblings*, and strange seeming *Agonies*: But, immediately, a *third Volley* came, and then the *Dog* ran about once or twice, and fell down and *died* immediately, with throwing out *Blood* at his *Mouth* and *Nose*.

To preserve
small Fœtuses;
by Mr. Rob.
Boyle.

n. 12. p. 199.

X. I long since presented the *Royal Society* with an Experiment of *preserving Whelps* taken out of the Dam's Womb, and other *Fœtuses*, or Parts of them, in *Spirits of Wine*: I have also opened *Hens Eggs* at several Days after the Beginning of the *Incubation*, and, carefully taking out the *Embryos*, embalmed each of them in a distinct Glass (which is to be carefully stopped) in *Spirit of Wine*; which I did, that so I might have them in readiness, to make on them, at any time, the Observations I thought them capable of affording. But I must not omit these two Circumstances; the *one*, that, when the *Chick* was grown big, before I took it out of the *Egg*, I have, but not constantly, mingled with the *Spirit of Wine* a little *Spirit of Sal Ammoniac*, made by the Help of *quick Lime*; which *Spirit* I chose, because, though it abounds in a *Salt*, not *sour*, but *urinous*, yet I never observed it (how strong soever I made it) to *coagulate Spirit of Wine*. The *other* Circumstance is, that I usually found it convenient to let the little Animals, I meant to *embalm*, lie for a little while in *ordinary Spirit of Wine*, to wash off the looser Filth that is wont to adhere to the *Chick* when taken out of the *Egg*; and then, having put either the same kind of *Spirit*, or better, upon the same *Bird*, I suffered it to soak some time therein, that the *Liquor*, having drawn, as it were, what *Tincture* it could, the *Fœtus*, being removed into more *pure* and well *dephlegmed Spirit of Wine*, might not discolour it.

A Microscopical Animal
discovered by
S.

n. 42. p. 842.

XI. As we examined, with an excellent *Microscope*, some little *Grains* of Sand searched, we perceived an *Animal* with *many Feet*; its Back *white* and *scaly*, but less than any of those hitherto observed: For although the *Microscope* shewed every *Grain* of Sand as big as an ordinary *Nut*, yet this *Animal* appeared no bigger than one of those *Grains* of Sand seen without a *Microscope*.

Microscopical
Observations;
by Mr. J. Harris.

n. 220. p. 254.

XII. July 7. 1694. I examined a small Drop of *Rain-water*, that had stood in a Gallipot in my Window for about *two Months*: I took it (with

the Head of a small Pin) from the *discoloured* Surface of the *Water*, and in it I observed four Sorts of *Animals*. In the *clear* Part of the *Drop* were *two* Kinds, and both very small; *some* were of the Figure of *Ants Eggs*; these were in continual Motion, and that very swift; and I find that this Kind of *oval* Figure is the most common to the *Animalculæ* found in *Liquors*: The other Sort that were in the *clear* Part of the *Drop*, were much more oblong, about three times as long as broad; these were exceeding numerous, but their Motion was *slow*, in comparison of the former.

In the *thick* Part of the *Drop* (for the *Water* from whence I took it had contracted a *thickish* Scum) I found also *two* Sorts of *Animals*; as a Kind of *Eels*, like those in *Vinegar*, but much smaller, and with their Extremes more sharp: These would wriggle out in the *clear* Part, and then suddenly betake themselves back again, and hide in the *thick* and *muddy* Part of the *Drop*, much like common *Eels* in the *Water*. I saw here also an *Animal* like a large *Maggot*, which would contract itself up into a *spherical* Figure, and then stretch itself out again; the End of its *Tail* appeared with a *Perceps*, like that of an *Earwig*, and I could plainly see it open and shut its *Mouth*, from whence *Air-bubbles* would frequently be discharged. Of these I could number about four or five, and they seemed to be busy with their *Mouths*, as if *feeding*.

These *four* Kinds of *living* *Creatures* I found afterwards also in many other *Drops* of the same corrupted *Water* (*i. e.*) in its *Film* or *Scum*, which was on the *Surface*; for under that, in the lower *Parts* of the *Water*, I could never find any *Animals* at all, unless when the *Water* was disturbed, and the *Surface* shaken down into, and mingled with the lower *Parts*.

April 27. 1696. With a much better *Microscope* I examined some *Rain-water* that stood uncovered a pretty While, but had not contracted any such *thick* and *discoloured* *Scum* as that before-mentioned had. In this, where it was *clear*, I could not find any *Animals* at all; but a little thin *white* *Scum*, that, like *Grease*, began to appear on the *Surface*, I found to be a *Congeries* of exceeding small *Animalcule* of different *Shapes* and *Sizes*, much like those produced by steeping *Barley* in *Water*.

At the same time I looked on a small *Drop* of the *green* *Surface* of some *Puddle-water*, which stood in my *Yard*: This I found to be altogether composed of *Animals* of several *Shapes* and *Magnitudes*; but the most remarkable were those which I found gave the *Water* that *green* *Colour*, and were *oval* *Creatures*, whose middle *Parts* were of a *Grass-green*, but each End *clear* and *transparent*. They would contract and dilate themselves, tumble over and over many times together, and then shoot away like *Fishes*: Their *Head* was at their broadest End, for they still moved that Way. They were very numerous, but yet so large, that I could distinguish them very plainly with a *Glass* that did not *magnify* very much. Among these were interspersed many other smaller and *transparent* *Animals*, like those mentioned but now, as found in the *whitish* *Scum* that was on some *Rain-water*, which had stood a while uncovered.

April 29. 1696. I found *another* Sort of *Creatures* in the *Water* (some of which I had kept in a Window, in an open Glass); they were as large as *three* of the other with the *green* Border about their Middles; but these were perfectly clear and colourless.

Then also examining more accurately the *Belts* or *Girdles* of *Green* that were about the *Animals* mentioned above, I found them to be composed of *Globules*, so like the *Rowes* or *Spawn* of *Fishes*, that I could not but fancy they served for the same Use in these little *Creatures*: For I found now, since *April* 27. many of them without any thing at all of that *green Belt*, or *Girdle*; others with it very much, and that unequally, diminished, and the *Water* filled with a vast Number of *small Animals*, which before I saw not there, and which I now looked on as the young *animated Fry*, which the old ones had shed. I continued looking on them, at times, for *two Days*; during which time the Number of the old ones, with the *green Girdles*, decreased more and more; and at last I could not see one of them to incompassed, but they were all *clear* and *colourless* from End to End

May 18. 1696. I looked on some of the Surface of *Puddle-water*, which was *blueish*, or rather of a *changeable Colour* between *Blue* and *Red*; in a very small Drop of which I found prodigious Numbers of *Animals*, and of various Bignesses; but among those were none with those *Girdles* before-mentioned, either of *Green*, or any other *Colour*.

I then also examined the Surface of some other *Puddle-water*, that looked a little *greenish*; and this I found stocked with such infinite Numbers of *Animals*, that I never saw the like any-where but in the *Genitura Masculina* of some *Creatures*. Among these there were very many of a *greenish* Colour, but they all moved about so strangely swift, and were so near to each other, that though I tired my Eyes, I could not distinguish whether the *green* Colour were all over their Bodies, or whether it were only round their Middles in *Girdles*, as before: But from the Roundness of their Figure, and their Smallness, I judge, that they chiefly consisted of the young *animated Spawn* of that kind of *Animals* I mentioned above. I found, that the Point of a Pin, dipped in *Spittle*, would presently *kill* them all; as I suppose it will other *Animalculæ* of this kind.

The same Day, also, I looked on the Surface of some *Mineral (Chalybeate)* Water, which had stood in a Phial unstopped for about *three Weeks*: In it I saw two *Kinds* of *Animals*, one exceeding small, and the other very large; which latter Sort had on the *Tail* something that looked like *Fins*. There were but very few of either Sort.

The *compounded Salt*, or *Vitriol*, of the *Water*, was *shot* into pretty Figures, but all irregular: They looked all like a small Heap of little *Sticks*, laid across each other at all Angles and Positions; only they were transparent, and a little *greenish*, as *Crystals* of a *Chalybeate* Nature use to be.

I infused whole *Pepper-corns*, *Bay-berries*, *Oats*, *Barley*, and *Wheat*, in *Water*; whose *Scum*, after 2 or 3 *Days*, afforded *Animals*, as hath been often already found by others, at least as to some of them; but I found the greatest

Numbers and Variety in *Wheat* and *Barley-water*, and the fewest in that wherein *Bay-berries* had been steeped.

How such vast Numbers of *Animals* can be thus (as it were at Pleasure) produced, without having recourse to *equivocal Generation*, seems a very great Difficulty to account for. But though the *solving* of it that way makes short Work of the Matter (for it is easy enough to say they are bred there by *Putrefaction*), yet the asserting *equivocal Generation* seems to me to imply more Absurdities and Difficulties than perhaps may appear at first Sight: I wish, therefore, that this Matter would a While employ the Thoughts of some ingenious and inquisitive Man. In the mean Time I have conjectured, that these *Animalculæ* may be produced by one or both of the following Ways:

1. I have thought that the *Eggs* of some exceeding small *Insects*, which are very numerous, may have been laid or lodged in the *Plicæ* or *Rugæ* of the *Coats* of the *Grain*, by some Kinds that inhabit on those *Seeds*, as their proper Places; for that *Insects*, of the larger Kind, do frequently thus deposit their *Eggs* on the *Flowers* and *Leaves* of *Plants*, is often experimented; and it is very probable that the smaller, or *microscopical Insects*, do the same. Now these being washed out of the *Seeds*, by their Immersion in Water, may rise to the Surface, and there be hatched into those *Animals* which we see so plentifully to abound there.

2. Or the Surface of the Water may arrest the straggling *Eggs* of some *microscopical Insects*, that perhaps were about in the *Air*; and, being fitted and prepared for this Purpose, by the Infusion of proper *Grain*, or a proportionable Degree of *Heat*, may compose so proper a *Nidus* for them, that they may, by the Warmth of the *Sun*, be easily hatched into *living Creatures*; which, it is probable (like the strange *Water-insect* from whence a *Gnat* is produced, mentioned by the learned Dr. *Hook* in his *Micrographia*, whose *Metamorphosis* I have often with Pleasure seen), may afterwards turn into *Flies*, or *winged Insects*, of the same *Species* with the *Animal Parent*. And perhaps sometimes both these Circumstances, and others of the like Nature, concur for their *Production*.

XIII. I have observed in *Hemispherules* of *Water*, duly applied to the *Microscopical End of a Wire*, two Sorts of *microscopical Insects*, *globular* and *elliptical*.

Those of a *globular* Form are but a little less transparent than the *Water* they swim in; they have sometimes two *dark Spots* diametrically opposite, but these are rarely seen: There are sometimes two of these *globular Insects* sticking together; where they are joined it is opacous; possibly they may be in the Act of *Generation*. They have a twofold Motion, a swift *progressive* irregular one, and, at the same time, a *Rotation* on their Axes at Right Angles to the Diameter that has the *dark Spots*; but this is seen only when they move slowly. They are almost of an incredible *Minuteness*.

I have examined many *transparent Fluids*, as *Water*, *Wine*, *Brandy*, *Vinegar*, *Beer*, *Spittle*, *Urine*, &c. and do not remember to have found any of them

Microscopical
Animals; by
Mr. S. Gray.
n. 221. p. 283.
Vid. Vol I.
Chap. III.
Sect. XXIV.

them without more or less of the Bodies of these *Insects*; but I have not seen any Motion, except in *common Water* that has stood for sometimes a longer, at others a shorter time, as has been observed by M. *Leeuwenhoek*; though I do not remember he has observed that they are existent in the *Water* before they revive. In the *River*, after the *Water* has been thickened by *Rain*, there are such infinite Numbers of them, that the *Water* seems, in great part, to owe *Opacity* and *Whiteness* to these *Globules*. *Rain-water*, so soon as it falls, has many, and *Snow-water* has more of these *Globules*. The *Dew* that stands on *Glass-windows* has them; and for as much as *Rains* and *Dews* are continually ascending or descending, I believe we may say, the *Air* is full of them: They seem to be of the same *specifick Gravity* with the *Water* they swim in, the *Dead* remaining in all Parts of the *Water*. Of many *Thousands*, that I have seen, I could discern no sensible Difference in their *Diameters*, they appearing of equal Bigness. In *Water* that has been *boiled* they retain their *Shapes*, and will sometimes *revive*.

There is another Sort of *Insects* I have this way seen, but these are not so frequently (at least this *Winter Season*) to be found: They are much longer than the former; they can transform themselves into many *Shapes*; they are, for the most part, *elliptical*, but sometimes they contract themselves so as to be almost *globular*; and sometimes they extend themselves so, as to be twice or three times longer than broad: These sometimes turn themselves round on their *Axes* and *Diameters* as they go; they consist of *transparent* and *opacous* Parts.

Observations
on the Ani-
malculæ in
Pepper-water,
&c. by Sir
Edm. King.
n. 203. p. 861.
Fig. 78.

XIV. Having steeped *Oats* in *Rain-water* some *Days* (perhaps nine or ten), and looking upon it with my bare *Eye*, I saw a Substance that seemed to me like that usually called a *Mother* (on other *Liquors*); and laying as much of it as a small *Pin's Head* upon the *Object-plate* of my best *Microscope*, I could very easily and plainly discern seven or eight Sorts of *Animalculæ*, of different *Sizes* and *Shapes* (or more), swimming in this Substance. Their *Shapes* and *Sizes* were after this Manner, as near as I could guess. They were all very *nimble* in their *Motions*, by *Computation*, several *thousand* times *magnified*.

2. The thin *Scum* upon *Pepper-water*, that did resemble *Flakes* of *Salt* upon some Sorts of human *Urine*, applied in the same Manner to the *Object-plate* of the *Microscope*, were only Clusters of *Animalculæ*, that had liquid Matter enough to swim in; and I was in *Admiration* at their *Numbers*, *Motions*, *Variety*, and *Minuteness*.

3. In a *Decoction* of *Herbs*, that was strained, and set by for a particular Use; in a little of the *Settling* of that (as much as a *Pin's Head*) I saw *Creatures* like little *Eels*, about *thus long*, and seemed to be as thick, but much sharper at both *Ends*, with a *wriggling Motion*, like *Eels*.

4. I observe these small *Creatures* above-mentioned (if I may so call them) resemble the Nature of *Fish* in several respects.

Fig. 79.

First,

First, They will flock together, and lie close together, as if they were in *Schools*, like *Carp*s in a *Pond*, that has been so shallow, as I have often seen, sometimes in one *Place*, sometimes in another; but, when disturbed, they are, as to your *Sight*, all dispersed and lost in a *Trice*: And so are these little *Creatures* in their original *Liquor*, if you shake the *Liquor* before you look to find them in *Schools*, or after; at least I am sure I did, and could never find any in that *Parcel* of *Liquor* till next *Day*, or till they did *associate* again.

