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THE  
PHILOSOPHICAL  
TRANSACTIONS  
ABRIDGED.

THE NINTH VOLUME.



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THE

Vol IX  
1732-1744

PHILOSOPHICAL  
TRANSACTIONS

(From the Year 1732, to the Year 1744)

ABRIDGED,

AND

Disposed under GENERAL HEADS,  
The *Latin* PAPERS being translated into *English*.

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By JOHN MARTYN, F. R. S.  
Professor of BOTANY in the University of *Cambridge*.

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VOL. IX.

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CONTAINING,  
PART III. The ANATOMICAL and MEDICAL PAPERS;  
AND  
PART IV. The HISTORICAL and MISCELLANEOUS PAPERS.

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LONDON:

Printed for W. INNYS, C. HITCH, T. ASTLEY, in *Pater-noster-Row*,  
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TRANSACTIONS

(From the Year 1727, to the Year 1744)

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The Latin PAPERS being translated into English

BY JOHN W. MARRATT, F.R.S.

Professor of Botany in the University of Cambridge.

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August-III. MDCCLVII.






THE  
Philosophical Transactions  
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PART III.  
CONTAINING THE  
*ANATOMICAL* and *MEDICAL*  
PAPERS.

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CHAP. I.  
*ZOOLOGY*, and the *Anatomy* of *ANIMALS*.

- I. AVING heard strange Stories about a Fly-tree, as it is called by some People, from which vast Swarms of Flies have been observed to issue, I desired a Person who went to see it, to bring me some of the fly-bearing Leaves; about the latter end of *June* last he brought me some Leaves, on which was fixed a tough little Bag, as big as the Husk of a Philbert, but is now very much shrunk with drying. It was of a dusky green Colour; I cut it open, and a Fly, like a Gnat, came out of it; I discovered no more Flies, 'till looking at it with a Glass, I could discern something moving amongst the blueish Pulp, and after a while observed that it contained many red Grubs, very small, without Wings; I bound up the *Nidus*, and next Morning the Grubs had gotten blueish Wings, and their Body was of a greyish Colour; there was a great
- Account of a remarkable Generation of Insects; by Mr Richard Lewis, N<sup>o</sup>. 429. p. 119. July &c. 1733.*



Number of them, but they soon flew away. I went to see the Tree; it's Bark and Leaf resembles a Male Mulberry, the Leaves were plentifully stocked with these Bags; I opened several of them which were plentifully stocked with these Insects. Amongst all the Excrecences which I have seen on Leaves, I have observed none like these. When the Leaf is small they are scarcely discernible, they grow with the Leaf, which is not discoloured or crumpled by them. I have read *Rbedi's* curious Treatise of the Generation of Insects, but found no Account therein of any of their Nests like these.

Annapolis in Maryland,

Oct. 27. 1732.

Of the Bases  
of the Cells  
wherein the  
Bees deposit  
their Honey, by  
Mr Mac Laurin,  
Prof. Math. Edinb.  
F. R. S. N<sup>o</sup>.  
471. p 565.  
Presented Nov.  
3. 1743.

II. The Sagacity of the *Bees* in making their Cells of an hexagonal Form, has been admired of old; and that Figure has been taken notice of, as the best they could have pitched upon for their Purposes: But a yet more surprising Instance of the Geometry of these little *Insects* is seen in the Form of the Bases of those Cells, discovered in the late accurate Observations of Monsieur *Maraldi* and Monsieur *de Reaumur*, who have found those Bases to be of that Pyramidal Figure, that requires the least Wax for containing the same Quantity of Honey, and which has at the same time a very remarkable Regularity and Beauty, connected of Necessity with it's Frugality.

These Bases are formed from 3 equal *Rhombus's*, the obtuse Angles of which are found to be the Doubles of an Angle that often offers itself to Mathematicians in Questions relating to *Maxima* and *Minima*; that is, the Angle, whose Tangent is to the *Radius*, as the Diagonal is to the Side of the Square. By this Construction, of the 6 solid Angles at the Base that correspond to the Angles of the Hexagon, Three are equal as well to each other, as to the solid Angle at the *Apex* of the Figure, each of which solid Angles is respectively formed from 3 equal plane obtuse Angles: And the other 3 solid Angles are also equal to each other, but severally formed each from 4 equal plane acute Angles, Supplements to the former obtuse ones.

By this Form the utmost Improvement is made of their Wax, of which they are on all Occasions very saving the greatest Regularity is obtained in the Construction, and with a particular Facility in the Execution; as there is one sort of Angle only with it's Supplement, that is required in the Structure of the whole Figure.

M. *Maraldi* \* had found by Mensuration, that the obtuse Angles of the *Rhombus's* were of  $110^{\circ}$  nearly; upon which he observed, that if the 3 obtuse Angles which formed the solid Angles above-mentioned, were supposed equal to each other, they must each be of  $109^{\circ}.23'$ ; from whence it has been inferred, that this last was really the true and just Measure of them: And lately M. *de Reaumur* † has informed us, that Mr *Koëning* having, at his Desire, sought what should be the Quantity to be given to this Angle, in order to employ the least Wax possible in a Cell of the same Capacity, that Gentleman had found, by a higher

Geometry

\* *Memoires de l' Acad. Royale des Sciences*, 1712.

† *Memoires sur les Insectes*, Tom. V.



Geometry than was known to the Antients, by the Method of *Infinite-imals*, that the Angle in question ought in this Case to be of  $109^{\circ}. 26'$ , And we shall now make it appear from the Principles of common *Geome-try*, that the most advantageous Angle for these *Rhombus's* is indeed, on that Account also, the same which results from the supposed Equality of the three plane Angles that form the above-mentioned solid ones.

Let  $GN$  and  $NM$  represent any two adjoining Sides of the Hexagon, that is, the Section of the Cell perpendicular to it's Length. The Sides of the Cell are not complete Parallelograms as  $CGNK$ ,  $BMNK$ , but *Trapezia*  $CGNE$ ,  $BMNE$ , to which a *Rhombus*  $CEBe$ , is fitted at  $E$ , and that has the opposite Point  $e$  in the *Apex* of the Figure, so that three *Rhombus's* of this kind, with 6 *Trapezia*, may complete the Figure of the Cell. Let  $O$  be the Centre of the Hexagon, of which  $CK$  and  $KB$  are adjoining Sides; join  $CB$  and  $KO$ , intersecting it in  $A$ ; and, because  $COB$  is equal to  $CKB$ , and  $KE$  equal to  $Oe$ , the Solid  $EBCK$  is equal to the Solid  $eBCO$ ; from which it is obvious, that the Solid Content of the Cell will be the same, where- ever the Point  $E$  is taken in the Right Line  $KN$ , the Points  $C, K, B, G, N$ , and  $M$ , being given. We are therefore to inquire where the Point  $E$  is to be taken in  $KN$ , so that the *Area* of the *Rhombus*  $CEBe$ , together with that of the two *Trapezia*  $CGNE$ ,  $ENMB$ , may form the least Superficies. Because  $Ee$  is perpendicular to  $BC$  in  $A$ , the *Area* of the *Rhombus* is  $AE \times BC$ , that of the *Trapezia*  $CGNE$ ,  $ENMB$ , is  $\overline{CG + EN} \times KC$ ; these, added to the *Rhombus*, amount to  $AE \times BC + 2KN \times KC - KE \times KC$ ; and because  $2KN \times KC$  is invariable, we are to inquire, when  $AE \times BC - KE \times KC$  is a *Minimum*?