2dly, They will follow their *Liquor*, to act in, to the last *Particle* of it, till they have no more to *swim* in; and then will seem to struggle for want on't, till their *Strength* fails them; and then, after a *Minute*, they will seem *dead* upon the *Object-plate* (when the watry *Parts* are dried away).

3dly, They will lie as if they were *dead* near *Half* an *Hour*, or more; then put a little *Water* to them, in *Half* a *Minute* they will begin to move themselves again, and, by *Degrees*, begin to *swim* faintly and feebly at first (as *Fish* will do); then, recovering their *Strength* again, will perform their brisk *Motions* as vigorous as ever.

4thly, Those that are almost *dead* will look *flat*, as if pressed then; but, when they move, turn themselves over and over, without any regular *Motion*; so that you might see them as *thin* as the thinnest *Spangle* you ever saw, and like it in *Shape*; and they will continue so, so long as they are faint and sick; but within about an *Hour's* time they will grow plump and well again, if you add fresh *Liquor* to them in time.

These *Animalculæ* choose, for the most part, the *Top* of the *Liquor*; I suppose for the *Sake* of the *Air*.

If you perceive them lie *dead* upon the *Object-plate*, as I did, and do not remember to add *Water* to revive them within an *Hour*, they will be *dead* indeed; but you may see them, in the *Posture* you left them, many *Days* after.

Now to give a farther *Testimony* that they are *Animalculæ*, which some doubt, I have noted the following *Observations*:

If you take a fine *Needle*, and put the *Point* in the *Spirit* of *Vitriol*, tho' you can see none of the *Spirit* with your *bare Eye* upon its *Point* when you take it out; yet, if you prick the same *Point* of that *Needle* into the *Middle* of that *Drop*, no bigger than a small *Pin's* *Head*, when some *Hundreds* of these *Animalculæ* are *swimming* very nimbly frisking about, you shall immediately see these *minute Creatures* (if I may so call them) presently affected from the *acid Particles*, so as to *spread* themselves, and tumble down seemingly *dead*.

Fig. 80.

If you dissolve *Salt*, and with the *Point* of the same *Needle* repeat the *Experiment* (in the same manner) in some of the same *Liquor* that contains some of the same *Parcel* of *Animalculæ*; you shall see the *Creatures*, afore-mentioned, be affected too, stop in their *Motions*, but in another manner quite; not spread flat, as those with *Spirit* of *Vitriol* did, but shrink long and round, in *Form* and *Figure* of that we call (whole *Oatmeal*, or) an *excorticated Oat*. And whereas the first with the *Spirit* fell down flat, without turning; these, as soon as affected, turn round and round, when they begin to be sick, and wobble,

wobble, as we say, before they fall down to the Bottom and *die*, unless you quickly recover them with fresh Water, and then you will perceive them get a new Life, by Degrees.

Tincture of *Salt of Tartar* put into them, in the same Manner, *kills* them more immediately; but yet they will be first so *sick*, or so affected, call it what you please, as you may see, by a surprizing *convulsive* Motion, they will grow faint and languid apace; as you may see them fall to the Bottom of the *Drop*, upon your Object-plate, *dead*, but in their own *Shape*, as they were before you applied your Needle; and will neither be *flat*, as with *Spirit of Vitriol*; nor *cylindrical*, as with *common Salt Liquor*.

Ink kills them as soon as *Spirit of Vitriol*, but makes them seem to shrink divers Ways, I suppose by the *Solution* of *Copper* which is in its Composition.

Blood (newly pressed from a Prick purposely made in your Finger) *kills* them almost as soon as *Spirit of Vitriol*, by reason (I suppose) of the *Salt* therein; but it is a fine and surprizing Sight to observe them *swimming* and bustling, first among the *Globules* of the *Blood*, jostling one another like *Fish* that are suddenly deprived of *Water*, and bustle together amongst *Mud*; for so they appeared to me.

Urine kills them too, in a little Time, though not so soon.

Sugar dissolved like *Salt* kills them also, if used in the same Manner; and with that some die *flat*, and some die *round*.

Sack will kill them, but not so speedily as the other Liquors.

Miscellaneous
Experiments;
by Sir Rob.
Southwell.
n. 238. p. 87.

XV. For *Red*, *Tinctura Rosarum*, 6 Spoonfuls.

For a *higher Red*, *Syrupus Florum Punicorum*, one Spoonful; either of these to be mixed with 5 of ordinary *Water*.

For *Violet*, one Spoonful of *Syrup* of *Violets* to 5 Spoonfuls of *Water*.

Then to change the *Rose Colour* into *high Green*, take *Oleum Tartari per deliquium*; wash herewith the Inside of the Glass, leaving a few Drops at the Bottom, and then pour in the said *Rose Tincture*, and it will change.

To make the *high Red Black*, dissolve half the Bigness of a *Walnut* of *Sal Ammoniac* in a Glass of *Water*; pour all out but 3 or 4 Drops in the Bottom; if the said *Red* be put hereinto, it turns as *black* as *Ink*.

To make the *Violet Red*, wash the Glass with the *Spirit* of *Vitriol* in manner aforesaid, and pour therein your *Violet Water*.

To make *Red Wine yellow* as *Sack*, steep in *White Wine Brasil Wood* 24 Hours, or else in ordinary *Water*, till it looketh *red*, and pour the same into a Glass washed with *Vinegar*; it grows presently *yellow*.

To make this *Yellow white*, take *Styrax Calamita* and *Benjamin*, Half an Ounce of each; pulverize it, and steep it in 4 Ounces of *Aqua Vitæ*, of which a few Drops will turn the *Liquor white*.

Note, This maketh the *Lac Virginis* for the common *Wash*.

Washing with *clear Water*, to make the Hands and Face *black*.

Beat *Galls* into a very fine Powder, and strew it very well, and roll it up and down into a *Towel*, then into a *Basin* of *Water* throw some *Roman Vitriol*

Vitriol, which will soon dissolve; and after the Party hath washed therein, it being *clear*, and without Smell, as soon as they wipe with the Towel, all the *Skin* grows *black*; and in some Days, washing it with *Soap*, it will come off.

To renew the *Lustre* of *Crystal*, boil your *Crystal* in fair Water for a *Quarter* of an *Hour*, and to a Proportion of six *Quarts* of Water add one *Quart* of *Brandy Wine*, letting the same continue to boil *Half* an *Hour* more; then take it out, and with the same Liquor rub it all over throughout with a *Brush*; and then dry it with a clean warm *Napkin*, rubbing it in every Part, and it will regain its former *Lustre*.

To make the *Hair* grow, take the *Roots* of *Burdock*, or what they call *Cuckolds-burs*, which stick on the Cloaths, of the largest Size, in *December*; boil them in *French White Wine* 8 Fingers high, till Half be consumed: Wash the *Head* therewith, being warmed, at *Night*; and it makes the *Hair* come out, in case the *Roots* be good.

Another. Make a *Lye* of the *Ashes* of *Vines*, and wash the *Head* therewith, being warm.

To hinder the *Hairs* from falling, put *Vine-ashes* in *Red Wine* of *France*, and then filtre all, and with that Liquor wash the *Head* warm.

Memorandum. The Powder of *Hermoadactiles* used in the *Hair*, as common *Powder*, does the same Thing.

Pour faire du *Feu Bleu*; faites vous faire de *Mesches* aupres d'un *Cordier*, qui ne soit pas trop fortement *Tordues*. Fondez du *Soufre* dans un pot à *Feu* de *Charbons*, trempez les *Mesches* dedans *Trois* ou *Quatre* fois selon que vous les aimerez d'avoir *Grosses*. Pour en représenter donc une *Figure*, on l'ébauche sur des *Planches*, puis on y attache en suivant ces *Traces* les *Mesches* avec des *Cloux*, & les rend un peu *rabotteuses* en les battant avec un *Marteau*, à fin que la *matiere* suivante y tienne tant mieux. Celà fait, prenez de l'*Eau de Vie* forte, meslez y de la *Poudre à Canon* en *Farine*, tant que tout soit en *Consistence* d'une bouille, & frottez en les *Mesches* avec un *Pinceau*, & espardez encore dessus de la *Poudre* en *Farine*. Ainsi on laisse le tout *Secher*, & il fera *Préparé* à l'*Usage*.

XVI. Take of small thin *Copper* Pieces, cleaned in the *Fire*, 1 Ounce; of *Aqua Fortis*, 3 Ounces; which being put together in a *Glass*, the *Copper* in 3 or 4 *Hours* will be dissolved: When it is cold, you may use it, by washing with a *Feather* upon your *Iron*, that is made clean and smooth, and it will presently take the *Colour* of *Copper*. When it cometh out with rubbing, you may renew it again; but if you do it *twice* together, the *Iron* will look *black*.

To give Iron a
Copper Colour;
by Sir Robert
Southwell.
n. 243. p. 295.

XVII. Beat a *Ducket* thin, and dissolve it in two *Ounces* of *Aqua Regia*, then dip therein a clean *Rag*, and let the same dry, and do it again and again, till all the said Liquor be soaked up; then burn the said *Rag*, and with the *Tinder* thereof let *Silver* be rubbed, using therewith a little *Spittle*, and

To gild Gold
upon Silver;
by Sir Robert
Southwell.
n. 243. p. 296.

and if by chance the *Silver* will not take, then hold it to the Fire, to take away all manner of Grease, and it will not fail.

Memorandum. This Method is known to very few *Goldsmiths* in *Germany*.

To print Glafs
in marble Co-
lours; by Sir
Rob. South-
well.
n. 245. p. 364.

XVIII. 1. Grind well upon a Stone some *Minium*, for *Red*.

2. *Radix Curcumæ*, or rather *Cerussa Citrina*, for *Yellow*.

3. *Smalt*, for *Blue*.

4. *Verdegris*, for *Green*.

5. *Cerufs*, or *Chalk*, for *White*.

Which being all separately wrought in *Oil*, take a Brush of Hogs Hair, dipped in any of the said *Colours*, and it will, being rolled in your Hand, scatter the same upon the Glafs; then, with your *Pencil*, work them together, as you think fit; and, lastly, sing a little *Mead* amongst them, which covers all.

An Imitation
of China
Dishes; by...
n. 7. p. 127.
The Chinese
Way of mak-
ing Gold-
thread; by
Dr. Hans
Sloane.
n. 250. p. 71.

XIX. S. *Septalio*, a Canon of *Milan*, hath the Secret of making as good *Porcelane* as is made in *China* itself, and *transparent*.

XX. The *Chinese* gild Paper on one Side with *Leaf Gold*, then cut it in long Pieces; they then weave it into their *Silks*, which makes them, with little or no Cost, look very rich and fine. The same long Pieces are twisted or turned about *Silk Thread* by them, so artificially, as to look finer than *Gold Thread*, though it be of no great Value.

To counterfeit
Opal; by Mr.
S. Colepreffe.
n. 38. p. 743.

XXI. I have been two Days at *Harlem*, on purpose to see the Experiment of the making of *counterfeited Opal-glass*: It is very lively, I confess, and, as I guess, performed only by the *Degrees* of *Heat*, producing the *Colours*. When the Composition is thoroughly melted, they take out some on the Point of an *Iron Rod*, which being cooled, either in the *Air* or *Water*, is colourless and pellucid; but being put into the *Mouth* of the *Furnace*, on the same Rod, and there turned by the Hand for a little Space, hath its little Bodies so variously posited in several Parts of the same Piece, as that the Light falling on them, being variously *modified* thereby, represents those several *Colours* that are seen in the true *Opal*. Whether it be the greatest or least Degree of *Heat*, that renders it a *white opaque* Body, I have let slip; but this I know (which seems remarkable), that the *Colours* of it may be destroyed and restored, according to the various *Motions* (I suppose) of its Particles by *Heat*.

Some Obser-
vations touch-
ing Colours
and Dyes; by
Dr. M. Lister.
n. 70. p. 2132.

XXII. Two Things, I conceive, are chiefly aimed at in the Inquiry of *Colours*; the *one*, to increase the *Materia Tinctoria*; and the *other*, to fix, if possible, those *Colours* we either have already, or shall hereafter discover, for Use. As to the *first*, *Animals* and *Vegetables*, besides other natural Bodies, may abundantly furnish us; and in both these Kinds some *Colours* are *apparent*, as the various *Colours* of *Flowers*, and the *Juices* of *Fruits*, &c.

&c. and the *Sanies* of *Animals*; others are *latent*, and discovered to us by the Effects the several Families of *Salt*, and other Things, may have upon them. Concerning the *apparent Colours* of *Vegetables* and *Animals*, and the various Effects of different *Salts* in changing them from one Colour to another, we may have many Instances in Mr. *Boyle*: And if we might, with the good Leave of that honourable and learned Person, range them after our Fashion, we should give you, at least, a new Prospect of them, and observe to you the Conformity and Agreement of the Effects of *Salt* on the divers Parts of *Vegetables*; viz.

1. That *acid Salts* advance the *Colours* of *Flowers* and *Berries*; that is, according to the Experiments of Mr. *Boyle*, they make the *Infusions* of *Balaustium* or *Pomegranate-flowers*, *Red-roses*, *Clove-jilly-flowers*, *Meserion*, *Peas-bloom*, *Violets*, *Cyanus-flowers*, of a fairer *Red*; also the *Juices* of the *Berries* of *Ligustrum*, of *Black Cherries*, *Buck-thorn-berries*, of a much fairer *Red*: And, to the same Purpose, *acid Salts* make no great Alterations upon the *white Flowers* of *Jasmin* and *Snow-drops*. 2. That *urinous Salts*, and *Alcalis*, on the contrary, quite alter and change the *Colours* of the same *Flowers* now named, and the *Juices* of the said *Berries* also, from *red* to *green*; even *Jasmin* and *Snow-drops*. 3. Again, that in like manner *urinous Spirits* and *Alcalis* advance, at least do not quite spoil the *Colours* of the *Juices* of *Leaves* of *Vegetables*, of their *Wood* and *Root*. Thus Mr. *Boyle* tells us, that *urinous Spirits* and *Alcalis* make the *yellow* *Infusions* of *Madder-roots*, *red*; of *Brasil-wood*, *purplish*; of *Lignum Nephriticum*, *blue*; the *red* *Infusion* of *Log-wood*, *purple*; of the *Leaves* of *Sena*, *red*. 4. That, on the contrary, *acid Salts* quite alter and change the said *Infusions*, from *red* or *blue*, to *yellow*.

In the next Place we would note to you the Effects of *Salts* upon *Animals*, in the Production and Change of *Colours*; but the Instances are very few or none, that I meet with in any Author, the *Purple-fish* being quite out of Use; and *Cochineal* and *Kermes* are by most questioned whether they are *Animals*, or no; but I think we may confidently believe them both to be *Insects*, that is, *Worms* or *Chrysalis* of respective *Flies* in *proxima futura*. We find, then, and have tried, concerning *Cochineal* (which of itself is *red*), that, upon the Affusion of the *Oil* of *Vitriol*, that is an *acid Salt*, it strikes the most *vivid Crimson* that can be imagined; and with *urinous Salts* and *Alcalis* it will be again changed into an obscure Colour betwixt a *Violet* and *Purple*.

Vide Vol. II.
Chap. VI.
Sect. LIX. &
Sect. XI. &
Sect. XXVIII.

Concerning the *apparent Colours* in *Flowers*, we think we may assert,

1. That generally all *red*, *blue*, and *white Flowers*, are immediately, upon the Affusion of an *Alkali*, changed into a *green Colour*, and then, in Process of no long time, turned *yellow*. 2. That all the Parts of *Vegetables*, which are *green*, will, in like manner, strike a *Yellow* with an *Alkali*. 3. That what *Flowers* are already *yellow*, are not much changed, if at all, by an *Alkali* or *urinous Spirit*. 4. The *blue Seed husks* of *Glastum Sylvestre*, old gathered and dry, diluted with Water, stain a *Blue*, which, upon the Affusion of *Lye*, strikes a *Green*; which *Green* or *Blue*, being thus touched

with the *Oil of Vitriol* dyes a *Purple*. All these three *Colours* stand. 5. On the *Tops of Muscus Tubulosus*, so called by Mr. Ray in his late *Catalogue of the Plants of England*, are certain *red Knots*; these, upon the *Affusion of Lye*, will strike a *Purple*, and stand.

As for the *latent Colours* in *Vegetables* and *Animals*, to be discovered to us by the *Affusion of Salts*, they likewise, no doubt, are very many. We will set down only a few *Instances* in both *Kinds*, which have not been, that we know of, discovered or taken notice of by others. I. *Latent Vegetable Colours*. 1. The *milky Juice* of *Lactuca Sylvestris costa Spinosa*, and *Sonchus Asper* and *Levis*, upon the *Affusion of Lye*, will strike a *vivid Flame-colour*, or *Crimson*, and after some time quite degenerate into a *dirty Yellow*. 2. The *Milk* of *Cataputia Minor*, upon the *Affusion of Lye*, especially if it be drawn with a *Knife*, and hath any time stood upon the *Blade* of it, will strike a *Purple* or *Blood-red Colour*, and by-and-by change into an ignoble *Yellow*. II. *Latent Animal Dyes*. 1. The common *Hawthorn-Caterpillar* will strike a *Purple*, or *Carnation*, with *Lye*, and stand. 2. The *Heads of Beetles* and *Pismires*, &c. will with *Lye* strike the same *Carnation-colour*, and stand. 3. The *Amber-coloured Scolopendra* will give with a *Lye* a most beautiful and pleasant *Azure* or *Amethystine*, and stand.

Lastly, We might consider the *fixing* of *Colours* for *Use*; but we are willing to leave this to more experienced *Persons*: Some obvious *Inferences*, however, we may venture to take notice of. 1. That, in all the *Instances* above-mentioned, whether *Vegetable* or *Animal*, there is not one *Colour* truly *fixed*; I say truly *fixed*, that is, *Proof of Salt* and *Fire*: For what seems to stand, and be *Lye-proof*, are either wholly destroyed by a different *Salt*, or changed into a much different *Colour*; which must needs prove a *Stain* and *Blemish*, when it shall happen in the *Use* of any of them. 2. That both the *apparent* and *latent Colours* of *Vegetables* are *fixable*: An *Instance* whereof we may observe in the *Seed-husks* of *Glastum*, and the *Use Dyers* make of the *Leaves*, after due *Preparation*. 3. It is probable, from the same *Instance*, that we may learn, from the *Colour* of some *Part* of the *Fruit* or *Seed*, what *Colour* the *Leaves* of any *Vegetable*, and the *whole Plant*, might be made to yield for our *Use*. 4. That the *latent Colours* of *Vegetables* are *pre-existent*, and not produced; from the same *Instance* of *Woad*, and likewise from this, that the *milky Juice* of *Lactuca Sylvestris* doth afford itself a *red Serum*. 5. That the *Change of Colours* in *Flowers* is *gradual* and *constant*. 6. That the *Colours* of *Flowers*, which will not stand with *Lye*, seem to be wholly destroyed by it, and *irrecoverable*. Thus it happens in the *Experiment*, that one *Part* of a *Violet Leaf*, upon the *Affusion of Lye*, is *changed* very soon into *Yellow*, and will never be revived into a *Red* by any *acid Salt*; but if another *Part* of the same *Leaf* be still *Green*, it will be revived. 7. That the *Driness* seems to be a *Means*, if not of *fixing*, yet bringing the *Vegetable Colour* into a *Condition* of not wholly and suddenly perishing by the otherwise destroying *Alkali*. 8. That those *Plants* or *Animals* that will strike different, and yet

yet vivid Colours, upon the Affusion of *different Salts*, and stand, as the *Cochineal* and *Glaſtum*, are probably, of all others, to be reckoned as the best Materials.

XXIII. The *Pelt* being taken off, is firſt ſtrained by Lines on a Sort of *Rack*, to dry them; and the *Brains* of the *Deer* are taken out, and meſſed and daubed on *Mofs* or dried *Grass*, and then dried in the Sun, or by a Fire, to preſerve them.

When the *hunting Time* is over, the *Women* (for the *Men* never do it) *dress* the *Skins*; firſt, by putting them in a Pond, or Hole of Water, to *soak* them well; then with an old Knife, fixed in a cleft Stick, they force off the *Hair*, whiſt they remain wet: The *Skins* being thus prepared, they put them, and a Proportion of the *dried Brains*, into a Kettle over a Fire, till they are more than *Blood-warm*; which will make them *lather* and ſcour perfectly clean; which done, they with ſmall Sticks wreſt and twiſt each *Skin* as long as they find any *Wet* to drop from them, letting them remain, ſo wreſted, ſome *Hours*; and then they untwiſt each *Skin*, and put them into a Sort of a *Rack*, like a *Clothier's Rack* (which they fix at every Place they come to, with no more Trouble than two ſmall Poles ſet upright, and two more put athwart, all fixed with their own *Barks*), and extend them every Way by Lines; and as the *Skin* dries, ſo they, with a dull *Hatchet*, or a *Stick* flatted and brought to a round Edge, or a *Stone* fitted by Nature for that Purpose, rub them all over, to force all the Water and *Grease* out of them, till they become perfectly *dry*. This is all they do: And one *Woman* will *dress* eight or ten *Skins* in a *Day*; that is, begin and end them.

XXIV. It is a conſiderable Advantage which thoſe have who want their *Eye-ſight*, as to *Memory*, and the Application thereof: For we who have our *Eye-ſight* can with more Advantage apply our *Memory* (in Matters of intent Conſideration) by *Night*, in the *Dark*, when all Things are quiet, than by *Day*, when *Sights* and *Noiſe* are apt to divert our Thoughts; and even by *Day* we may better do it with our *Eyes ſhut*, than *open*.

I had the Curioſity, many *Years* ago, to try how far the *Strength* of *Memory* would ſuffice me to perform ſome *arithmetical* Operations (as *Multiplication*, *Diviſion*, *Extraction* of *Roots*, &c.) without the Aſſiſtance of *Pen* and *Ink*, or ought equivalent thereto; and I found it to ſucceed in Numbers of 20, 30, or 40 *Places*. Particularly, *December* 22. 1669. (by *Night*, in the *Dark*) I extracted the *Square Root* of 3, to the 20th *Place* of *decimal Fractions*; and, at the Requeſt of a *Foreigner*, *Feb.* 18. 1670-1. (by *Night*, in *Bed*, and without any other Aſſiſtance than my *Memory*) I propoſed to myſelf a Number of 53 *Places*, and found its *Square Root* to 27 *Places*; and (having fixed them in my *Memory*, by repeating the ſame Operation a *Night* or two after) at his next Viſit, *March* 11. following, I dictated to him the *Numbers* from my *Memory*, not having committed them to *Writing* before.

By

The Weſt-Indian Way of *dreſſing* Buck and Doe-skins; by Sir Robert Southwell. n. 194. p. 532.

The Strength of *Memory*; by Dr. Wallis. n. 178. p. 1269.

By which I am sufficiently satisfied that a reasonable good *Memory*, fixed with good *Attention*, is capable of being charged with more than a Man would at first imagine.

The Credibility of Human Testimony ;
by
n. 256. p. 359.

XXV. *Moral Certitude absolute*, is that in which the Mind of Man intirely acquiesces, requiring no further Assurance. As if one, in whom I *absolutely confide*, shall bring me word of 1200*l.* accruing to me by Gift, or a Ship's Arrival; and for which therefore I would not give the least valuable Consideration to be insured.

Moral Certitude in complete, has its several *Degrees* to be estimated by the *Proportion* it bears to the *absolute*. As if one, in whom I have that *Degree* of *Confidence*, as that I would not give above *one* in 6 to be *insured* of the Truth of what he says, shall inform me, as above, concerning 1200*l.* I may then reckon that I have as good as the *absolute Certainty* of 1000*l.* or *five Sixths* of *absolute Certainty* for the whole Sum.

The *Credibility* of any *Reporter* is to be rated, 1. By his *Integrity*, or *Fidelity*; and, 2. By his *Ability*: And a double *Ability* is to be considered; both that of *apprehending* what is delivered, and also of *retaining* it afterwards, till it be transmitted.

What follows concerning the *Degrees* of *Credibility*, is divided into 4 *Propositions*. The *two first* respect the *Reporters* of the Narrative, as they either *transmit* successively, or *attest* concurrently; the *third* the *Subject* of it, as it may consist of several *Articles*; and the *fourth* joins those three Considerations together, exemplifying them in *oral* and in *written Tradition*.

Prop. I. Concerning the *Credibility* of a Report, made by single successive Reporters, who are equally credible.

Let their *Reports* have each of them *five Sixths* of *Certainty*, and let the *first Reporter* give me a *Certainty* of 1000*l.* in 1200*l.* it is plain that the *second Reporter*, who delivers that Report, will give me the *Certainty* but of $\frac{5}{6}$ of that 1000*l.* or the $\frac{5}{6}$ of $\frac{5}{6}$ of the full *Certainty* for the whole 1200*l.* and so a *third Reporter*, who has it from the *second*, would have delivered me, &c.

That is, if *a* be put for the Share of *Assurance* a single *Reporter* gives me, and *c* for that which is wanting to make that *Assurance* complete;

and I therefore supposed to have $\frac{a}{a+c}$ of *Certainty* from the *first Reporter*;

I shall have from the *second* $\frac{a a}{a+c^2}$, from the *third* $\frac{a^3}{a+c^3}$, &c. And ac-

cordingly if *a* be = 100, and *c* = 6 (the Number of *Pounds* that an 100*l.* put out to *Interest* brings at the *Year's End*), and consequently my Share of *Certainty* from *one Reporter* be = $\frac{100}{106}$ (which is the present Value of any *Sum* to be paid *one Year* hence), the *Proportion* of *Certainty* coming



ing to me from a *second* will be $\frac{1}{100}$ multiplied by $\frac{1}{100}$ (which is the present Value of Money to be paid after *two Years*), and that from a *third Hand Reporter* = $\frac{1}{100}$, thrice multiplied into itself (the Value of Money payable at the End of *3 Years*), &c.

Corollary. And therefore, as at the *Rate* of 6 per Cent. Interest the present Value of any *Sum* payable after *12 Years*, is but *half* the *Sum*; so if the *Probability* or *Proportion* of *Certitude* transmitted by each *Reporter* be $\frac{1}{100}$, the *Proportion* of *Certainty*, after twelve such *Transmissions*, will be but as an *Half*; and it will grow by that time an equal *Lay*, whether the *Report* be *true* or no. In the same *Manner*, if the *Proportion* of *Certainty* be set at $\frac{1}{101}$, it will come to an *Half* from the 70th *Hand*; and if at $\frac{1}{1001}$, from the 695th.

Prop. II. Concerning concurrent Testifications.

If *two concurrent Reporters* have, each of them, as $\frac{1}{6}$ of *Certainty*, they will both give me Assurance of $\frac{35}{36}$, or of 35 to one; if *three*, an Assurance of $\frac{215}{216}$, or of 215 to one.

For if *one* of them gives a *Certainty* for 1200*l.* as of $\frac{1}{6}$, there remains but an Assurance of $\frac{1}{6}$, or of 200*l.* wanting to me, for the whole; and towards that the *second Attestor* contributes, according to his *Proportion* of *Credibility*, that is, to $\frac{1}{6}$ of *Certainty* before had, he adds $\frac{1}{6}$ of the $\frac{1}{6}$, which was wanting: So that there is now wanting but $\frac{1}{6}$ of $\frac{1}{6}$, that is, $\frac{1}{36}$; and consequently I have, from them both, $\frac{35}{36}$ of *Certainty*. So from *three*, $\frac{215}{216}$, &c.

That is, if the *first Witness* gives me $\frac{a}{a+c}$ of *Certainty*, and there is wanting of it $\frac{c}{a+c}$; the *second Attestor* will add $\frac{a}{a+c}$ of that $\frac{c}{a+c}$; and, consequently, leave nothing but $\frac{c}{a+c}$ of that $\frac{a}{a+c} = \frac{c^2}{a+c^2}$: And, in like manner, the *third Attestor* adds his $\frac{a}{a+c}$ of that $\frac{c^2}{a+c^2}$, and leaves wanting only $\frac{c^3}{a+c^3}$, &c.

Corollary. Hence it follows, that if a *single Witness* should be only so far *credible*, as to give me the *Half* of a full *Certainty*; a *second* of the same *Credibility* would (joined with the *first*) give me $\frac{3}{4}$, a *third* $\frac{7}{8}$, &c. so that the *Coattestation* of a *tenth* would give me $\frac{1023}{1024}$ of *Certainty*, and the *Coattestation* of a *twentieth* $\frac{2096999}{2097000}$, or above *two Millions* to one, &c.

Prop. III. Concerning the Credit of a Reporter for a particular Article of that Narrative, for the whole of which he is credible in a certain Degree.

Let

Let there be *six* Particulars of a *Narrative* equally remarkable: If he to whom the *Report* is given has $\frac{1}{6}$ of *Certainty* for the whole *Sum* of them, he has 35 to *one*, against the *Failure* in any *one* certain *Particular*.