Suppose the Point  $L$  to be so taken upon  $KN$ , that  $KL$  may be to  $AL$  as  $KC$  is to  $BC$ . From the Centre  $A$  describe in the Plane  $AKE$  with the *Radius*  $AE$ , an Arc of a Circle  $ER$  meeting  $AL$ , produced, if necessary, in  $R$ ; let  $EV$  be perpendicular to  $AR$  in  $V$ , and  $KH$  be perpendicular to the same in  $H$ ; then the Triangles  $LEV$ ,  $LKH$ ,  $LAK$ , being similar, we have  $LV : LE :: LH : LK :: LK : LA ::$  (by the Supposition last made)  $KC : BC$ . Hence, when  $E$  is between  $L$  and  $N$ , we have  $LH + LV (= VH) : LK + LE (= KE) :: KC : BC$ ; and when  $E$  is between  $K$  and  $L$ , we have  $LH - LV (= VH) : LK - LE (= KE) :: KC : BC$ ; that is, in both Cases we have  $KE \times KC = VH \times BC$ ; and consequently  $AE \times BC - KE \times KC = AE \times BC - VH \times BC = \overline{AE - VH} \times BC = \overline{AR - VH} \times BC = \overline{AH} + \overline{VR} \times BC$ ; which, because  $AH$  and  $BC$  do not vary, is evidently least when  $VR$  vanishes, that is, when  $E$  is upon  $L$ . Therefore  $CLBl$  is the *Rhombus* of the most advantageous Form in respect of Frugality, when  $KL$  is to  $AL$  as  $KC$  is to  $BC$ . This is the same Method by which we have elsewhere determined the *Maxima* and *Minima*, in the Resolution of several Problems that have usually been treated in a more abstruse Manner. See *Treatise of Fluxions*, Art. 572. &c.



Now because  $OK$  is bisected in  $A$ ,  $KC^2 = OK^2 = 4AK^2$ ; and  $AC^2 = 3AK^2$ , or  $BC = 2AC = 2\sqrt{3} \times AK$ ; consequently  $KC : BC :: 2AK : 2\sqrt{3} \times AK :: 1 : \sqrt{3}$ , and  $KL : AL :: (KC : BC) :: 1 : \sqrt{3}$ , or  $AL : AK :: \sqrt{3} : \sqrt{2}$ ; and (because  $AK : AC :: 1 : \sqrt{3}$ )  $AL : AC :: 1 : \sqrt{2}$ ; that is, the Angle  $CLA$  is that, whose Tangent is to the *Radius* as  $\sqrt{2}$  is to 1, or as 14142135 to 10000000; and therefore is of  $54^\circ. 44'. 08''$ , and consequently the Angle of the *Rhombus* of the best Form is that of  $109^\circ. 28'. 16''$ .

By this Solution it is farther easy to estimate what their Savings may amount to upon this Article, in consequence of this Construction. Had they made the Base flat, and not of the pyramidal Form described above, then, besides completing the Parallelograms  $CGNK$  and  $BMNK$ , the Surface of the Base had been  $3CB \times AK$ ; what they really do form amounts in Surface to the same Parallelograms, and  $3CB \times AH$ : the

Savings therefore amount to  $3CB \times \overline{AK - AH} = 3CB \times AH \times \frac{\sqrt{3} - \sqrt{2}}{\sqrt{2}}$ ,

which is almost a fourth part of the Pains and Expence of Wax, they bestow above what was necessary for compleating the Parallelogram Sides of the Cells: And at the same time they seem also to have other Advantages from this Form, besides the saving of their Wax; such as a greater Strength of the Work, and more Convenience for moving in these larger solid Angles

It remains that we should shew, that the plane Angles  $CLB$ ,  $CLN$ , and  $BLN$ , are equal to each other. We before found, that  $KL : AL :: KC : BC :: KA : (= \frac{1}{2} KC) AC$ ; consequently  $KL : KA :: AL : AC$ , and the Triangles  $LKA$ ,  $LAC$ , are similar: Therefore  $LK : AL :: AL : LC :: KC : BC :: 1 : \sqrt{3}$ , and  $LC = 3LK$ . With the Centre  $L$  and *Radius*  $LC$ , describe in the Plane  $CGNK$  the Semicircle  $DCP$ , meeting the Line  $KN$ , in  $D$  and  $P$ ; join  $CP$  and  $CD$ , and let  $LQ$  be perpendicular to  $CP$  in  $Q$ , then will the Angle  $CDK$  be equal to  $QLP$ , and we shall have  $PQ : LQ :: PC : DC :: \sqrt{PK} : \sqrt{DK} :: \sqrt{LC + LK} : \sqrt{LC - LK} :: \sqrt{4} : \sqrt{2} :: \sqrt{2} : 1 :: AC : AL$ . Consequently the Angle  $QLP = ALC$ , and  $CLP = CLB$ , or the obtuse Angle of the *Rhombus*  $CLBl$  is equal to  $CLP$ , the obtuse Angle of the *Trapezium*; and consequently, the three plane Angles that form the solid Angle at  $L$ , or the *Apex* at  $l$ , are equal to each other: From which it is obvious, that the 4 acute plane Angles, which form the solid Angle at  $C$  or  $B$ , are likewise equal among themselves.

Though *M. Maraldi* had found, by his Mensuration, these obtuse Angles to be of about  $110^\circ$ ; the small Difference between this and the  $109^\circ. 28'. 16''$ , just found by Calculation, seems to have been either accidental, or owing to the Difficulty of measuring such Angles with Exactness: Besides that he seems to admit the real Equality of the several plane Angles, that form as well the *Apex*, as the other solid ones we have been



treating of. And, as to the small Difference between our Angle and that determined by Mr *Koënic*, who first considered this Problem, but has not yet published his Demonstration of it, that can only be owing to his not carrying on his Computation so far, and would scarcely have been worth the mentioning, were it not yet in Favour of the Practice of these industrious little Insects; and did it not therefore give us ground to conclude, that in general, and when the particular Form and Circumstance of the Honey-comb does not require a Variation from their Rule, the *Bees* do truly construct their Cells of the best Figure, and that not only nearly, but with Exactness; and that their Proceeding could not have been more perfect from the greatest Knowledge in *Geometry*. How they arrive at this, and how the wonderful Instinct in Animals is to be accounted for, is a Question of an higher Nature; but this is surely a remarkable Example of this Instinct, as it has suggested a Problem that had been overlooked by Mathematicians, though they have treated largely on the *Maxima* and *Minima*; and such an one, as has been thought to exceed the Compass of the common *Geometry*.

It may be worth while to add here, that if the Cells had been of any other Form than hexagonal, and the Bases had still been pyramidal, these must have been terminated by *Trapezia*, and not by *Rhombus*'s, and therefore had been less regular, because *OA* and *AK* would have been unequal: Nor could there have been room for such an advantageous or frugal a Construction as that we have described, because the solid Content of the Cell would have increased with the Right Line *KE*. The Cells, by being hexagonal, are the most capacious, in proportion to their Surface, of any regular Figures that leave no Interstices between them, and at the same time admit of the most perfect Bases. Thus, by following what is best in one respect, unforeseen Advantages are often obtained; and what is most beautiful and regular, is also found to be most useful and excellent.

III. Among the remarkable Observations of the Year 1732, none is more worthy to be related, than the Destruction of the Caterpillars and Grass-hoppers, which several Years ago miserably spoiled the Fruits of the Earth, in the northern Part of the Circle of *Saxony*, in the Marquisate of *Brandenburg* and *Lusatia*, and perhaps in other Places. Both these Sorts of Insects came out in incredible Multitudes, in the Spring of the Year 1732. The Caterpillars, in many Places, devoured almost all the Leaves of the Trees, as well wild as cultivated; and the Grass-hoppers also threatened as great a Devastation as they had made some Years before. Therefore the Country People began to dig Pits, and to gather the Grass-hoppers before their Wings were strong enough to fly, and to throw them into the Pits and bury them. But this Labour of the poor Husbandmen would have availed but little, if it had not pleased God to weary these Insects, with such Inclemencies of Weather, that they all perished in a short Time, about the Beginning of Summer, before they had laid their Eggs. For after a gentle Warmth

*A Relation of the Destruction of the Caterpillars and Grasshoppers, which some Years ago destroyed the Country, near Wittenberg, by Jo. Fred. Weideler, F. R. S. No. 432. p. 294. Apr. &c. 1734.*

about



about the Beginning of *April*, O. S. had brought these Insects out early, the severe cold of some Nights, *April* 15, 16, 17, and 18, and cold heavy Showers on *April* 22, and *May* 19, and then almost continual Rains about the End of *May*, and great Part of *June* and *July*, hindered these noxious little Animals from increasing the Bulk and Strength of their Bodies as usual. The Grass-hoppers particularly, which cannot endure much Moisture, at the Beginning of *July*, were found in great Numbers dead in the Fields; and many of them, which escaped drowning, had leaped upon the longer Stalks of the Herbs and Flowers, and hung down from them dead, fastened by their Mouths. That this was the probable Cause of the Death of the Grass-hoppers, appears from this Observation; that those Insects kept to the highest and most dry Fields, where they also made their Nests, and always avoided the low Vallies. I must not omit the Figure of these Grass-hoppers, which shewed them to be a different Species from the green ones, which are seen every Year in small Numbers, in the Meadows and Corn-Fields. Their Heads and Backs were black, and in some grey, distinguished with yellow Specks; their Belly was yellow; and the Muscles of their hinder Feet were red; which when they flew, made them appear purple. The Length of the Body of most of them, did not exceed an Inch and a half; but in *August* 1732, I found some that were above two Inches of a geometrical Foot long. In the same Month they coupled; and one female would contain above 30 Eggs. They laid their Eggs in Holes made in the Earth; and the Females died in them about the End of September. I was told, that four Years ago, when they travelled hither from *Poland*, through *Lusatia* and the Marquisate, they flew high in the Air in Troops, above the Houses and Towers, so as to appear at a Distance like a Cloud. Wherefoever they rested, they covered the whole Ground, and spread themselves far and near. They did the chief Damage in the higher Grounds near *Wittemberg*, for they did not penetrate into the Valley near the City, but kept themselves on the Hills about 1500 Paces off, and thence spread themselves towards the Marquisate and *Lusatia*. They were fond of the soft Tops of the Ears of Corn, and for the more convenient devouring of them, pulled off the entire Ear before it was ripe, which they did chiefly by Night. I have been assured by Persons of Credit, that most of the Ears of a whole Acre have been often thus pulled down in one Night; so that in some Places the poor Husbandmen did not recover so much as their seed.

*A New Species of Insect,*  
by Jac. Theod.  
Klein, Secr.  
to the Republic  
of Dantzick, and  
F. R. S. No.  
447, p. 150.

IV. 1. This Aquatic Insect was sent me from *Uderwang* in the Eastern *Prussia*. On account of it's great Number of Feet, and the Swiftnes of it's Motion, I may call it *Scolopendra Aquatica scutata* with greater Propriety than *Aldrovandus* called a cetaceous Fish, *Scolopendra cetacea*.

*Fig. 4.* represents the Insect on the upper Part, covered with it's Sheath, which is something like the Shape of a Tortoise; only it is a little











little elevated longitudinally in the middle of the Back, and towards the Extremity of the Body opens with a triangular Section, and is slightly denticulated; it is entire, and almost of the same Substance with the Sheaths of *Goedart's* Beetle, which comes from the Corn-worm, or of that which we call the *Rose Beetle*, but its Colour is rather paler. The Eyes pass through the Sheath, and rise a little above it.

Jan. &c.  
1738.  
Fig. 4.

Fig. 5. represents the under Part, with its great Number of Legs; each of these under the *Tibiae* has a *Sacculus*, Fig. 7. and ends in three Feet or Claws. The three Feet of the two fore Legs are longer than those of the other Legs, though they are not of equal Length with Respect to each other. All the Divisions of the Feet are jointed like the Bristles of the bifid Tail of this *Scolopendra*, or like the *Antennae* of other Insects.

Fig. 6. Represents the Body of the Insect, with the Sheath raised up. In the thin Cuticle of the lower Part of the Sheath, on both Sides, there are Apertures, as if made with a Needle. Whether the Insect draws in the Water into the Cavity where the Sheath is elevated, and emits it again, or whether it fills the Cuticle with Air, and empties it again, when it would sink or rise in the Water, I cannot certainly affirm. It has about 30 Infections, but I could not easily count the Number of Legs, because, having but one Specimen, I was loth to destroy it. At the Extremity of the Body, which separates the Sheath, the Rings of the Infections are set with little Spines, as they are drawn in Fig. 4, and 6.

Fig. 6.

Fig. 7. Shews one of the Legs next the Fore-ones, with its *sacculus*; it is represented in another Situation in Fig. 5.

Fig. 7.

As long as this Insect continued alive, it moved its Feet with a continual and singular Quickness, and drew its Body into the Sheath, and thrust it out again. I have not been able to find the least Mention of it in Authors.

2. I have sent a Creature, whose Name I cannot learn from any Books or Persons I have yet met with, to be kept in the Museum of the Royal Society. I brought it from a Pond upon *Bexley Common* last Saturday, where great Numbers have been observed for these 5 Weeks past: The Pond was quite dry the 24th of June, but upon its being filled with the great Thunder-shower upon the 25th, within two Days the Pond was observed to swarm with them, by a Farmer watering his Cows there: And what I thought observable, there is no Duct or Channel that could convey them from any adjacent Place.

Concerning the  
same Sort of  
Insect found  
in Kent, by  
the Rev. Mr  
Littleton  
Brown, F. R. S.  
dated Aug. 9.  
1737. Ibid. p.  
153.

3. The Legs of this Insect are very extraordinary; I counted 42 on a Side in one of those found in *Kent*; the 20 next the Head are nearly of a Size, but then they grow gradually smaller and smaller towards the Tail. I took out one of the larger ones of the Left Side of the Chest; the Foot consists of five flat membranous Claws, with a stiff Rib along their Middle, and beset with Hairs on the Edges, like those of Crabs; on the lower Side of the Leg hangs an oval Bag, and beyond that grows a large

An Addition  
by Cromwell  
Mortimer,  
M. D. R. S.  
Secr. Ibid.  
Fig. 8.



a large thin Membrane, which can be extended by a bony Rib that runs cross it; this Membrane and the whole Foot, is convex on the Side next the Head, and concave on that next the Tail; the Thigh, or first Joint of the Leg, is webbed on each Side; so that the whole Structure of the Legs seems to shew that they are rather designed for swimming with, than walking. The Leg represented in *Fig. 8*, was drawn, when the Insect lay on it's Back, as in *Fig. 5*. Many Parts of this Insect, tho' no bigger than the Figures, have some Resemblance to those of the *Molucca Crab*.

Experiments  
and Obser-  
vations on a  
Beetle, that  
lived 3 Years  
without Food:  
by Mr Henry  
Baker. N<sup>o</sup>.  
457. p. 441.  
July &c.  
1740.  
Fig. 9.

V. In the Middle of *June* 1737, being at *Tottenham* in *Middlesex*, a large Cistern of Lead, that was placed in the Coach-house-yard, to receive by Pipes the Rain-water from some Out-buildings, fell down, through the Failure of a wooden Frame whereon it stood. My Curiosity led me to examine into it; and at the Bottom of it, I observed several black \* *Beetles*, plunging in a muddy slimy Sediment, which the Water had left. Taking out 2 or 3 of them, I found them of a middling Size, somewhat above an Inch in Length, having 6 pretty long Legs, with 2 little Hooks at the Extremity of each, in the Manner of the common *Beetles*: They were all over of a rusty black Colour, with *Antennæ* long and jointed; a Body covered with one strong Shell, forming an Appearance of Case-wings, but undivided, and without any filmy Wings underneath, and a Tail turning up a little: In short, they resemble very much a Sort of *Beetle* that is sometimes seen in Houses, but were of a stronger and much more firm Contexture.

As I have preserved most of our *English* Insects, I chose one of the largest of these *Beetles*, and threw it into a Cup full of common *Lamp-Spirits*, (that being the Way of killing and preparing them for my Purpose) and in a few Minutes it appeared to be quite dead: Whereupon I shut it up in a round Pill-box of about an Inch and half Diameter, and carried it in my Pocket next day to *London*, where I tossed it into a Drawer, and thought no more of it for above 2 Months after; when opening the Box, I found it, to my great Surprise, alive and vigorous; though it had nothing to eat for all that Time, nor received any more Air than what could be met with in so small a Box, whose Cover shut up very close. Having, however, no Intention of keeping it alive, I again plunged it into *Spirit of Wine*, and let it lie considerably longer than the first time, till supposing it dead beyond any Possibility of Recovery, I put it into the Box again, and locked it in my Drawer, without looking any more at it for a Month at least, when I found it again alive. And now I began to imagine there must be somewhat extraordinary in this Creature, since it could survive the Force of *Spirit of Wine*, which soon kills most other Insects, and live for 3 Months, without taking in any Sustenance.