For he has 5 to *one* there will be no *Failure* at all; and if there be, he has yet another 5 to *one* that it falls not upon that single *Particular* of the *six*: That is, he has $\frac{5}{6}$ of *Certainty* for the whole; and, of the $\frac{1}{6}$ wanting, he has likewise $\frac{5}{6}$, or $\frac{5}{36}$ of the whole, more: And therefore, that there will be no *Failure* in that *single Particular*, he has $\frac{5}{6}$ and $\frac{5}{36}$ of *Certainty*; or $\frac{35}{36}$ of it.

In general, if $\frac{a}{a+c}$ be the *Proportion* of *Certainty* for the whole, and

$\frac{m}{m+n}$ be the *Chance* of the rest of the *particular* Articles *m*, against some

one or *more* of them *n*, there will be nothing wanting to an *absolute Certitude*, against the not failing in the Article or Articles *n*, but only

$$\frac{\frac{nc}{m+n \times a+c}}$$

Prop. IV. Concerning the Truth of either oral or written Tradition (in whole, or in Part) successively transmitted, and also coattested by several Successions of Transmittents.

1. Supposing the *Transmission* of an oral *Narrative* to be so performed by a *Succession* of single Men, or joined in *Companies*, as that each *Transmission*, after the *Narrative* has been kept for 20 *Years*, impairs the *Credit* of it a 12th Part; and that consequently, in the 12th *Hand*, or at the End of 240 *Years*, its *Certainty* is reduced to an *Half*; and there grows then an even Lay (by the *Corollary* of the 2d *Proposition*) against the *Truth* of the *Relation*: Yet if we further suppose, that the same *Relation* is coattested by 9 other several *Successions*, transmitting alike each of them, the *Credibility* of it, when they are all found to agree, will (by the *Corollary* of the first *Proposition*) be as $\frac{1023}{1704}$ of *Certainty*, or above a *Thousand* to *one*; and if we suppose a *Coattestation* of 19, the *Credibility* of it will be, as above 2 *Millions* to *one*.

2. In oral *Tradition*, as a single Man is subject to much Casualty, so a *Company* of Men cannot be so easily supposed to join; and therefore the *Credibility* of $\frac{1000}{1700}$, or about $\frac{19}{20}$, may possibly be judged too high a Degree for an oral *Conveyance*, to the Distance of 20 *Years*: But in written *Tradition* the *Chances* against the *Truth* or *Conservation* of a single *Writing* are far less; and several *Copies* may also be easily supposed to concur, and those since the *Invention* of *Printing* exactly the same; several also distinct *Successions* of such *Copies* may be as well supposed, taken by different *Hands*, and preserved in different *Places* or *Languages*.

And

And therefore if *Oral Tradition* by any one Man, or Company of Men, might be supposed to be *credible* after 20 Years, at $\frac{1}{2}$ of *Certainty*, or but $\frac{1}{5}$ or $\frac{1}{6}$, a *written Tradition* may be well imagined to continue, by the *joint Copies* that may be taken of it for one Place (like the several *Copies* of the same *Impression*) during the Space of 100, if not 200 Years; and to be then *credible* at $\frac{1}{100}$ of *Certainty*, or at the *Proportion* of 100 to 1. And then seeing that the *successive Transmissions* of this $\frac{1}{100}$ of *Certainty* will not diminish it to an *Half* until it passes the 69th *Hand* (for it will be near 70 Years before the *Rebate of Money*, at that *Interest*, will sink it to *half*), it is plain, that *written Tradition*, if preserved but by a *single Succession* of *Copies*, will not lose *half* of its full *Certainty* until 70 times 100, if not 200 Years, are past; that is, 7,000, if not 14,000 Years. And further, that if it be likewise preserved by *concurrent Successions* of such *Copies*, its *Credibility* at that Distance may be even *increased*, and grow far more *certain* from the several agreeing Deliveries at the End of 70 *Successions*, than it would be at the very *first* from either of the *single Hands*.

3. *Lastly*, In stating the *Proportions of Credibility* for any *Part* or *Parts* of a *Copy*, it may be observed, that in an *Original*, not very long, good Odds may be laid, that a *Copy* by a careful Hand shall not have so much as a *literal Fault*; but, in one of greater Length, that there may be greater Odds against any *material Error*, and such as shall alter the *Sense*; greater yet, that the *Sense* shall not be altered in any *considerable Point*; and still greater, if there be many of these *Points*, that the *Error* lights not upon such a *single Article*; as in the *third Proposition*.

XXVI. At London, in the Year 1685. there were

	Christened;	Males, 7484.	Females, 7246.	in all, 14730.
	Buried;	Males, 11891.	Females, 11331.	in all, 23222.
An. 1686.	{ Christened;	Males, 7575.	Females, 7119.	in all, 14694.
	{ Buried;	Males, 11828.	Females, 10781.	in all, 22609.
An. 1687.	{ Christened;	Males, 7737.	Females, 7213.	in all, 14951.
	{ Buried;	Males, 11174.	Females, 10286.	in all, 21460.

General Bills of Mortality in London. n. 177 p. 1245.

n. 191 p. 445.

		Good.	Poor.	Waste.	Total.
Jan. 169 $\frac{5}{6}$	Houses —	4665	485	849	5999
169 $\frac{6}{7}$		4905	502	717	6124
Jan. 169 $\frac{5}{6}$	Hearths —	24402	1080	3439	29220
169 $\frac{6}{7}$		25366	1227	2027	29519

XXVII. The Number of the Houses and Hearths in Dublin; by Capt. South. n. 261. p. 518.

In the *Total* of *Hearths*, there are included 299, which are in *Colleges*, &c. and are not reckoned in the 3 *first Columns*.

XXVIII.
The Number of
People in Ire-
land An. 1695.
by Capt. South.
n. 261. p. 520.

County of <i>Ardmagh</i>	Persons <i>Assessed</i>	25185	25640
	Persons <i>Exempted</i>	455	
County of <i>Louth</i>	Persons <i>Assessed</i>	16502	17203
	Persons <i>Exempted</i>	701	
County of <i>Meath</i>	Persons <i>Assessed</i>	42181	43319
	Persons <i>Exempted</i>	1138	
<i>Total of these three Counties</i>			86162
<i>City of Dublin</i>			40508
In the rest of the Kingdom, according to the <i>first</i> <i>Quarter's Assessment</i> of the <i>Poll</i> , there are, in Pro- portion to the above 3 <i>Counties</i> , which were very exactly returned			907432
<i>Total</i>			1034102

XXIX.
A List of the
Sea-faring
People in Ire-
land, A. 1697.
by Capt. South.
n. 261. p. 519.

	<i>Sea- men.</i>	<i>Fisher- men.</i>	<i>Boat- men.</i>	<i>Total.</i>	<i>Whereof Papists.</i>
<i>Baltimore</i> and Members	9	188	84	281	268
<i>Belfast, &c. Carrickfergus</i> included	194	62	12	268	2
<i>Coleraine</i>	48	233	169	450	209
<i>Cork</i>	58	34	91	183	111
<i>Donoghade</i> , whereof <i>Masters</i> 35	283	28	2	313	
<i>Drogheda</i>	22	56		78	61
<i>Dublin</i>	42	271	99	412	276
<i>Dundalk</i> and <i>Carlingford</i>	2	90		92	51
<i>Gallway</i>	42	42	88	172	140
<i>Killebeggs</i>	5	120	4	129	78
<i>Kinsale</i>	104	76	45	225	106
<i>Limerick</i>	13		137	150	132
<i>Londonderry</i>	56	46	22	124	36
<i>Rosfe</i>	20	85	77	182	148
<i>Sligoe</i>	11	68	8	87	60
<i>Strangford</i>	69	159	12	240	78
<i>Tralee</i> and <i>Kerry</i>	2	165		167	163
<i>Waterford</i>	36	83	50	169	143
<i>Wexford</i>	80	346		426	399
<i>Wicklow</i>	22	49	5	76	58
<i>Youghall</i>	40	114	46	200	135
<i>Total</i>	1158	2315	951	4424	2654

Counties.	Regulars.	Seculars.	Counties.	Regulars.	Seculars.
Caivan	5	29	Kildare	9	16
Fermanagh	6	13	Louth	12	14
Donegal	22	24	Carlow	8	8
Tyrone	7	22	Kilkenny	17	30
Downe	4	15	King's County	13	19
Antrim	5	13	Queen's County	1	16
Ardmagh	4	10	West-Meath	16	22
Monaghan	5	20	Longford	15	22
Waterford	16	23	Roscommon	24	52
Limerick	15	51	Lcritrim	13	20
Clare	18	43	Sligoe	31	31
Cork	30	97	Mayoe	42	50
Kerry	19	23	Galloway	39	45
Tipperary	48	39	Meath	19	23
Londonderry	5	15	Dublin	1	26
Wicklouw	6	15	Drogheda Town	4	2
Wexford	16	24			
Total				495	872

XXX.
The Number of
the Romish
Clergy in Ire-
land An. 1698.
by Capt. South.
n. 261. p. 521.

Shipped for Foreign Parts, by Act of Parliament, the Number of Regulars following, their Passage and Provisions being paid for by the Government; viz.

From	Dublin	153
	Galloway	170
	Cork	75
	Waterford	26
Total		424

An. 1695.	Married.	Christened.	Buried.	An. 1695.	Married.	Christened.	Buried.
January	23	79	72	July	21	69	56
February	17	67	76	August	28	78	63
March	00	65	62	September	15	73	63
April	35	78	58	October	31	86	45
May	25	89	77	November	25	69	45
June	20	75	74	December	08	88	57
Sum					248	916	748

XXXI.
Bills of Mar-
riages, Births,
and Burials, in
Frankfort on
the Maine; by
Dr. Fred.
Slare.
n. 229. p. 559.

So that there were married 248 Couples; and amongst them 2 Couples that lived before, 50 Years in Matrimony.

Christened { In Frankfort; Citizens Children, 534. Foreigners, 234. Males, 420: Females, 348. In all, 768. And amongst them Twins, 11. Posthumous, 11. Jews, 2. Bastards, 13.
In Sachsenhausen; Citizens Children, 94. Foreigners, 54. Males, 84. Females, 64. In all, 148. And amongst them, Twins, 3. Posthumous, 1. Bastards, 2.
Christened in all, 916.

Deceased { In Frankfort; Citizens, 63. Women, 39. Widows, 24. Sons, 153. Daughters, 123. Not Christened, 7. Foreigners, 194. Out of the Hospital, 30. Out of the Alms, Orphans, and Work-Houses, 9. In all, 642.
In Sachsenhausen; Citizens, 8. Women, 3. Widows, 3. Sons, 20. Daughters, 14. Not Christened, 3. Foreigners, 55. In all, 160.
Deceased in all, 748.

XXXII. Marriages, Births, and Burials, in Old, Middle, and Lower Marck. n. 260. p. 471.

In the Year 1698.	Mar-ried.	Chri-ened.	Bas-tards.	Buri-ed.	In the Year 1698.	Mar-ried.	Chri-ened.	Bas-tards.	Buri-ed.
In <i>Thurfurft, Schlo- band Dohm-Kirchen</i> }	63	117		69	<i>Strauckbergische Insp.</i>	22	93		44
In <i>Berlin</i>	88	332	9	200	<i>Zebdenifche Insp.</i>	40	148		88
In <i>Berlinifchen Inſpect.</i>	185	717	26	469	<i>Rarvenfche Insp.</i>	142	303		67
In <i>Berlin Suburbs</i>	36	143	14	136	<i>Reu - Angermundifche Insp.</i> }	102	362	9	154
In <i>Collen</i>	62	188	4	98	<i>Lenkenfche Insp.</i>	51	220		127
In <i>Collenifchen Inſpect.</i>	58	263	4	88	<i>Rathenowifche Insp.</i>	92	381		180
In <i>Collenifchen Suburbs</i>	11	87	8	17	<i>Wriekenfche Insp.</i>	52	193		110
In <i>Frederechſwofder</i>	22	103	4	51	<i>Trewen Briekenfche Insp.</i> }	34	127		52
In <i>Dorotheen-Stadt</i>	26	100		36	<i>Beelikfche Insp.</i>	28	93		57
In <i>Frederich Stadt</i>	38	146	12	37	<i>Beeklowifche Insp.</i>	50	206		87
Of the <i>Guarnifon</i>					<i>Mittenwaldifche Insp.</i>	23	84		48
<i>Die Frankoff. Geme- inde in beifigen Thurf. Refidenz Städten</i> }	57	259		138	<i>Lindowifche Insp.</i>	16	96	1	42
<i>Alleſtadt Brandenb. Inf.</i>					<i>Furftenwaldifche Insp.</i>	26	95	4	42
<i>Reuſtadt Brandenb. Inſpection</i> }	99	388		166	<i>Reuſtadt Eberkwal- diſche Insp.</i> }	22	118	6	51
<i>Stift Brandenb. Inſp.</i>	56	235		129	<i>Munchebergifche Insp.</i>	64	236		121
<i>Franckfurtiſche Inſp.</i>	243	872		438	<i>Stendaliſche Inſp.</i>	95	226		186
<i>Reformirte Gemeinde zu Franckfurt an der Oder</i> }					<i>Altwardt Galkewe- deſche Inſp.</i> }	142	521	25	320
<i>Perlebergiſche Inſp.</i>	92	375		226	<i>Rouſtadt Galkwedel Putliſche Inſp.</i>	11	56	4	43
<i>Reuen Ruppiniſche Inſp.</i>	82	330		171	<i>Gardelegniſche Inſp.</i>	49	188		94
<i>Witſtottiſche Inſpect.</i>	46	211		111	<i>Geebauſeniſche Inſp.</i>	94	393	2	232
<i>Havelbergiſche Inſp.</i>	30	154		86	<i>Ayrikiſche Inſp.</i>	109	321		260
<i>Im Dohm zu Havelberg</i>	16	93		55	<i>Apenburgiſche Inſp.</i>	39	144		82
<i>Prikwalitiſche Inſp.</i>	82	314		163	<i>Tangermundiſche Inſp.</i>	71	330		132
<i>Spandowiſche Inſp.</i>	94	364		170	<i>Ziegeſarſche Inſp.</i>	44	146		85
<i>Reform. Gemeinde zu Spandow</i> }	4	12		3	<i>Werbenſche Inſp.</i>	43	157		90
<i>Ropenitz und Zugeho- rige Dorffer</i> }					<i>Wilknatiſche Inſp.</i>	19	80		42
<i>Die Frankoffiſche Ge- meinde zu Spandow</i> }					<i>Wuſterhauſeniſche Inſp.</i>	71	251		127
<i>Duranienburg</i>	12	30	2	22	<i>Calbiſche Inſp.</i>	67	201		120
<i>Reformirte Gemeinde zu Duranienburg</i> }					<i>Templiniſche Inſp.</i>	27	117		63
<i>Bernawiſche Inſp.</i>	62	231	2	100	<i>Gramzowiſche Inſp.</i>	36	135	7	59
<i>Granfeciſche Inſp.</i>	15	62		29	<i>Oſterburgiſche Inſp.</i>	32	147		78
<i>Reformirte Geme- inde zu Granſee</i> }					<i>Straackburgiſche Inſp.</i>	25	138		69
<i>Prenklowiſche Inſp.</i>	257	802	23	361	<i>Trebbin</i>	7	44	2	18
<i>Joffeniſche Inſp.</i>	41	161		80	<i>Teltow</i>	1	30		8
<i>Joachimſthal und Zu- gehorige Dorffer</i> }	9	49	5	13	<i>Liebenberg</i>	10	24		4
					<i>Storckowiſche Inſp.</i>	37	178	1	66
					<i>Alten Landsberg und zugehörige Dorffer</i> }	9	24		17
					<i>Reform. Gem. zu Alten Landsburg</i> }	11	32	1	11
					<i>Buchholk</i>				

The Sum of the married, 3698. Christened, 13776, whereof Bastards, 173. Deceased, 7138.