\* *Scarabæus impennis tardipes*, the slow-legged Beetle. *Moff.* 139. *Fig. Id. Angl.* 999. *Pet. Gaz.* Dec. 3. *Tab.* xxiv. 7.



A few Days before this, a Friend had sent me 3 or 4 *Cock-Roches*, or as *Merian* calls them, *Kakkerlaccæ*, brought alive from the *West-Indies*: These I had placed under a large Glass of 6 or 7 Inches Diameter, made on purpose to observe the Transformation of *Caterpillars*: I put my *Beetle* amongst them, that he might enjoy a greater Share of Liberty than he had done for 3 Months before. I fed them with green *Ginger* moistened in Water, and they eat it greedily; but I could not find, nor do I believe, that the *Beetle* ever tasted it during the whole 5 Weeks they lived under the Glass together. I often took notice, that the *Cock-Roches* would avoid the *Beetle*, and seem frightened at his Approach; but never observed any Tokens of his Liking or Dislike of them, for he usually stalked along, without regarding whether they came in his Way or not. Perceiving the *Cock-Roches* begin to decline in Vigour, I was afraid they would lose much of their Beauty, if I permitted them to die of Sicknes, and would become unfit to be preserved as I proposed: Wherefore I put them into *Spirit of Wine*, and the *Beetle* their Companion with them. They appeared dead in a few Minutes, and I believe were really so: The *Beetle* seemed likewise in the same Condition: Whereupon, after they had lain in *Spirits* about an Hour, I took them out, and whelmed the Glass over them, till I should have Leisure to dispose of them as I intended. This was about 10 in the Morning, and I saw them no more till Evening, but found the *Beetle* then creeping about as strong and vigorous as ever: And therefore I resolved to put him to a Trial I imagined he could not possibly survive, which was to let him remain a whole Night in *Spirits*; but here too I found myself mistaken, for after he had been taken out a Day, he appeared as lively as if nothing had happened to him.

Since that time I have put him no more in *Spirits*, but have kept him under the Glass afore-mentioned, where he is alive at present: Though during the 2 Years and half he has been in my Possession, I have never been able to discover, that he has drank or eaten any thing. I must not conceal, however, that, by way of Experiment, I have put under his Glass, at different times, Water, Bread, Fruits, &c. but I never found them in the least diminished or touched by him. These Trials too were always made at many Months asunder, and I am pretty certain, there has been at least a Year together, during some Part of the aforesaid Time, wherein nothing has been offered him either to eat or drink.

The Question will then be, How this Creature has been wonderfully kept alive for two Years and an half, without taking any visible Food? Dr *Alex. Stuart's* Supposition, that it finds it's Nourishment in the Air, carries with it the highest Probability: Since, as he was pleased to observe, there are Particles in the Air which evidently supply a Growth to Plants of some particular Kinds, such as the *Sempervive*, *Orpine*, *House-leek*, &c. And the same or some other Particles therein contained



may possibly be likewise able to afford a Nourishment to Animals of some certain Kinds. There is a farther Reason also to believe, that something like this must be; for, in the amazing Plan of Nature, the *Animal, Vegetable, and Mineral* Kingdoms are not separated each from other by wide Distances, or broken off by sudden Starts, but differ from each other (near their Boundaries) by such minute and insensible Degrees, that it is impossible to find out certainly where the one begins, or where the other ends. As the Air, therefore, yields Nourishment to some Kinds of Plants, it may probably do the same to some Kinds of Animals; for otherwise a Link would seem wanting in the mighty Chain of Beings. And that *Cameleons, Lizards, Snakes, &c.* can live for Months together without any visible Sustenance, is a Fact generally allowed to be true; the Cause of it too has been attributed to an exceeding slow Digestion, Circulation, and Distribution of Nourishment, in those Creatures; but as their Agility seems to imply a brisk Motion of their *animal Spirits*, I am inclined to think the Circulation of their other Fluids cannot be so sluggish as commonly is supposed: And, perhaps, it may not be unreasonable to believe, that their being able to live so long without visible Food, is rather owing to some other Nourishment they receive from the Air, which supplies the want of more substantial Diet.

I have met with no Instance I could give Credit to, of any Creature's living without Food for so long a time as the *Beetle* I have been mentioning; and yet I doubt not (though it may have been kept alive by Air only) but that, in it's natural State, it eats more solid Food; after somewhat the same Manner as the Plants before named thrive best when set in a little Earth, notwithstanding they may flourish a long while, and send forth Branches and Flowers, when they are suspended in the Air, and receive no Nourishment but from the Humidity or some other Qualities thereof.

We have not, indeed, as yet, many Instances of this Sort in Animals; nor is it probable any of the larger Kinds can live long without Supplies of Food: But there may be several Insects capable of subsisting on minute Particles carried about every-where with the Air, though, for want of sufficient Experiments, we are not acquainted with them.

It's reviving so often after being seemingly killed by *Spirit of Wine*, shews a Strength of Life I never found in any other Insect: Some Kinds, indeed, will come to Life again, if taken out as soon as they appear dead; and the *Ear-wig*, in particular, after continuing so some Minutes: But half an Hour in *Spirits* puts a final End to the Life of all the *Insects* I ever tried, except this *Beetle*.

It walks not much about under the Glass that covers it, but is usually found with it's Nose thrust close down to the Bottom thereof, perhaps to suck in the Air. On removing the Glass, it appears robust and vigorous, and would willingly run away. A strong aromatic kind of Smell



Smell issues from it, agreeable enough when there is not too much of it; and the same Scent hangs about the Fingers a long while after touching it. Since the Weather has been so excessive cold, it is grown somewhat torpid; but till now has always appeared as lively in cold as in hot Weather, and I have observed it's Smell to be stronger in Winter than in Summer. In the exhausted Receiver, where I have kept it sometimes for half an Hour, it seems perfectly unconcerned, walking about *in vacuo* as briskly as in the open Air; but, upon Admission of the Air, it shrinks it's Legs together, and appears in a Surprize for near a Minute.

We know the *Egyptians* had a high Veneration for the *Beetle*, by their many Images thereof, which are still preserved in the Cabinets of the Curious, and *Historians* tells us it was one of their Deities: But, as the *Egyptians* were a wise and learned People, we cannot imagine they would shew so much Regard to a Creature of such a mean Appearance, without some extraordinary Reason for so doing: And is it not possible they might have discovered it's being able to subsist a very long Time without any visible Sustenance, and therefore have made it a Symbol of the Deity? In the same Manner as it is probable the *Onion* was held sacred by them, for representing the *Orbits* of the *Planets*.

*P. S.* This *Beetle* (after being kept half a Year longer) was permitted to get away, by the Carelessness of a Servant, who took down the Glass to wipe it.

VI. About *Michaelmas* 1728, Mr *Bankley*, the Clerk of the Survey at *Portsmouth* shewed me the Insect as represented in *Fig. 10.* and *11.* On opening the Piece of Wood, (which was tied together with a Packthread) I found this Animal yet alive, and moving in a large Cavity in the Middle of the Wood, which appeared otherwise sound, having no visible Entrance into it. This Beetle being turned out upon a Sheet of Paper, crawled about upon it. Mr *Bankley* gave me the following Account of it: "This Insect was found *August 26,* " 1728, in splitting a Piece of Exotic Wood into two Pieces, cut a " cross the Grain  $4 \frac{1}{8}$  Inches thick, taken up in the Hold of his Ma- " jesty's Ship *Bredab*, when in the Dock at *Portsmouth*, after her Re- " turn from the *West-Indies*: It lived upwards of a Month afterwards. " The Hole in which it was nourished, was 5 Inches deep, and "  $2 \frac{1}{4}$  Inches by  $1 \frac{1}{4}$  Inch broad, in the great Piece; 2 Inches deep, and "  $2 \frac{1}{4}$  Inches by  $1 \frac{1}{4}$  Inch broad, in the smaller Piece. There was not " the least Sign of any Defect on the Outside of the Wood, but it ap- " peared very fair and sound; the Inside was porous, having a Grain " like *Cedar*, but in Colour not unlike yellow *Sanders*."

On Examination, I found this Insect to be a sort of *Scarabeus* called *Capricornus* from it's long Horns; which in this were very much crumpled, and partly broken off against the Wood, in it's Confinement: It's Wings were likewise crumpled on the same Account. The

*An Account  
of a Capri-  
corn Beetle,  
found alive in a  
Cavity within  
a sound Piece of  
Wood, by C.  
Mortimer,  
M. D. Secr.  
R. S. No.  
461. p. 861.  
Aug. &c.  
1741.  
Fig. 10, 11.*



Females of these Insects usually lay their Eggs in the Crevices of the Bark of Trees: So it is probable, that as soon as this Insect was hatched in Form of a Worm, it gnawed it's Way through the Bark into the Wood; and that afterwards the Hole it had made in the Wood, closed towards the Outside; and the Worm still continuing to gnaw deeper, formed the large Cavity; and then taking it's perfect Form of a Beetle, remained in that hollow Place, where the Sap of the Tree arising, might have supplied it with Nourishment, and even Air; since it is known, by various Experiments, that Air will insinuate itself, where-ever such Fluids, as contain Air, in them, can penetrate.

I have seen in the magnificent *Museum* of Sir *Hans Sloane*, Bart. a Piece of Wood, found without, having a Cavity within, wherein was found alive a Sort of Beetle, but I think of a different *Species*. It came from *Jamaica*, if I remember right.

*A Dissertation on the Worms which destroy the Piles on the Coasts of Holland and Zealand, by Job Bafter, M. D. F. R. S. Translated from the Latin by T. S. M. D. F. R. S. No. 455. p. 276. Nov. &c. 1739.*

VII. §. 1. In the Year 1730, the Persons appointed to take care of the Dikes on our Coasts, observed that the Piles made of the hardest Oak, defending the Coasts of the *Netherlands* against the Sea, were eat through in a few Months, so as to be broken by the least external Force. Surprized at this uncommon and dangerous *Phenomenon*, they enquired into it's Cause, and saw that a Sort of Worms, before that Time very scarce, but now increased to an incredible Number, had in so short a Time eat into those Piles between the highest and lowest Water-Marks, and threatned very great Damage to the Inhabitants of these Countries.

The superstitious Populace immediately persuaded themselves, that this new Genus of Animals was created by the Divine Wrath for punishing the Sins of Mankind: But prying Experience has taught, that those Worms like other Insects, were created in the Beginning; but now multiplied to an incredible Degree from some unknown Cause.

§. 2. If a Pile of the hardest Oak has stood 6 Months on the Shore, and be taken out in Summer or Autumn, there appears Mud and Filth sticking to it's outward Surface; which being scraped off with a Knife, discovers a vast Number of Holes, scarcely as large as Pins Heads.

§. 3. If you view this Mud (§. 2.) through a Microscope, you will see,

1. A Number of whitish Points, not bigger than Grains of Sand.
2. Some very small Worms.

The whitish Points seem to be the Eggs of this Insect, and the Worms to be such as are already hatched from them; and these Worms gradually perforating the outward Surface of the Wood, rendered soft by lying in the Water, made the aforesaid Holes (§. 2.) and through them worked their way into the Substance of the Wood.

§. 4. A small Style of Whalebone or Lead, thrust into these small Holes, runs strait into them for 3 or 4 Lines, so that it's outer End always makes a right Angle with the Pile: But afterwards, if the Style be

be



be gently pushed forward, it does not continue in the strait Line, but runs either way, generally upward.

§. 5. But if one of these Piles (§. 2.) be split lengthwise with a Hatchet or Wedge, it is found full of Passages, or hollow cylindrical Ducts, each of which contains a Worm surrounded with a thin testaceous Substance, exactly filling the Duct, and forming it's *Involucrum* or Sheath, in which Sheath it can move with Freedom. See §. 19.

These Ducts (§. 4.) beginning at the outward Surface by a narrow Hole, grow gradually wider, and run either strait, oblique, upward or downward. But what is most surprizing is, that these Ducts never run into one another, nor communicate; but each of them continues separate for every single Worm. Over the Worm's Head there are found two or three Drops of a salt Liquor, thicker than Water, but not the least Appearance of the Dust of the corroded Wood.

§. 6. Whence it appears, that all the Wood, which had before filled up the Place of the Duct, in which the Worm with it's Covering is now found, was eaten and consumed by the Worm: And as it seems quite incredible, that an Animal, which appears soft, and almost as fluid as the White of an Egg, should be able to eat through such hard Wood; I offer the Description of this *Xylophagous Worm* to the Royal Society, in order to give them some Knowledge of this Water-Insect, which has done so many Millions Damage to these Countries.

§. 7. They are found of various Sizes and Thickness. There are some of the younger ones not above an Inch or 2 in Length; some of a middle Size, such as we have represented in *Fig. 12.* and *13.* and some 13 or 14 Inches long.

§. 8. The Head is of a most wonderful Structure, being covered with two hard . . . (I know not which to call them, Shells or *Hemicrania*) of a Substance neither testaceous nor ossieous, securing their softer Contents: And being viewed through a Microscope, they appear as in *Fig. 14.* as well as I could have them drawn.

§. 9. These *Hemicrania* are two white Bodies, much harder than the Substance which forms the testaceous Covering; the inner Surface hollow and smooth; the outer, convex and rough, with 3 Fibres running different ways; and both together perfectly represent a double Bit, of that Kind of Borer, we call an Auger.

§. 10. The upper Part of the external convex Surface (*Fig. 14. A.*) has a very sharp Edge, in which the first Series of Fibres begins from one Point; which Fibres gradually dilating, and running lengthwise, end about the middle Part of it; and this middle Part makes a right Angle with the upper Part. In this Part the Fibres being elevated, run cross-wise. (*Fig. 14. B.*) The lower Part is thicker than the upper, but softer and less compact. In this Part the Fibres are raised up and rough, first curve, then strait, and, like the others, run lengthwise to the lower Edge of this Part, which is strongly fastened to the Head by various Ligaments. (*Fig. 14. C, D.*)

Worms §. 10:



*A Dissertation on the Worms which destroy the Piles*

§. 11. The concave or inner Part of these *Hemicrania*, (§. 9.) which contains the softer Parts of the Head, is very smooth; but almost in the Middle has a very small and tender Eminence or Process, (in Shape much like Dr *Rau's* Process in the Organ of Hearing) fixed at one End, and loose at the other, running almost the whole Width, and doubtless destined for supporting some of the inward Parts of the Head. (See *Fig. 15. A.*)

§. 12. These 2 *Hemicrania*, connected together by strong Ligaments, and as it were by a small Hinge, (by means whereof they can dilate without separating) besides their defending the soft Head from external Injuries, are the Instruments wherewith the Animal gets it's Food. For whatever way it turns it's Head, the raised and rough Fibres, running either length-wise or cross-wise, always rub off some of the Wood.

§. 13. These *Hemicrania* carefully removed, the contained Parts (*Fig. 17.*) are laid open to View; but they are so soft, and of so wonderful a Structure, that the Eye, though armed with a Microscope, can neither discern their true Make or Use. First, indeed, there appears a Membrane enveloping the whole Head; in the middle and anterior Part, which is not covered by the said *Hemicrania*, it appears as if raised by a *Tubercle*, (*Fig. 17. c.*) and in that Place it is of a red Colour; but the lower ligamentous Edge firmly adheres both to the small Process (§. 11.) and to the lower Edge of the *Hemicranium*.

§. 14. This Membrane carefully separated and removed, (*Fig. 18. A. A.*) in the middle of the subjacent Pulp you will find a small Pear-like Body, perfectly pellucid, somewhat protuberant above the other Parts, which made the *Tubercle* in the Membrane (§. 12). It is much harder than the other contained Parts of the Head and Body; so that it will bear cutting with the Scalpel. It is of a red Colour, as perfectly pellucid as a Drop of Water; of the Shape of a Pear, from a larger Basis terminating in a Point. I cannot better resemble it to any thing than to the Crystalline Lens of the Eye: Yet in Spirit of Wine it preserved it's Transparency, but it's Bulk was diminished. (*Fig. 18, B.*)

I cannot guess it's Use: It does not seem to me, as it does to some, to be the Organ of Sight; for the Worm seems to have no Occasion for an Eye, as spending it's Life in perfect Darkness; besides that, the investing Membrane is not transparent, and therefore would obstruct the Sight.