XXXIII. Marriages, Births, and Burials, in the Dominions of the E. of Brandenburg.

In the Year 1698.	Married.	Cbristened.	Buried.
In der Cbur und Mara-Brandenburg	3702	13793	7149
In der Neu-Ward und Lande Sternberg	1528	5946	3211
Im Herkogthumb Preussen	616	21803	17091
Im Herkogthumb Magdeburg	1357	5480	3042
Im Herkogthumb Cleve und Graffschafft Marck	1888	6178	4215
Im Herkogthumb Pommern	1714	7244	4827
Im Furstenthumb Halberstadt	488	2297	1192
Im Furstenthumb Minden	525	1937	1326
In der Graffschafft Hohenstein	145	568	415
In der Graffschafft Ravensberg	665	2223	1789
In der Herrschafft Lauenburg und Butow	125	495	421
The Sum	18298	67763	44678

n. 281. p. 508.

XXXIV. The City of *Breslaw* is the Capital City of the Province of *Silesia*, or, as the Germans call it, *Schlesia*; and is situated on the eastern Bank of the River *Oder*, antiently called *Viadrus*, near the Confines of *Germany* and *Poland*, and very nigh the *Latitude* of *London*. It is very far from the Sea, and as much a *mediterranean* Place as can be desired; whence the Confluence of *Strangers* is but small, and the Manufacture of *Linen* employs chiefly the poor People of the Place, as well as of the Country round about; whence comes that Sort of *Linen* we usually call your *Sclesie Linen*, which is the chief, if not the only Merchandize of the Place. For these Reasons the *Degrees* of *Mortality* in this City seem most proper for a *Standard*, and the rather, for that the *Births* do a small matter exceed the *Funerals*: The only thing wanting is the *Number* of the *whole People*, which in some measure I have endeavoured to supply by Comparison of the *Mortality* of the People of all *Ages*; which I shall trace out, with all the Accuracy possible, from the curious Tables of the *Births* and *Funerals* drawn up monthly by *Dr. Newman*, of that City.

The Value of Annuities upon Lives, drawn from the Bills of Mortality at *Breslaw*; by *Mr. Edmund Halley*. n. 196. p. 596.

It thence appears, that, in the *five Years* from 87 to 91 inclusive, there were *born* 6193 Persons, and *buried* 5869; that is, *born per Annum* 1238, and *buried* 1174. Whence an *Increase* of the People may be argued of 64 *per Annum*, or of about a 20th Part; which may perhaps be balanced by the *Levies* for the *Emperor's* Service of his Wars. But this being contingent, and the *Births* certain, I will suppose the People of *Breslaw* to be increased by 1238 *Births* annually. Of these it appears by the same *Tables*, that 348 do *die* yearly in the *first Year* of their Age, and that but 890 do arrive at a full *Year's* Age; and likewise, that 193 do *die* in the *five Years* between 1 and 6 complete, taken

at

at a *Medium*; so that but 692 of the Persons *born* do survive 6 whole *Years*. From this Age the Infants, being arrived at some Degree of Firmness, grow less and less mortal; and it appears, that of the whole People of *Breslaw* there die *yearly* as in the following *Table*; wherein the *upper Line* shews the *Age*, and the next under it the *Number* of Persons of that Age *dying yearly*.

7.	8.	9.	..	14.	..	18.	..	21.	..	27.	28.	..	35.	36.	..	42.	..	45.	..
11.	11.	6.	$5\frac{1}{2}$	2.	$3\frac{1}{2}$	5.	6.	$4\frac{1}{2}$	$6\frac{1}{2}$	9.	8.	7.	7.	8.	$9\frac{1}{2}$	8.	9.	7.	7.
49.	54.	55.	56.	..	63.	..	70.	71.	72.	..	77.	..	81.	..	84.	..	90.	91.	
10.	11.	9.	9.	10.	$12\frac{1}{2}$	14.	9.	11.	9.	6.	7.	3.	4.	2.	1.	1.	1.		
98.	99.	100.																	
0.	$\frac{1}{5}$	$\frac{2}{5}$																	

And where no *Figure* is placed over, it is to be understood of those that die between the *Ages* of the preceding and consequent Column.

From this *Table* it is evident, that from the Age of 9 to about 25, there does not *die* above 6 *per Annum* of each Age, which is much about one *per Cent.* of those that are of those Ages: And whereas in the 14, 15, 16, 17 *Years* there appear to *die* much fewer, as 2 and $3\frac{1}{2}$, yet that seems rather to be attributed to Chance; as are the other Irregularities in the Series of *Ages*, which would rectify themselves, were the Number of *Years* much more considerable, as 20 instead of 5. And by our own Experience in *Christ-Church Hospital* I am informed, there *die* of the *young Lads*, much about One *per Cent. per Annum*, they being of the aforesaid *Ages*. From 25 to 50, there seem to die from 7 or 8, and 9 *per Annum*, of each Age; and after that to 70, they growing more crazy, though the *Number* be much diminished, yet the *Mortality* increases, and there are found to *die* 10 or 11 of each Age *per Annum*. From thence the Number of the *living* being very small, they gradually decline till there be none left to *die*; as may be seen at one View in the *Table*.

From these Considerations I have formed the adjoined *Table*, whose Uses are manifold, and give a more just *Idea* of the *State* and *Condition* of *Mankind*, than any thing yet extant that I know of. It exhibits the *Number* of People in the City of *Breslaw* of all *Ages*, from the *Birth* to extreme *old Age*, and thereby shews the *Chances* of *Mortality* at all *Ages*; and likewise how to make a certain Estimate of the *Value* of *Annuities* for *Lives*, which hitherto has been only done by an imaginary *Valuation*: Also the *Chances* that there are that a Person of any *Age* proposed does *live* to any *Age* given; with many more, as I shall hereafter shew. This *Table* does shew the *Number* of Persons that are *living* in the *Age current* annexed thereto, as follows.

Age Cur.	Per-sons.	Age.	Per-sons.										
1	1000	8	660	15	628	22	586	29	539	36	481	7	5547
2	855	9	670	16	622	23	579	30	531	37	472	14	4584
3	798	10	661	17	616	24	573	31	523	38	463	21	4270
4	760	11	653	18	610	25	567	32	515	39	454	28	3964
5	732	12	646	19	604	26	560	33	507	40	445	35	3604
6	710	13	640	20	598	27	553	34	499	41	436	42	3178
7	692	14	634	21	592	28	546	35	490	42	427	49	2709
												56	2194
												63	1694
												70	1204
43	417	50	346	57	272	64	202	71	131	78	58	77	692
44	407	51	335	58	262	65	192	72	120	79	49	84	253
45	397	52	324	59	252	66	182	73	109	80	41	100	107
46	387	53	313	60	242	67	172	74	98	81	34		
47	377	54	302	61	232	68	162	75	88	82	28	Sum Total	3400
48	367	55	292	62	222	69	152	76	78	83	23		
49	357	56	282	63	212	70	142	77	68	84	20		

Thus it appears, that the *whole People of Breslaw* does consist of 34000 Souls, being the *Sum Total* of the Persons of all Ages in the Table.

The *first Use* hereof is to shew the *Proportion* of Men able to bear Arms in any Multitude, which are those between 18 and 56, rather than 16 and 60; the one being generally too weak to bear the Fatigues of War, and the Weight of Arms, and the other too crazy and infirm from Age, notwithstanding particular Instances to the contrary. Under 18, from the Table, are found in this City 11997 Persons, and 3950 above 56, which together make 15947. So that the Residue to 34000 being 18053, are Persons between those Ages. At least one *half* thereof are Males, or 9027: So that the whole Force this City can raise of fencible Men, as the Scotch call them, is about 9000, or $\frac{2}{3}$, or somewhat more than a Quarter of the Number of Souls; which may perhaps pass for a Rule for all other Places.

The *second Use* of this Table is, to shew the differing Degrees of Mortality, or rather Vitality, in all Ages: For if the Number of Persons of any Age remaining after one Year be divided by the Difference between that and the Number of the Age proposed, it shews the Odds that there is, that a Person of that Age does not die in a Year. As for Instance, a Person 25 Years of Age has the Odds of 560 to 7, or 80 to 1, that he does not die in a Year: Because that of 567 living of 25 Years of Age, there do die no more than 7 in a Year, leaving 560 of 26 Years old.

So likewise for the Odds that any Person does not die before he attain any proposed Age, take the Number of the remaining Persons of the Age proposed, and divide it by the Difference between it and the Number of those of the Age of the Party proposed; and that shews the Odds there

is between the *Chances* of the Parties *living* or *dying*. As for Instance; What is the *Odds* that a Man of 40 *lives* 7 Years? Take the *Number* of Persons of 47 Years, which in the *Table* is 377, and *subtract* it from the *Number* of Persons of 40 Years, which is 445, and the *Difference* is 68; which shews that the Persons *dying* in that 7 Years are 68, and that it is 377 to 78, or $5\frac{1}{2}$ to 1, that a Man of 40 does *live* 7 Years. And the like for any other *Number* of Years.

Use III. But if it be required at what *Number* of Years it is an *even Lay*, that a Person of any *Age* shall *die*, this *Table* readily performs it: For if the *Number* of Persons *living*, of the *Age* proposed, be *halfed*, it will be found by the *Table* at what *Year* the said *Number* is reduced to *half* by *Mortality*; and that is the *Age* to which it is an *even Wager* that a Person of the *Age* proposed shall arrive before he *die*. As for Instance; A Person of 30 Years of *Age* is proposed, the *Number* of that *Age* is 531, the *Half* thereof is 275, which *Number* I find to be between 57 and 58 Years; so that a Man of 30 may reasonably expect to *live* between 27 and 28 Years.

Use IV. By what hath been said, the *Price* of *Insurance* upon *Lives* ought to be regulated; and the *Difference* is discovered between the *Price* of *insuring* the *Life* of a Man of 20 and 50, for *Example*; it being 100 to 1 that a Man of 20 *dies* not in a *Year*, and but 38 to 1 for a Man of 50 Years of *Age*.

Use V. On this depends the *Valuation* of *Annuities* upon *Lives*; for it is plain, that the *Purchaser* ought to pay for only such a Part of the *Value* of the *Annuity* as he has *Chances* that he is *living*; and this ought to be computed *yearly*, and the *Sum* of all those *yearly Values*, being added together, will amount to the *Value* of the *Annuity* for the *Life* of the Person proposed.

Now the *present Value* of Money payable after a *Term* of Years, at any given *Rate* of *Interest*, either may be had from *Tables* already computed, or, almost as compendiously, by the *Table* of *Logarithms*: For the *Arithmetical Complement* of the *Logarithm* of *Unity* and its *yearly Interest* (that is, of 1, 06. for 6 *per Cent.* being 9,974694) being *multiplied* by the *Number* of Years proposed, gives the *present Value* of one *Pound* payable after the End of so many Years. Then, by the foregoing *Proposition*, it will be, as the *Number* of Persons *living* after that *Term* of Years, to the *Number* *dead*, so are the *Odds* that any one Person is *alive* or *dead*. And by *Consequence*, as the *Sum* of both, or the *Number* of Persons *living* of the *Age* first proposed, to the *Number* remaining after so many Years (both given by the *Table*), so the *present Value* of the *yearly Sum*, payable after the *Term* proposed, to the *Sum* which ought to be paid for the *Chance* the Person has to enjoy such an *Annuity* so many Years. And this being repeated for every *Year* of the Person's *Life*, the *Sum* of all the *present Values* of those *Changes* is the true *Value* of the *Annuity*. This will, without doubt, appear to be a most laborious Calculation; but it being one of the principal

principal *Uses* of this Speculation, and having found some *Compendia* for the Work, I took the Pains to compute the following *Table*; being the short Result of a not ordinary Number of *arithmetical Operations*. It shews the *Value* of *Annuities* for every *fifth Year* of *Age*, to the *70th*, as follows:

<i>Age.</i>	<i>Years Purchase.</i>	<i>Age.</i>	<i>Years Purchase.</i>	<i>Age.</i>	<i>Years Purchase.</i>
1	10,28	25	12,27	50	9,21
5	13,40	30	11,72	55	8,51
10	13,44	35	11,12	60	7,60
15	13,33	40	10,57	65	6,54
20	12,78	45	9,91	70	5,32

Use VI. *Two Lives* are likewise *valuable* by the same Rule: For the Number of *Chances* of each *single Life*, found in the *Table*, being *multiplied* together, become the *Chances* of the *two Lives*. And after any certain *Term* of *Years*, the *Product* of the two remaining *Sums* is the *Chances* that *both* the *Persons* are *living*; the *Product* of the two *Differences*, being the *Numbers* of the *Dead* of both *Ages*, are the *Chances* that *both* the *Persons* are *dead*; and the two *Products* of the remaining *Sums* of the one *Age* *multiplied* by those *dead* of the other, shew the *Chances* that there are that each *Party* *survives* the other; whence is derived the *Rule* to estimate the *Value* of the *Remainder* of one *Life* after another. Now as the *Product* of the two *Numbers* in the *Table* for the two *Ages* proposed, is to the *Difference* between that *Product* and the *Product* of the two *Numbers* of *Persons* *deceased* in any *Space* of *Time*; so is the *Value* of a *Sum* of *Money* to be paid after so much *Time*, to the *Value* thereof under the *Contingency* of *Mortality*: And as the *Product* of the two *Numbers* answering to the *Ages* proposed, to the *Product* of the *deceased* of one *Age* *multiplied* by those remaining *alive* of the other; so the *Value* of a *Sum* of *Money* to be paid after any *Time* proposed, to the *Value* of the *Chances* that the one *Party* has, that he *survives* the other whose *Number* of *Deceased* you made use of in the *second Term* of the *Proportion*. This perhaps may be better understood by putting *N* for the *Number* of the *younger Age*, and *n* for that of the *elder*, *Yy* the *deceased* of both *Ages* respectively, and *Rr* for the *Remainders*; and $R + Y = N$, and $r + y = n$: Then shall *Nn* be the whole *Number* of *Chances*, $Nn - Yy$ the *Chances* that one of the 2 *Persons* is *living*, *Yy* the *Chances* that they are both *dead*, *Ry* the *Chances* that the *elder* *Person* is *dead* and the *younger* *living*, and rY the *Chances* that the *elder* is *living* and the *younger* *dead*. Thus 2 *Persons* of 18 and 35 are proposed, and after 8 *Years* these *Chances* are required: The *Numbers* for 18 and 35 are 610 and 490, and there are 50 of the *first Age* *dead* in 8 *Years*, and 73 of the *elder Age*; there are in all 610×490 , or 298900 *Chances*; of these there are 50×73 , or 3650.

that they are both *dead*. And as 298,900, to 298,900, — 3,650, or 295,250, so is the *present Value* of a Sum of Money to be paid after 8 Years, to the *present Value* of a Sum to be paid, if either of the two *live*. And as 560 × 73, so are the *Chances* that the *elder* is *dead*, leaving the *younger*; and as 417 × 50, so are the *Chances* that the *younger* is *dead*, leaving the *elder*. Wherefore as 610 × 490 to 560 × 73, so is the *present Value* of a Sum to be paid at 8 Years End, to the Sum to be paid for the *Chance* of the *younger's* *Survivance*; and as 610 × 490, to 417 × 50, so is the same *present Value* to the Sum to be paid for the *Chance* of the *Elder's* *Survivance*.