§. 15. At the Sides, where the lower Edges of the *Hemicrania* do not touch one another, there is a Sort of Cavity; and in these Sides the harder Fibres may be distinguished, disposed in such a Manner, as perfectly to resemble the Gills of Fish; and through them the Worm seems to breathe.

§. 16. The extreme Softness of the other Parts of the Head, prevents our coming at the Knowledge of the Use of the Membranes, furnished with *Fibres* of different Tendencies, or enquiring by what Organs the



Worm takes the Wood shaved off by the *Hemicrania*, or rough Shells; whether it does this by Suction, or not; by what Muscles, or how acting, this wonderful Head is moved. 'Tis probable, indeed, that it's Motion consists in the opening and closing these Shells (§. 8.) that shave off the Wood; and that the inner Parts have a Power to move on all Sides, as the Ball does in the Socket of the Eye; and perhaps to come forth of these Shells, and re-enter after taking their Food. But of these things there can be no Certainty, because the Parts dissolve between the Fingers.

§. 17. The Body, viewed forward, (*Fig. 13.*) is of a reddish Colour. In the middle appears a Line, often dark-brown, often blackish, sometimes not visible, sometimes running near half the Length. The rest of the Animal is of a whitish or grey Colour.

1. If you intend to dissect it, and examine the Inside, you must first remove a thin Membrane surrounding the whole Body, which for that Reason may be called the *Cutis* or *Cuticula*. When this is removed, there appears an oblong Vessel placed in the Middle, (*Fig. 13.*) of a reddish Colour, from the shaved Wood, of which it is full: Hence it seems to be the Stomach, or at least the first Organ of Digestion.

2. In the lower Part you will find another Vessel, appearing like a dark-brown Line, which contains the Excrements, of which it is often found full, and discharges them at the End of the Tail.

3. At the Sides of the reddish Vessel or Stomach (§. 17. 1.) is placed a white, clammy, fat Substance, sticking to the Fingers, and perhaps constituting the Flesh of the Animal.

§. 18. Where the Body ends, the Tail begins, thicker than the Body, and rendered stronger by circular *Fibres*. At it's End, it has 2 small hard Bodies, containing and defending the tender Extremities of the Tail.

This Tail, thicker than the Body, terminates in 2 Ends, the thickest of which certainly serves for the Discharge of the Excrements, the slenderest doubtless for Generation: And this it can stretch out to an incredible Length, so that in Worms that seemed to be in Copulation, it appeared above an Inch out of the Pile.

The two small Bodies, that contain these Ends of the Tail, are of a harder Substance than even the *Hemicrania*. The outer Part is gibbous, the inner hollowed. The lower End is bifid; whence I conjecture, that they serve the Animal for Feet, when it is mounting upright, or corroding the Wood; by leaning on them as on a Prop (*Fig. 19.*)

§. 19. The above-described Worm dwells now very securely in a testaceous Tube of a white Colour, which it exactly fills, yet so as to be able to move with Freedom. That Tube, like the Coverings of Snails, &c. daily grows with the Animal, from the Matter which perspires from it's Body; whence it is sometimes found strait, sometimes bent, according to the Course which the Worm steered in corroding.



*A Dissertation on the Worms which destroy the Piles*

§. 20. As to their Generation, it is probable enough, that, analogous to that of other Insects, it is performed by Copulation of Male and Female: For they can so lengthen one End of their Tail, and thrust it out of the Pile, that they may copulate by that Means. Then they lay their Eggs in the Water close to the Piles, to which they stick by their clammy viscid Matter, (such, for Example, as Frog's Spawn) and afterwards, by the Heat of the Sun, hatch the Worm, which immediately endeavours to get into the Pile. (See §. 2, and 3.)

I could not observe the Difference of Sex, either with my Eye, or a Microscope. Some think them Hermaphrodites, as Snails, and that they copulate in the same Manner: But these Conjectures are not very probable.

§. 21. Many Remedies and Secrets for destroying these dangerous Enemies were immediately boasted of, which for the most Part were Preparations of *Arsenic* or *Mercury*, and are not worth enumerating: I will only give the Receipt of one, which is the best and surest of all.

Take an Iron Plate of an oblong Figure, and of the Width of the Pile, with a strong Handle at each End. One End of this Plate must be armed with thick Nails half an Inch long, and about an Inch asunder. The Nails of this Plate must be driven into a Pile of any slight Wood, with a Hammer, and then the Plate pulled off by Means of it's Handles. And this is to be so often repeated, until the Pile is perforated every where with small Holes: Then it must be dawbed over with *Varnish* in the hottest Sun (the *Varnish* is imbibed by the soft Wood with so many Holes in it); and while the *Varnish* is yet hot, let it be strewed over with *Brick-dust*: And this is to be repeated 3 or 4 times, after the preceding *Varnish* is thorough dry, till the Pile is entirely surrounded with a stony Crust, which will be impenetrable to all Insects, and last many Years.

But the Divine Clemency has already so far destroyed these pernicious Insects, which multiplied so prodigiously for 8 or 9 Years past, that there is great Room for Hope, that our Country will in a short Time be entirely freed from them.

*An Explanation of the Figures.*

Fig. 12. The Pile-worm of it's natural Size, lying on it's Belly.

Fig. 13. The same lying on it's Back.

See §. 17. A. The Stomach. B. The Duct full of Excrements. C. The Tail, with it's Defences *dd*, and it's Point *e*, which it can stretch out.



The Six following Figures are represented much larger than Life.

- §. 10. Fig. 14. *AA*. The first Series of Fibres running strait down. *BB*. The second Series running transversely. *CC*. The third taking a different Course. *DD*. The lower Edge, which is infixed to the Head.
- §. 11. Fig. 15. The Shell or *Hemicranium* seen on the Inside with the Process running cross it, one End of which *A* is fixed, the other *a* is movable.
- §. 12. Fig. 16. *A. B. C. D.* The same as in Fig. 3. *E*. The Hinge, whereby these are connected, and may easily dilate or open.
- §. 13. Fig. 17. *AA*. The Membrane covering the Head freed from the *Hemicrania*, which were attached to this Membrane. *B*. The Place where the *Hemicrania* were connected. *c*. The middle anterior Part, in which the *Tubercle* was prominent.
- §. 14. Fig. 18. *AA*. The Membrane of Fig. 17. separated and turned back. *B*. The pellucid pyriform Body lying in the middle of the Head, and which formed *c*. the *Tubercle*.
- §. 18. Fig. 19. The two Defences of the Tail, of which the exterior Part *A*. is gibbous; the other, or interior *B*. is, as it were, hollowed: These Extremities are bifid. *C*. By this Part they are joined to the Tail.

VIII. 1. The first Account given to the *Royal Society*, of this surprising Property of an Insect, was in a Letter from *M. Buffon*, of the *Royal Academy of Sciences at Paris*, and *F. R. S.* to *Martin Folkes*, Esq; now President; his Letter bears Date the 18th of July 1741, N.S. and was communicated to the Society at their next Meeting on the 29th of October following; and therein *M. Buffon* acquaints Mr *Folkes* of 2 very singular Observations, lately made in Natural History; the first of a small Sort of Bug, which produces it's Like somewhat after the Manner of Plants, and without Copulation; the other of a small Insect called a *Polypus*, which is found sticking to the common *Duckweed*, and which, being cut in two, puts out from the upper Part a Tail, and from the lower a Head, so as to become 2 Animals instead of one; besides which, when cut in three, the middlemost Part puts out from one End a Head, and from the other a Tail, so as to become 3 Animals, all living like the first, and performing the Offices of their Specie. Both which Observations *M. Buffon* says were well averred.

*Of the Polypus, a Water Insect, which being cut into several Pieces, becomes so many perfect Animals. No. 466. p. 219. Nov. 1742.*



Mr *Folkes* also at the same time, communicated another Letter he had received from the Honourable *Charles Bentinck*, Esq; at the *Hague*, dated the 15th of the foregoing *September*, wherein it is said, That a young Gentleman of *Geneva*, then in *Holland*, whose Name we since learn to be *Monsieur du Tremblay*, had found in Water, wherein he was looking for Insects, some small things he at first took for Plants, till, on a further Examination, he perceived them to move, and to contract themselves on their being touched; nor could he at first think them to be Animals, by reason of several young Shoots he found to come out from them, and to hang upon one another as far as the fourth Generation: He was, however, at last satisfied they were Insects, and that they preyed upon others, and would even eat raw Flesh. They fixed themselves, he said, by one End to some Plant, or the Side of the Vessel in which they were contained, and at the other End had 6 or 8 Arms, with which they seized their Prey. He also found, that one of them being cut asunder, a few Days after, new Arms were grown out of that Part that had none before; since which he had cut them every Way possible, in Length, Breadth, and obliquely; and always with the same Success; after which he has gone on still further, subdividing them, but never found them to propagate any other ways than by Shoots, several at a Time, and without any Copulation. Mr *Bentinck* added, That this Gentleman would soon print an Account of the Observations he had made; and that the Insects he had himself seen of this Sort, were from about a Line to half an Inch in Length.

The late Mr *Lewenboeck* seems to have met with this same Sort of *Animalcula*, in the Year 1703, and has described and given a Draught of them, in a Letter published in N<sup>o</sup>. 283. Soon after which, a more perfect Draught and Description of the same Insects were inserted from an anonymous Hand in N<sup>o</sup>. 288, all which Figures answer very well to the Description, and a rough Sketch in Mr *Bentinck's* Letter. In *Fig. 3*, and *4*, of this last cited *Transaction*, one of the Insects is represented as quite pursed up or contracted; but neither Mr *Lewenboeck*, nor the last-mentioned anonymous Author, ever thought of dividing the Insect, though the latter had observed the young Shoot dropping off from the Parent.

Of the same  
by J. F. Gronovius, M. D.  
at Leyden.  
No. 466, p.  
218.  
Read, Nov.  
18, 1742.

2. It is now about Nine Months since, that a young Gentleman, living in the Family of *Mynbeer Bentinck* at the *Hague*, discovered a Water Insect, not known yet or described by any Author. It has a pellucid Body, having here and there branched out something like Claws, with which it catches a particular Sort of small Worms, which are every-where found in standing Waters: These are it's Food.

But of what Sort this Insect is, is not known; nor have it's Mouth, Stomach, or Intestines been yet discovered.

But what is most surprising is, that, cut this Animal in 5 or 6 Pieces, in a few Hours there will be as many like their Parent.



This Discovery was and is very surprizing to all our Virtuoso's, and really not believed, until the Professors *Albinus* and *Mussenbrock* were provided with the Animals, and, after having well examined this Creature, found the Prodigy of increasing itself in that wonderful Manner, very true.

One of the Gentlemen that made this Discovery was Mr *Allemand*, a Man of great Learning and Ingenuity, Tutor to the Sons of Mr *s'Gravenfande*.

There have been several of these wonderful Creatures sent to *Paris*, to M. *Reaumur*, from whom we hope for a particular Dissertation.

But after all, I do not think it a perfect Animal, but a kind of the *Uva marina*, *Holothuria*, or *Zoophyta*, which really are living when they are first caught; of this Kind are the *Pennæ marinæ*, figured by *Barrelierus*, Tab. 1273 and 1774, and also the *Fungi Marini*, Tab. 1293, 1294. These last I remember I have found several times on our Sea-Coasts, and observed that there was a living Nature in them.

3. The last News from *Paris* gives something very surprizing in the Account of M. *Reaumur's* late Memoir, read in the *Royal Academy of Sciences* there, concerning an Animal called a *Polypus*, in which Life is said to be preserved, after it has been cut into several Pieces; so that one Animal seems by Section to be immediately divided into 2, 3, or more complete Animals, each separately enjoying Life, and continuing to perform the proper Offices of it's Species.

By \_\_\_\_\_  
of Cambridge.  
*Ibid.* p. 227.  
Read. Nov.  
25, 1742.

Such an Account would have been less regarded, had we not been informed before, that Two \* Letters had been communicated to the *Royal Society*, some Months since, from good Hands, both which mentioned the same thing, and related it as a Fact averred, and carefully examined, by one of the greatest Judges, and most indefatigable Promoters, of Natural History, and especially of that Part of it, which leads to the Knowledge of what is most particular and remarkable in the Insect, and Reptile Part of the Creation.

Some of our Friends, who are firmly attached to the general Metaphysical Notions we have formerly learned, reason strongly against the very Possibility of such a Fact: but as I have myself formerly owned, on other Occasions, my Distrust of the Truth, or Certainty at least, of some of those Principles, which I never yet had a sufficient Understanding of, to give a full and clear Assent to; I shall now make no Scruple of acknowledging, that I have already seen so many strange things in Nature, that I am become very diffident of all general Assertions, and very cautious in affirming, what may, or may not possibly be.

The most common Operations both of the Animal and Vegetable World are all in themselves astonishing, and nothing but daily Experience, and constant Observation, makes us see, without Amazement,

\* See the preceding Articles.



an Animal bring forth another of the same Kind; or a Tree blossom, and bear Leaves and Fruit.

The same Observation, and daily Experience, make it also familiar to us, that besides the first Way of propagating Vegetables from their respective Fruit and Seed, they are also propagated from Cuttings; and every one knows, that a Twig of a *Willow*, particularly, cut off and only stuck into the Ground, does presently take Root and grow, and becomes as much a real and perfect Tree, as the original one from which it was first taken,

Here is then, in the Vegetable Kingdom, the very thing quite common, that *M. Reaumur's* Memoir is said to give a rare Example of in the Animal. The best Philosophers have long observed very strong Analogies between these two Classes of Beings: and the Moderns, as they have penetrated further into Nature, have every Day found Reason to extend that Analogy: some have even with great Probability talked of a Scale of Nature in which she, by an insensible Transition, passed from the most perfect of Animals, not only to the most imperfect, and thence to the most imperfect of Vegetables, but even through Coral-line Bodies, and Minerals, to the very Earths and Stones, which seem the most inanimate Parts of our Globe.

Now in such a Scale, who is the Man that will be bold to say, Just here Animal Life entirely ends, and here Vegetable Life begins? Or, Just thus far, and no further, one sort of Operations goes, and just here another sort quite different takes it's Place? Or, again, Who will venture to say, Life in every Animal is a Thing absolutely different from that which we dignify by the same Name in every Vegetable? And might not a Man even be excused, if he should modestly doubt, whether Plants and Vegetables may not themselves be considered as a very low and imperfect Tribe of Animals; as Animals might in like manner, be considered as a more perfect and exalted kind of Vegetables?

We see the two Sexes of Male and Female run through all the higher Parts of the Animal Creation; yet would he have gone a great deal too far, who should have thence asserted, there were no Exceptions to this general Oeconomy; or that this was one of the general and distinguishing Affections of all the Animal Kind: For modern Discoveries have informed us, that there is somewhat very analogous to this in the Vegetable Creation also: And even in the Animal it has been found, that *Snails*, *Earth-worms*, and some others, are really Hermaphrodites, having in themselves the Organs of both Sexes; whilst the working *Bee* is truly of no Sex at all, nor any-ways employed in the Production of that Species, it labours so hard daily to provide with Food.

But, whereas, in Animals, the Division of the Sexes is almost general; and the Union of them in one Subject appears but in a few Instances; contrarywise, in Vegetables, almost all have the whole  
Apparatus



Apparatus of Generation in each Individual, whilst only a few Sorts seem to emulate Animals in what is analogous to the Division of them.

I seem, perhaps, to wander too much from the Point first-mentioned; but as I am only offering loose Hints, and such wild Conjectures as come in my Way, hope to be excused, though I yet hazard another Observation, which is, That what appears chiefly to be new, in the Subject of this Memoir, is, that the Animal or Animals live and do well after their Separation, and that they are capable of re-producing such Parts as the Head and the Tail, which seemed essentially wanting.