Fig. 81.

This possibly may be yet better explained by expounding these *Products* by *rectangular Parallelograms*, as in Fig. 81. wherein *AB*, or *CD*, represents the *Number* of Persons of the *younger Age*; and *DE*, *BH*, those remaining *alive* after a certain *Term of Years*; whence *CE* will answer the *Number* of those *dead* in that *Time*: So *AC*, *BD*, may represent the *Number* of the *elder Age*; *AF*, *BI*, the *Survivors* after the same *Term*; and *CF*, *DI*, those of that *Age* that are *dead* at that *Time*: Then shall the whole *Parallelogram ABCD* be *Nn*, or the *Product* of the two *Numbers* of Persons representing such a *Number* of Persons of the two *Ages* given; and by what was said before, after the *Term* proposed the *Rectangle HD* shall be as the *Number* of Persons of the *younger Age* that *survive*, and the *Rectangle AE*, as the *Number* of those that *die*. So likewise the *Rectangle AI*, *FD*, shall be as the *Numbers* *living*, and *dead*, of the other *Age*. Hence the *Rectangle HI*, shall be as an equal *Number* of both *Ages* *surviving*; the *Rectangle FE*, being the *Product* of the *deceased Yy*, an equal *Number* of both *dead*; the *Rectangle GD*, or *Ry*, a *Number* *living* of the *younger Age*, and *dead* of the *elder*; and the *Rectangle AG*, or *rY*, a *Number* *living* of the *elder Age*, but *dead* of the *younger*. This being understood, it is obvious, that as the *whole Rectangle AD*, or *Nn*, is to the *Gnomon F A B D E G*, or *Nn — Yy*, so is the *whole* *Number* of Persons or *Chances* to the *Number* of *Chances* that *one* of the two Persons is *living*. And as *AD*, or *Nn*, is to *FE*, or *Yy*, so are all the *Chances* to the *Chance*, that *both* are *dead*; whereby may be computed the *Value* of the *Reversion* after *both Lives*. And as *AD*, to *GD*, or *Ry*, so the *whole* *Number* of *Chances* to the *Chances* that the *younger* is *living* and the *other* *dead*; whereby may be cast up what *Value* ought to be paid for the *Reversion* of one *Life* after another, as in the *Case* of providing for *Clergymens Widows* and others by such *Reversions*. And as *AD*, to *AG*, or *rY*, so are all the *Chances* to those that the *elder* *survives* the *younger*. I have been the more particular, and perhaps tedious, in this *Matter*, because it is the *Key* to the *Case* of *three Lives*, which of itself would not have been so easy to comprehend.

Use VII. If *three Lives* are proposed, to find the *Value* of an *Annuity* during the *Continuance* of any of those *three Lives*, the *Rule* is, As the *Product* of the *continual Multiplication* of the 3 *Numbers* in the *Table*, answering to the *Ages* proposed, is to the *Difference* of that *Product*, and of the *Product* of the 3 *Numbers* of the *deceased* of those *Ages* in any given *Term of Years*; so

So is the *present Value* of a Sum of Money to be paid certainly after so many Years, to the *present Value* of the same Sum to be paid, provided one of those 3 Persons be *living* at the Expiration of that Term. Which Proportion being yearly repeated, the Sum of all those *present Values* will be the Value of an *Annuity* granted for 3 such Lives. But to explain this, together with all the Cases of *Survivance* in 3 Lives, let N , be the Number in the Table for the younger Age; n , for the second; and v , for the elder Age: Let T , be those dead of the younger Age in the Term proposed; y , those dead of the second Age; and v , those of the elder Age; and let R be the Remainder of the younger Age; r , that of the middle Age; and ρ , the Remainder of the elder Age. Then shall $R + T$, be equal to N ; $r + y$, to n ; and $\rho + v$, to v ; and the continual Product of the 3 Numbers $N n v$, shall be equal to the continual Product of $R + T \times r + y \times \rho + v$, which being the whole Number of Changes for 3 Lives, is compounded of the eight Products following: (1.) $R r$, which is the Number of Chances that all 3 of the Persons are living; (2.) $r T$, which is the Number of Chances that the 2 elder Persons are living, and the younger dead; (3.) $R y$, the Number of Chances that the middle Age is dead and the younger and elder living; (4.) $R r v$, being the Chances that the 2 younger are living and the elder dead; (5.) $T y$, the Chances that the 2 younger are dead and elder living; (6.) $r T v$, the Chances that the younger and elder are dead and the middle Age living; (7.) $R y v$, which are the Chances that the younger is living and the 2 other dead; (8.) $T y v$, which are the Chances that all three are dead; which latter subtracted from the whole Number of Chances $N n v$, leaves $N n v - T y v$, the Sum of all the other 7 Products, in all of which one or more of the 3 Persons are surviving.

Fig. 82.

To make this yet more evident, I have added Fig. 82. wherein these 8 several Products are at one View exhibited. Let the *rectangled Parallelepipedon*, $ABCDEF GH$, be constituted of the Sides AB , GH , &c. proportional to N , the Number of the younger Age; AC , BD , &c. proportional to n ; and AG , CE , &c. proportional to the Number of the elder, or v ; and the whole Parallelepipedon shall be as the Product $N n v$, or our whole Number of Chances. Let BP , be as R ; and AP , as T : Let CL , be as r ; and Ln , as y ; and GN , as ρ ; and NA , as v ; and let the Plane $PR e a$, be made parallel to the Plane $ACGE$; the Plane $NV b Y$, parallel to $ABCD$; and the Plane $LXT Q$ parallel to the Plane $ABGH$: And our first Product $R r$, shall be as the Solid $STWIFZ e b$; the second, or $r T$, will be as the Solid $EYZ e QSMI$; the 3d, $R y$, as the Solid $RHOVWIST$; and the 4th, $R r v$, as the Solid $Z a b DWXIK$; 5thly, $T y$, as the Solid $G QRSIMNO$; 6thly, $r T v$, as $IKLMGYZA$; 7thly, $R y v$, as the Solid $IKPOBXVW$; and lastly, $AY y v$, will be as the Product of the 3 Numbers of Persons dead, or $T y v$.

I shall not apply this in all the Cases thereof, for Brevity's Sake; only to shew in one how all the rest may be performed, let it be demanded, what is the Value of the Reversion of the younger Life after the two elder proposed? The Proportion is, As the whole Number of Chances, or $N n v$, to the

$R r r r 2$ Product



Product Ry^v, so is the certain *present Value* of the Sum payable after any *Term* proposed, to the *Value* due to such *Chances* as the *younger* Person has to *bury both the elder*, by the *Term* proposed; which he therefore is to pay for. Here it is to be noted, that the *first Term* of all these *Proportions* is the same throughout; *viz. Nnv*. The *second* changing *yearly* according to the *Decrease* of *Rrs*, and *Increase* of *Yy^v*. And the *third* are successively the *present Value* of Money payable after *one, two, three, &c. Years*, according to the *Rate of Interest* agreed on. These Numbers, which are in all Cases of *Annuities* of necessary Use, I have put into the following Table, they being the *decimal Values* of *one Pound* payable after the *Number of Years* in the *Margent*, at the *Rate of 6 per Cent*.

<i>Years.</i>	<i>Present Value of 1l.</i>	<i>Years.</i>	<i>Present Value of 1l.</i>	<i>Years.</i>	<i>Present Value of 1l.</i>
1	0,9434	19	0,3305	37	0,1158
2	0,8900	20	0,3118	38	0,1092
3	0,8396	21	0,2941	39	0,1031
4	0,7921	22	0,2775	40	0,0972
5	0,7473	23	0,2618	45	0,0726
6	0,7050	24	0,2470	50	0,0543
7	0,6650	25	0,2330	55	0,0406
8	0,6274	26	0,2198	60	0,0303
9	0,5919	27	0,2074	65	0,0227
10	0,5584	28	0,1956	70	0,0169
11	0,5268	29	0,1845	75	0,0126
12	0,4970	30	0,1741	80	0,0094
13	0,4688	31	0,1643	85	0,0071
14	0,4423	32	0,1550	90	0,0053
15	0,4173	33	0,1462	95	0,0039
16	0,3936	34	0,1379	100	0,0029
17	0,3714	35	0,1301		
18	0,3503	36	0,1227		

It were needless to advertise, that the great Trouble of working so many Proportions will be very much alleviated by using *Logarithms*; and that instead of using *Nnv — Yy^v*, for the *second Term* of the Proportion in finding the *Value* of *3 Lives*, it may suffice to use only *Yy^v*, and then *deducting* the *fourth Term*, so found, out of the *third*, the *Remainder* shall be the *present Value* sought: Or all these *4 Terms* being *added* together, and *deducted* out of the *Value* of the *certain Annuity* for so many *Years*, will leave the *Value* of the *contingent Annuity* upon the *Chance of Mortality* of all those *3 Lives*. For Example: Let there be *3 Lives* of *20, 30, and 40 Years* of *Age* proposed, and the Proportions will be thus:

As 661 in 531 in 445, or 156190995, or $N n$,

to 8 in 8 in 9, or 576, or $Y y^v$, for the 1st Year; so 0,9434, to 0,00000348
 to 15 in 16 in 18, or 4320, for the 2d Year; so 0,8900, to 0,00002462
 to 21 in 24 in 28, or 14112, for the 3d Year; so 0,8396, to 0,00008128
 to 27 in 32 in 38, for the 4th Year; so 0,7921, to 0,00016650
 to 33 in 41 in 48, for the 5th Year; so 0,7473, to 0,00031071
 to 39 in 50 in 58, for the 6th Year; so 0,7050, to 0,00051051

and so forth to the 60th Year, when we suppose the elder Life, of 40 certainly to be expired; from whence till 70, we must compute for the first and second only; and from thence to 90, for the single youngest Life. Then the Sum Total of all these 4 Proportionals being taken out of the Value of a certain Annuity for 90 Years, being 16,58 Years Purchase, shall leave the just Value to be paid for an Annuity during the whole Term of the Lives of 3 Persons of the Ages proposed. And note, that it will not be necessary to compute for every Year singly, but that in most Cases every 4th or 5th Year may suffice, interpoling for the intermediate Years *secundum artem*.

It may be objected, that the different Salubrity of Places does hinder this Proposal from being universal; nor can it be denied: But by the Number that die, being 1174 per Annum in 34,000, it does appear that about a 30th Part die yearly, as Sir Will. Petty has computed for London; and the Number that die in Infancy, is a good Argument that the Air is but indifferently salubrious. So that, by what I can learn, there cannot perhaps be one better Place proposed for a Standard.

I have sought if it were possible to find a Theorem that might be more concise than the Rules before laid down; but in vain: For all that can be done to expedite it is, by Tables of Logarithms ready computed to exhibit the Rationes of N to Y , in each single Life, for every 3d, 4th, or 5th Year of Age, as Occasion shall require; and these Logarithms being added to the Logarithms of the present Value of Money payable after so many Years, will give a Series of Numbers, the Sum of which will shew the Value of the Annuity sought. However, for each Number of this Series, two Logarithms for a single Life, 3 for 2 Lives, and 4 for 3 Lives, must necessarily be added together.

It may not perhaps be unacceptable to observe farther from these Tables, how unjustly we repine at the Shortness of our Lives, and think ourselves wronged if we attain not old Age; whereas it appears hereby, that the one Half of those that are born are dead in 17 Years time, 1238 being in that time reduced to 616. So that instead of murmuring at what we call an untimely Death, we ought to account it as a Blessing that we have survived, perhaps by many Years, that Period of Life, whereat the one Half of the whole Race of Mankind does not arrive.

I shall

I shall also observe, that the *Growth* and *Increase* of *Mankind* is not so much *stinted* by any thing in the *Nature* of the *Species*, as it is from the cautious *Difficulty* most *People* make to adventure on the *State* of *Marriage*, from the *Prospect* of the *Trouble* and *Charge* of providing for a *Family*. For by *Computation* from the *Table* I find, that there are nearly 15000 *Persons* above 16, and under 45, of which at least 7000 are *Women* capable to bear *Children*: Of these, notwithstanding, there are but 1238 *born* yearly, which is but little more than a 6th *Part*. So that about one in 6 of these *Women* do *breed* yearly; whereas, were they all *married*, it would not appear strange or unlikely, that 4 of 6 should bring a *Child* every *Year*. The *political* Consequences hereof I shall not insist on; only the *Strength* and *Glory* of a *King* being in the *Multitude* of his *Subjects*, I shall hint, that above all Things *Celibacy* ought to be *discouraged*; as by extraordinary *Taxing*, and *military* *Service*; and those who have *numerous* *Families* of *Children* to be countenanced and *encouraged*, by such *Laws* as the *Jus trium Liberorum* among the *Romans*; but especially by an effectual *Care* to provide for the *Subsistence* of the *Poor*, by finding them *Employments*, whereby they may earn their *Bread*, without being chargeable to the *Publick*.

Problems touching compound Interest and Annuities, resolved by Mr. Adam Martindale, with Explications; by Mr. J. Collins, Ph. Col. n. 1. p. 34.

XXXV. Twelve Problems touching Interest compound, and Annuities, expressed in Symbols, to be resolved by Logarithms, and distinguished into three Ranks, whose Symbols are thus to be understood.

<p><i>p</i> <i>r</i> <i>t</i> <i>a</i> <i>s</i> <i>d</i></p>	<p>signifies</p>	<p>Principal Rate, viz. 1 lib. with its Rate Time Amount or Aggregate Sum of Principal and Arrearages Difference of Principal and Worth</p>	<p>} common to all the 3 Ranks. } proper to { { 1 { 2 } Rank. { 3</p>
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Their Capitals stand for the Logarithms of the Number signified by the small Letters; *D*, signifies *Data*; *Q*, *Quæsitum*; *Prob.* *Problem*; *Res.* *Resolution*.

The first Rank, touching compound Interest for a single Sum of Money.

1 *Prob.* *D.* *p*, *r*, *t*. *Q.* *a*? *Res.* $Rt. + P = A.$

2 *Prob.* *D.* *a*, *r*, *t*. *Q.* *p*? *Res.* $A - Rt = P.$

3 *Prob.* *D.* *p*, *a*, *t*. *Q.* *r*? *Res.* $\frac{A - P}{t} = R.$

4 *Prob.* *D.* *p*, *r*, *t*. *Q.* *t*? *Res.* $\frac{A - P}{R} = t.$

The second Rank concerning Annuities in Arrear at compound Interest, grounded upon these two Axioms.

1. The Annuity and Rate of Interest being given, the principal Correspondent to the Annuity is in effect given also; being easily found out by the Rule of Three, thus;

As

As the Interest of any Principal (Ex. gr. of 1, 10, 100, &c.) is to that Principal; so the Annuity or Pension, to its Principal.

2. The Sum of the Principal and the Arrearage of all the Payments being found, the Arrearages alone may be obtained by subtracting the Principal from that Sum.

The Problems are these that follow.

1 Prob. D. p, r, t. Q. s? Ref. $Rt. + P = S.$

2 Prob. D. s, r, t. Q. p? Ref. $S - Rt = P.$

3 Prob. D. p, s, t. Q. r? Ref. $\frac{S - P}{t} = R.$

4 Prob. D. p, s, r. Q. t? Ref. $\frac{S - P}{R} = t.$

The third Rank, touching Annuities anticipated, or bought for a Sum in hand (or equivalent thereto) at compound Interest discounted, bottomed upon the former of the two Axioms above-mentioned, and this that followeth;

If the Difference and Worth be once found, the Worth is easily obtained, by subtracting that Difference out of the Principal, which is ever greater, being the Worth of the Annuity at that Rate for ever.

1 Prob. D. p, r, t. Q. d? Ref. $P - Rt = D.$

2 Prob. D. d, r, t. Q. p? Ref. $D + Rt = P.$

3 Prob. D. p, d, t. Q. r? Ref. $\frac{P - D}{t} = R.$

4 Prob. D. p, d, r. Q. t? Ref. $\frac{P - D}{R} = t.$

XXXVI. There are 2 Lotteries, at either of which a Gamester paying a Shilling for a Lot, or Throw, the first Lottery upon a just Computation of the Odds has 3 to one of the Gamester, the second Lottery but 2 to 1: Nevertheless the Gamester has the very same Disadvantage (and no more) in playing at the first Lottery as the second.

It looks very like a Contradiction, that the Disadvantage should be no greater in playing against 3 to 1, than 2 to 1; but it may thus be resolved.

Let the { 1st } Lottery { 3 } Blanks { 3 } Prizes { 16 Pence }
 { 2d } consist of { 4 } and { 2 } of { 2 Shill. } apiece.

In the first Lottery the Gamester hazards a Shilling to win a Groat, and the Changes being equal, it is evident there are 3 to 1 against him.

In the second Lottery the Gamester ventures a Shilling against a Shilling, and the Lots being 4 to 2, his Disadvantage is two to one.

And yet a Lot at either of them being truly just worth 8 Pence (viz. the 6th Part of 3 times 16 Pence, or twice 2 Shillings), the Disadvantage must be the very same in both Cafes; that is, the Gamester pays a Shilling for a Lot that is worth but 8 Pence.

The

An arithmetical Paradox concerning the Chances of Lotteries; by Mr. Fr. Roberts.

n. 198. p. 677.

The Method of finding this Answer being somewhat out of the common Road, I shall here add it; and thereby infinite Solutions on the same Kind may be discovered.

1st Lottery.

Let a = the Number of Blanks.
 b = the Number of Prizes.
 r = the Value of a Prize.
 1 = to what you pay for a Lot; viz. a Shilling.

2d Lottery.

m = the Number of Blanks.
 n = the Number of Prizes.
 s = the Value of a Prize.

So the Lottery has its Chances for 1 , and the Gamester his for $r-1$. Now the true Odds consisting of the compounded Proportion of the Chances and the Values; viz. $\frac{a}{b}$ and $\frac{1}{r-1}$, the Share of the Lottery will be a , and that of the Gamester $rb-b$. Therefore, as the present Case stands, the first Lottery must be, $a = 3rb - 3b$; and, by the like Reasoning, the second Lottery will be $m = 2sn - 2n$. Now the Value of a Lot being the Sum of the Prizes divided by the Number of Lots (which must be equal in both Lotteries), it yields $\frac{rb}{a+b} = \frac{sn}{m+n}$. So to proceed,

a	} =?	1	$a = 3rb - 3b$	
b		2	$m = 2sn - 2n$	
				$rb \quad sn$
r		3	$\frac{a \times b}{m \times n} = \frac{rb}{sn}$	
m		4	(*)	
n		5	(*)	
s		6	(*)	
q		7	Let $\frac{a+b}{rb} = q$	
$7 \times a + b$		8	$rb = qa + qb$	
8×3		9	$3rb = 3qa + 3qb$	
$1 + 3b$		10	$3rb = a + 3b$	
$9, 10$		11	$3qa + 3qb = a + 3b$	
Scope		12	If $a = 0$, to avoid negative Numbers	
$11, 12$		13	$3b = 3qb$	
$13 \div 3b$		14	$q = 1$	
$12, 14$		15	$q > 1$, makes $a < 0$; $q < 1$, makes $a > 0$	
Scope		16	If $b = 0$	
$11, 16$		17	$3qa = a$	
$17 \div 3a$		18	$q = \frac{1}{3}$	
$16, 18,$	19	$q < \frac{1}{3}$, makes $b < 0$; $q > \frac{1}{3}$ makes $b > 0$		

3, 7	20	$\frac{sn}{m+n} = q$
20 × mn	21	$sn = qm + qn$
21 × 2	22	$2sn = 2qm + 2qn$
2 + 2n	23	$2sn = m + 2n$
22, 23	24	$2qm + 2qn = m + 2n$
Scope	25	If $m = 0$
24, 25	26	$2qn = 2n$
26 ÷ 2n	27	$q = 1$
25, 27	28	$q > 1$ makes $m < 0$, $q < 1$ makes $m < 0$
Scope	29	If $n = 0$
24, 29	30	$2qm = m$
30 ÷ 2m	31	$q = \frac{1}{2}$
29, 31	32	$q < \frac{1}{2}$ makes $n < 0$; $q > \frac{1}{2}$ makes $n > 0$
15, 19, 28, 32	33	that $abmu$ may be > 0 , q must be $> \frac{1}{2} < 1$
33, 4 (*)	34	Let therefore $q = \frac{2}{3}$
7, 34	35	$\frac{rb}{a+b} = \frac{2}{3}$
35 ×, 10	36	$3rb = 2a + 2b = a + 3b$
36 —	37	$a = b$
20, 34	38	$\frac{sn}{m+n} = \frac{2}{3}$
38 ×	39	$3sn = 2m + 2n$
39 × 2	40	$6sn = 4m + 4n$
22 × 3	41	$6sn = 3m + 6n$
40, 41	42	$4m + 4n = 3m + 6n$
42 —	43	$m = 2n$
1 ÷ 37	44	$1 = 3r - 3$
44 + 3	45	$3r = 4$
2 ÷ n, 43	46	$2 = 2s - 2$
46 + 2	47	$2s = 4$
5 (*)	48	Let $A = 3$
37, 48	49	$B = 3$
45 ÷ 3	50	$R = \frac{4}{3}$, i.e. 16 Pence
6 (*)	51	Let $M = 4$
43, 51	52	$N = 2$
47 ÷ 2	53	$S = 2$, i.e. 2 Shillings.

XXXVII. *Papers overlook'd till it was too late to insert them in their proper Places.*

*A diseas'd
Kidney; by
S. Malpighi.
n. 160. p. 607
Vid. Vol. III.
Part I. Chap.
IV. Sect.
LIII.*

1. *Monstrosum* aliquid, in Illustrissimi Juvenis *Antonii Francisci Daviæ*, *Excelsi Antianorum* Consulis, Cadavere observatum, non parum exaratum a me *Renum* Structuram illustrat. Hujus *Ren* Sinister, exiguus mole, exterius quasi Congeriem & Racemum *Uvæ Albæ* exhibebat, multiplicibus scilicet Glandulosis Folliculis, veluti tot exiguis Botris congestus: Hi Insignibus *Excretoriis* vasis, quibus de more *Renum* caro excitatur, haud donabantur, sed immediate expanso *Pelvi*, vel saltem brevissimo Ductu, necessebantur. *Venæ* & *Arteriæ* singula irrigabant, & *Ureter* è *Pelvi* producebatur. *Ren* Dexter mole longe major erat, & exterius insignes *Glandulæ*, quasi *Vesiculæ* *Urina* turgidæ, erumpebant. Congeries quoque *Excretoriorum* Vasorum, quibus *Renum* caro conflatur, amplior & latior solito erat, & appensæ *Glandulæ* Amplæ quasi *Vesiculæ* interserebantur. Harum aliquæ Corrupto & Subnigricante *Sanguine* scatebant, reliquæ *Urina* turgebant, vel Arenulis Tartareaque *Materia* referebantur. Ex hac itaque *Renum*, licet *Monstrosa*, sed *Simplici* Structura, evidenter patet, præcipuas *Renum* partes, præter *Arterias* & *Venas*, *Glandulas* esse, & *Pelvim*, qui in *Ureteres* productus in *Glandulis Lotium* per *Excretoria* Vasa recipit, & sensim in *Vesicam* derivat. Turgebant autem *Glandulæ*, & *Monstrosa* deformabantur Specie, quia impedita *Excrementi* expulsionem in *Pelvim*, necessario stagnante intus *Urina* laxabatur *Glandulosa* Compages, & in aliquibus etiam loco *Seri* Rubicunda *Sanguinis* portio continebatur; impedito scilicet per *Venas* regressu, vel lacerato separationis Organo. Hoc idem in reliquis *Glandulis* accidit vi Morbi, & præcipue in *Fecore*, in quo vigente *Cachexia* non raro ipsius *Glandulosi Acini* turgente *Bile*, quandoque *Sero* aut *Tartaro*, in ampliorem ita extenduntur formam, ut *Vesiculas* æmulentur. *Simplicissima* quoque *Glandularum* structura, in pluribus Partibus observata, totum confirmat; nam in Labiis *Bovum*, in *Homini* Facie, circa *Penis Glandem*, in *Intestinis*, & in *Musculorum* Spaciis *Minimæ* *Simplices*que locantur *Glandulæ*, quæ nil aliud sunt, quam *Rotundi*, interdum *Ovales*, & non raro *Oblongi*, folliculi *Excretorio* Vasi continuati, & appensi, quorum varia Structura *Diversi* separantur *Humores* & *Succi*.

*The Phosphorus Metallo-
rum; by Sir
Rob. Southwell.
n. 245. p. 365.
Vide Vol. III.
Part I. Chap.
IX. Sect. XI.
The Texture of
Ivory; by Dr.
Neh. Grew.
n. 141 p. 1003.
Fig. 83.*

2. Take *Lapis Smaragdi Mineralis* (such as is found in the Mines of *Saxony*), and beat it into a very fine Powder: If you strew this very fine on any *Metal*, and in any Figure, and set the Plate on any *hot Coals*, in a short time you will perceive in the Dark a *Light* to shine, which will (saith my Author) last as long as you continue the *hot Coals*: And if you beat out the Fire, it may do again for once or twice; but then the Virtue will fade.

3. I have often taken Notice of the *Grain* of *Ivory*, which upon a due Position to the falling *Light* is visible to a naked Eye; the several Pieces, whereof it is composed, appearing like the *Fibres* of a *Muscle*, running in *Parcels*, *decussatim*, and under and over one another reciprocally, and so making up one Piece of *platted Work*.

XXXVIII.

XXXVIII. *Papers of less general Use, omitted.*

1. **A** Relation of the Advice given by M. Petit, touching the *Conjunction* n. 5. p. 41. of the *Ocean* and *Mediterranean*; by M
2. A Narrative of the *Conjunction* of the *Ocean* and *Mediterranean*, by n. 56. p. 1123. the Contrivance and Management of M. Riquet; together with a *Map* of the said *Channel*; by M
3. Additions to the foregoing *Narrative*; in which the Progress and de- n. 84. p. 4080. signed *Usefulness* of that great *Undertaking* are more amply represented; by M. De Froidour.
4. Divers *Rural* and *Oeconomical Inquiries*; by n. 111. p. 240.
5. An Account of some of Dr. Elsholt's curious and useful *Experiments*; *Ph. Col.* n. 4. communicated from *Berlin* to Mr. T. H. p. 104.
6. A miscellaneous *Catalogue* of mean, vulgar, cheap, and simple *Expe-* n. 167. p. 849. *riments*; by Sir Will. Petty.
7. A *Register* of the *Price* of *Corn*, *Births* and *Burials*, *Quantity* of *Rain*, n. 90. p. 5141. *Earthquakes*, *Inundations*, and remarkable *Fatalities*, solicited by Dr. J. Beale.

XXXIX. *Letters and other Papers by M. Ant. Van Leewenhoeck, omitted.*

1. **A** Specimen of some Observations made by a *Microscope* lately invented n. 94. p. 6037. by M. Leewenhoeck, concerning *Mould* upon *Skin*, *Flesh*, and other n. 97. p. 6116. Things; the *Sting* of a *Bee*; the *Head* and *Eyes* of a *Bee*, and a *Louse*.
2. Considerations touching the *Compression* of *Air*. n. 102. p. 21.
3. *Microscopical* Observations upon *Blood*, *Milk*, *Hair*, *Nails*, and the n. 102. p. 23. *internal Parts* of a *Louse*, and her Manner of *Feeding*.
4. *Microscopical* Observations concerning *Blood*, *Bone*, the *Liver*, *Brain*, n. 106. p. 121. *Spinal Marrow*, *Flesh*, *Spittle*, and the *Cuticula*; also upon *Sweat*, *Wool*, *ibid.* p. 122. *Hair*, *Blood*, *earthy Particles* in the *Air*, *Fat*, and *Tears*.
5. *Microscopical* Observations upon the *Eye*, the *Optick Nerve*, and other n. 108. p. 178. *Nerves*; upon *Salt*, *Yellow Earth* from *England*, *Flemish Earth*, *Clay*, and a *Green Cloud* in *Water* and the *Animalcula* in it.
6. *Microscopical* Observations concerning the *Optick Nerve*; also about n. 117. p. 378. the *Texture* of the *Blood*, the *Sap* of some *Plants*, the *Figures* of *Salt* and *S* 380. *Sugar*, and the probable Cause of the *Difference* of their *Taste*; and the *Fi-* *gure* and *Operation* of *Manna*.
7. Observations concerning the *Texture* of *Trees*; compared with what has n. 127. p. 653. been writ upon that Subject by Dr. Grew and S. Malpighi: Also concerning *Animalcles* in *Wine*.
8. *Animalcles* discovered in *Rain-Water*, *River-Water*, *Well-Water*, n. 133. p. 821. *Sea-Water*, and in *Water* wherein *Pepper* had been infused.
9. The Manner of *observing* and *numbering* the *Animalcles* in *Water*. n. 134. p. 844.

- n. 136. p. 899. 10. Observations on the *carneous Fibres* of a *Muscle*, the *Pia Mater* and the *Brain*, the *spinal Marrow*, *Moxa*, *Cotton*, and the *Roughness* within the *Shell* of a *Chestnut*.
- n. 140. p. 1002. 11. *Microscopical* Observations of the *Structure* of *Teeth* and other *Bones*, and of *Hair*.
- n. 142. p. 1040. 12. A Letter to my Lord *Brouncker*, *De Natis è Semine Masculo Animalculis*; answered by *Dr. Grew*; the Observations further prosecuted by the Author; and *Dr. Grew's* Opinion *de Vasis in Crassa Seminis Materia Observatis*.
- Pb. Col. n. 1. p. 3. 13. *Animalcles* discovered in the *Melt* of a *live Cod-fish* and *Pikes*; in the *Vasa Deferentia* of a *Male Hare*, and of *Birds*; and in the *Testicles* of a *Dog*, and a *Cock*.
- Pb. Col. n. 3. p. 51. 14. *Microscopical* Observations on *Lees of Wine*, *Blood*, *Fermenting Syrups*, *Water*, the *Liquor* in the *Venæ Lactææ*, the *Chyle*, *Milk*, *Urine*, the *Watery Parts* of the *Air*; the *Semen Masculum* of *Insects*; *Pepper-Water*; together with his Method of *calculating* the *Minuteness* of the *Animalcles*.
- Pb. Col. n. 4. p. 93. 15. The *Structure* of *Hair*, and its Manner of *growing*; the *Excrements* of *Men* and other *Animals*; and the *Particles* of *Clay*.
- Pb. Col. n. 5. p. 252. 16. The *Texture* of the *Muscles* of *Quadrupeds* and *Fish*; the *Growth* of *Hair*; the *Blood* of *Fish*; the *Fins* of *Oysters*; and the *Production* of *Oyster-Shells*.
- Pb. Col. n. 7. p. 188. 17. The *Texture* of the *Muscular Flesh* of *Lobsters* and *Prawns*.
- n. 145. p. 74. 18. The *Generation* of *Animals ab Animalculo*, and not *ex Ovo*; the *Parts* and *Generation* of *Fleas*; the *Flesh* of a *Louse*; the *Flesh* and *Feathers* of a *Gnat*; *Sal Volatile Oleosum* mixed with *Blood*; no *Air-bubbles* in *Blood*.
- n. 148. p. 197. 19. The *Texture* of several Sorts of *Trees*, and their *five* Sorts of *Vessels*; *Animalcles* in the *Melts* of *Fish*.
- n. 152. p. 347. 20. The *Generation* of *Animals ab Animalculo in Semine Masculo*, particularly of *Frogs* and *Fish*; the *Vessels* and *Muscles* of a *Frog*; *Digestion* by the *Motion* of the *Stomach*; *Circulation* of the *Blood*; and the *Cause* of *Fevers*.
- n. 159 p. 568. 21. *Animalcles* in *Spittle*; in the *Scurf* of the *Teeth*; the supposed *Worms*
- n. 197. p. 646. in the *Skin*; and the *Scales* upon the *Skin*.
- n. 160. p. 586. 22. The *Cuticula* of the *Mouth* and *Lips* covered with *Scales*; the Reason of the *Tickling* by a *Hair* lying upon the *Skin*; a *scaly Child*; the *Slime* within the *Guts*; the *Lactæal* and *Lymphatick Vessels*; and the Use of the *Slime* within the *Guts*.
- n. 165. p. 780. 23. The *Crystalline Humour* of the *Eye*; the Use of the *Eye-lids*; and the *red Particles* of *Blood*.
- n. 168. p. 883. 24. The *Brain* of several *Animals*; the *Crystalline Humour* of an *Human Eye*; *Moxa*, and other *downy Substances*; the *Chalk-Stones* of the *Gout*; the *Leprosy*, and the *Scales* of *Eels*.

25. The Salts of *Vinegar*; *Crabs-Eyes* and *Chalk* dissolved in *Vinegar*; the *n.* 170. p. 963. *Particles of Water*; the Salts of several Sorts of *Wine*; *Tartar*, *Crabs-Eyes*, and *Chalk*, dissolved in *Wine*.

26. The Salt of *Carduus Benedictus*; Salt of *Wormwood*; *Alum*; Salt-*n.* 173 p. 1073. *petre*; *Blue Vitriol* of *Cyprus*; *Oil of Tartar per Deliquium*; *Muscovy Pot-Ashes*; *Campfire*; Salt of the *Ashes* out of an *Iron Foundery*; Salt of the *Ashes* of a *Tin* or *Lead Oven*; Salt in *Quick-lime* and in *Lime of Fish-Shells*; Salt of *English Soda*, and of the *Soda of Britany* and *Alicant*; and *Sal Ammoniac*.

27. The Generation of *Animals ab Animalculis in Semine Masculo*; the *Se-* *n.* 170. p. 979. *men Masculum* found in the *Uterus*; and the *Propagation of Plants.* *n.* 173 p. 1090.

28. *Animalcles* in the *Testicles* of a *Rat*; in the *Seed of Muscles*; in *Oy-* *n.* 174 p. 1120. *sters*; and in the *Sap of Vines.* *n.* 196. p. 593.

29. The *Seeds of Ash*; the *Propagation of Plants and Animals*; the *Seeds* *n.* 199. p. 700. *of Willow*, and of *Elm*, and some other *Vegetables.*

30. *Native Cinnabar*, *Brimstone*, *Gunpowder*, and *Nitre.* *Air generated* *n.* 200. p. 754. *by the firing of Gunpowder* in close *Glasses*, and by the *Infusion of Crabs-Eyes* in *Vinegar.*

31. The *Texture of Bones*; the *Bark of Trees*; the *Skin of Animals*; *n.* 202. p. 838. *the Pores of the Skin*, and *Perspiration.*

32. The *Seed of Cotton*; *Eggs of Insects*; *Date-Stones*; *Mother-Cloves,* *n.* 205. p. 949. *and the Manner of curing them in India*; and *Nutmegs.* The *Seeds of Gooseberries*, of *Black Currants*, of *Tulips*, of *Cassia*, of the *Olive*, and of the *Lime-Tree.* *Sweat*, the *Pores of the Hands*, the *Crystalline Humour of the Eye*, and the *Optick Nerve.* The *Gall of a Trout*; the *Skin of an Eel*, and the *Scales and Slime* upon it; the *Slime and Scales* upon *Bream*, and upon *Perch*; *Beer-Vinegar*; *Juice of Lemons*; *Spirit of Sal Ammoniac*; and *Sal Volatile Oleosum.*

33. The *Generation of an Insect* called a *Wolf*, and a *Way to destroy them*; *n.* 213. p. 194. *Insects* upon the *Walls of a Granary*; *Animalcles in Water*; the *Insects* bred in *Apples*; and *Cheese-Maggots.*

34. The *Growth and Goodness of Timber.* *n.* 213 p. 224.

35. The *Generation of Eels*; the *Circulation of the Blood* visible in *Eels*; *n.* 221. p. 269. *Mites* in *French Barley*, and in *Figs*; the *Seeds of Figs*; the *Seeds of Strawberries*, and the *Hair of the Feet of Norway Lobsters.*

36. Several *Magnetical Experiments*; the *Concave Surface of Liquors* in *n.* 227. p. 512. *Glasses*; and a *Relation of a German* who pretends to *cure Diseases by Sympathy.*

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- n. 37. p. 740. 2. *La Venerie Royale*; du *Sieur de Salnove à Paris*, in 4to.
- n. 119. p. 461. 3. *The Gentleman's Recreation*, in four Parts; viz. *Hunting*, *Hawking*, *Fowling*, *Fishing*. Lond. 1674. in 8vo.
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- n. 183. p. 152. 5. Two *Essays* in *Political Arithmetick* concerning the comparative *Magnitude*, *Riches*, &c. of *London* and *Paris*; by *Sir Will. Petty*. To which is here added an *Answer* to the *Objections* made by the *Author* of the *Nouvelles de la Republique des Lettres*; and to those by *M. Azout*: Where 'tis computed that the *Number* of the *People* in *London* is 695,718; in *Paris* 494,555; in *Rouen* 80,000; in *Rome* 125,000.
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18. *Disquisition de Magia Divinatrice & Operatrice*. Auth. *Francisco Moncæio*. Francofurti & Lipsiæ, 1683. in 4to. n. 162. p. 706.

19. *Confucius, Sinarum Philosophus, sive Scientia Sinensis*: Latine exposita, Studio & Opera PP. S. J. Adjecta est Tabula Chronologica *Siniciæ Monarchiæ* ab hujus Exordio ad hæc usque Tempora. n. 189. p. 376.

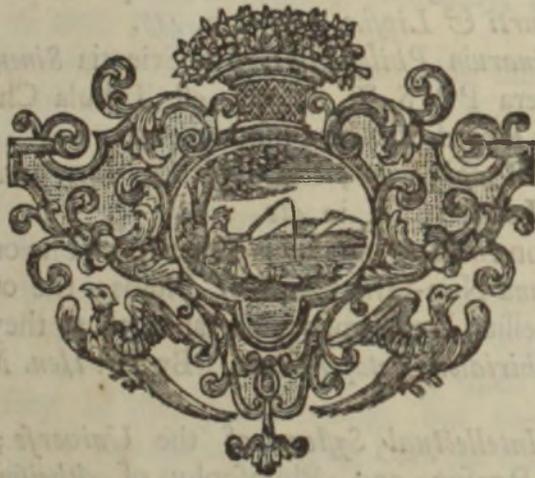
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F I N I S.



Tentamina



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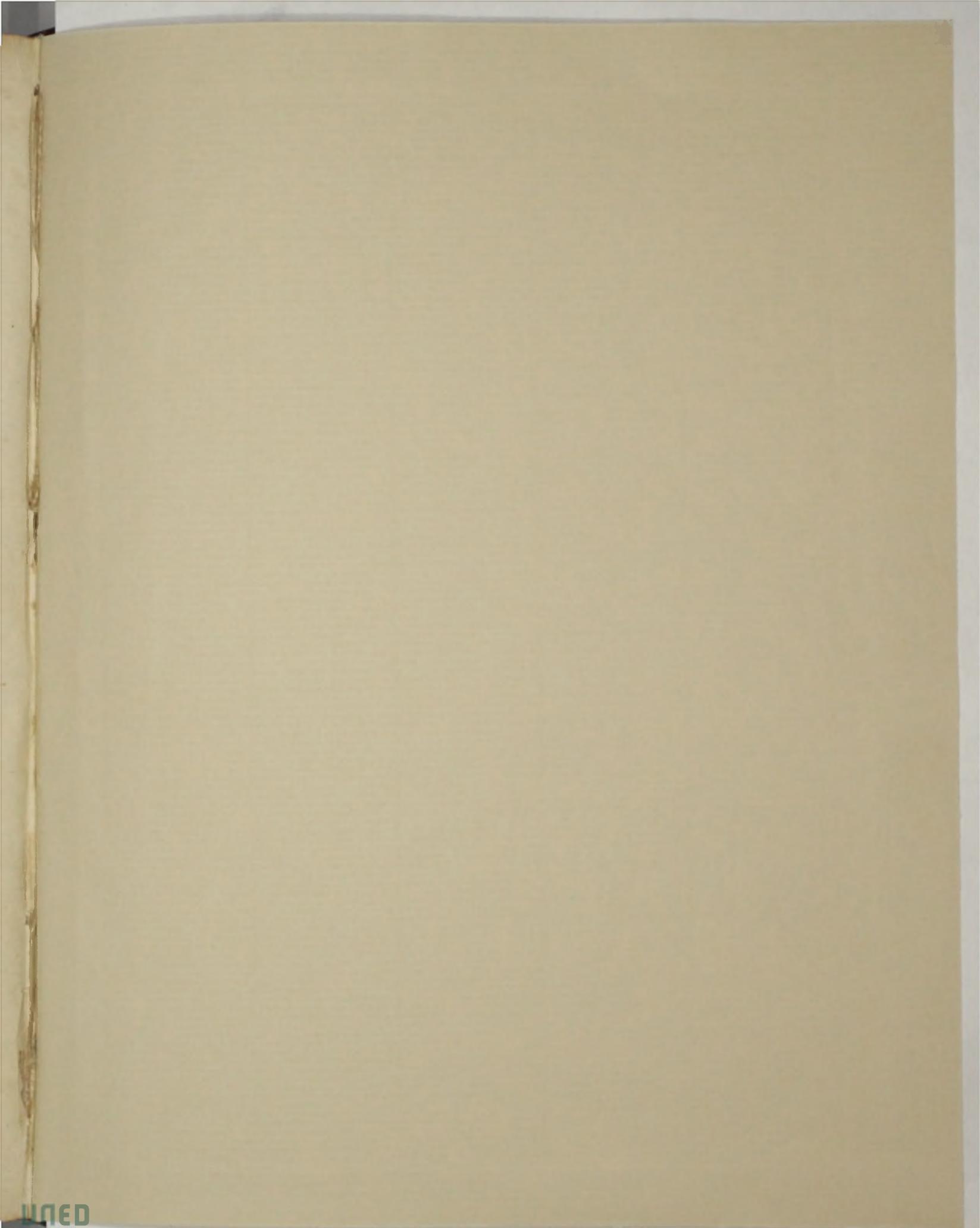
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