I say, that the Animal's living and doing well again, is what is chiefly new; for that an Animal, after Separation of some of the principal Parts, seems for some time to retain Life in each Part, must have been observed by every body; and though People generally say, from their Prejudice in favour of some of the Principles above hinted at, that to be sure only one of the Parts, though they know not always which *feels* and has the Sensation of Pain; yet have all I have ever talked with on the Subject, as freely acknowledged, that the *Phænomena* appeared on the other Side.

A *Chicken*, or a *Pigeon*, whose Head is suddenly struck off, shews in both Parts, if no preconceived Opinion led us to think otherwise, strong Signs of Pain and Suffering, and the very same Signs, that the respective Parts of the Animal shew of that Sensation, whilst it is surely living and entire: And I have been told by some, who have seen the Heads of Malefactors suddenly severed from their Bodies, that the same Observation holds also in our own Species. But we have all seen it hold much stronger in the more imperfect Animals, as they are commonly called, such as *Worms*, where, on the Separation of the Body into two Parts, Life has continued seemingly in both, and with strong Signs of it, longer than we have had the Patience to attend and examine. We have been, indeed, quite uncertain, in which of the Parts this seeming Life has been most conspicuous: and as both Parts have seemed to endeavour to get away, and have frequently soon after been found missing, Boys and ordinary People are generally possessed of an Opinion, that they unite and grow together again after their Separation.

Now, if it could once be allowed, that Animal Life and Sensation might subsist but an Instant, in both Parts of the Creature, after it's Section; the whole remaining Difficulty would be only as to the Cure of the Wounds, and the Reproduction of the necessary Organs that are wanting. And, for the first of these, we know very well, that the more imperfect Animals are killed with much greater Difficulty than the more perfect, their Vitals being more diffused, and their general Organization being, I suppose, far more simple than that of the higher Tribes: And as to the other, I think no one will see any Impossibility in the Reproduction of certain Parts, after what we have seen and  
read



read of, in the *Lobster* and *Cray-fish* Kinds, who when they chance by any Misfortune to loose a Claw, reproduce it in a short time, with all it's Joints, and the proper Muscles for moving them; all which appears as difficult as the regaining of a Mouth and a Tail to some of the *Worm-kind*; whose general Organization being simple, and consisting chiefly of only one strait Gut, or Passage, from the Mouth to the Vent, they seem to want little more to reproduce either, than a Contraction of the Wound, with the Assistance of the Muscles that move the several Rings of which the Body is composed; and every one of which, in it's first and natural State, performs almost the same Motions as are necessary for Suction or Ejection: the latter of which we have even sometimes seen very wonderfully supplied in our own Species, in those Cases, where grievous Wounds of the Intestines have put Nature upon trying to perform her Operations in a new Way.

I shall add one or two Facts I should indeed have mentioned before, when I was speaking of the Difficulty of killing some of the Tribes of Insects and Reptiles; which are, that I have myself seen the Heart of a *Viper* continue it's regular Beats more than 6 Hours after it had been taken out of the Body: That I have seen that Body move and seem alive to all Purposes for a great Part of the same time, after having lost the Heart; and that I have seen *Wasps* whose Heads had been taken off, creeping in the window the next Day; and *Butterflies* that have lived, and attempted even to fly, several Days after undergoing the same severe Operation.

Insects seem at first to suffer but little from the Loss of their hinder Parts, although these contain most of their *Viscera*; nor does the Loss of Limbs seem to affect them in any Proportion to the more perfect Animals. But even in our own Kind, in Infancy, before the Parts have lost all their Softness, much greater Wounds may be received without Loss of Life, than afterwards. If we go yet further back to our *Embryo* State, it is very probable, that yet vastly greater Hurts are recoverable: And it is upon that Principle chiefly, that the best and most likely Account has been given by modern Writers in Anatomy, of some very remarkable Monsters that have appeared in the World, where even some of the most essential Parts of Two *Fœtus's* have been seen wonderfully united in one and the same Body.

By the Hon.  
W. Bentinck,  
Esq; F. R. S.  
No. 467. p. 2.  
Jan. 1742-3.

4. What I here send you inclosed will, I hope, answer the Queries of your last Letter. M. *Tremblay*, the Gentleman who has made the Observations on the Insects, has drawn the following Extract from his Journal: And I can answer for the Truth of the Facts therein contained, as there is not one of them but what I have seen repeated above 20 times.

By Monsieur  
Tremblay, at  
the Hague.  
Translated  
from the

5. The Animal in question is an aquatick Insect, which is represented in *Fig. 20*. It's Body *AB*, which is pretty slender, has on it's anterior Extremity *A* several Horns *AC*, which serve it instead of Legs and Arms, and which are yet slenderer than the Body. The Mouth

Mouth



Mouth of the *Polypus* is in that anterior Extremity; it opens into the Stomach, which takes up the whole Length of the Body *AB*. This whole Body forms but one Pipe; a Sort of a Gut which can be opened at both Ends.

French by  
P. H. Z.  
F. R. S. Ibid.  
p. 3.

The Length of the Body varies according to its different Species, and according to many other Circumstances, to be mentioned hereafter.

Fig. 20.

I know 2 Species, of which I have seen some Individuals extend their Bodies to the Length of an Inch and a half; but this is uncommon. Few are generally found above 9 or 10 Lines long; and even these are of the larger Kind.

The Body of the *Polypus* can contract itself, so as not to be above a Line, or thereabouts, in Length. Both in contracting and extending itself, it can stop at any Degree imaginable, between that of the greatest Extension, and of the greatest Contraction.

The Length of the Arms of the *Polypus* differs also according to the several Species: Those of one of the Species that I know, can be extended to the Length of 7 Inches at least. The Number of Legs or Arms is not always the same in the same Species. One seldom sees in a *Polypus*, come to its full Growth, fewer than 6. The same may be said of the Extension, and of the Contraction of the Arms, which I have said concerning the Body. The Body and the Arms admit of Inflexion in all their Parts, and that in all manner of Ways. From the different Degrees of Extension, Contraction, and Inflexion, which the Body and the Arms of the *Polypus* admit of, results a great Variety of Figures, which they can form themselves into.

These Insects do not swim, they crawl upon all the Bodies they meet with in the Water, upon the Ground, upon Plants, upon Pieces Wood, &c. Their most common Position is, to fix themselves by their posterior End *B* to something, and so stretch their Body and Arms forwards into the Water. They make use of their progressive Motion, to place themselves conveniently, so as to catch their Prey. They are voracious Animals: their Arms extended into the Water, are so many Snares which they set for Numbers of small Insects that are swimming there. As soon as any of them touches one of the Arms, it is caught.

The *Polypus* being seized of a Prey, conveys it to his Mouth, by contracting or bending his Arm. If the Prey be strong enough to make Resistance, he makes use of several Arms. A *Polypus* can master a Worm twice or thrice as long as himself. He seizes it, he draws it to his Mouth, and, what is more, swallows it whole. If the Worm comes end-ways to the Mouth, he swallows it by that End; if not, he makes it enter double into his Stomach, and the Skin of the *Polypus* gives way. The Size of the Stomach extends itself so as to take in a much larger Bulk than that of the *Polypus* itself, before it swallowed that Worm. The Worm is forced to make several Windings and Folds in the Stomach, but does not keep there long alive; the *Polypus* sucks it,

it,



it, and after having drawn from it what serves for his Nourishment, he voids the Remainder by his Mouth, and these are his Excrements. According as the Weather is more or less hot, the *Polypus* eats more or less, oftener or less often.

They grow in Proportion to what they eat; they can bear to be whole Months without eating, but then they waste in Proportion to their Fasting.

There is not on the Body of a *Polypus* any distinguished Place, by which they bring forth their young. I have some of them that have greatly multiplied under my Eyes, and of which I might almost say, that they have produced young ones, from all the exterior Parts of their Body. A *Polypus* does not always put forth a single young one at a time; it is a common thing to find those which produce 5 or 6: I have kept some which have put forth 9 or 10 at the same time, and when one dropt off, another came in it's Place. These Insects seems so many Stems from which issue many Branches. I have learned by a continual Attention to two Species of them, that all the Individuals of these Species produce young ones.

I have for two Years had under my Eye thousands of them; and though I have observed them constantly, and with Attention, I never observed any thing like Copulation. Upon Supposition that this Copulation is performed in some secret Manner: I tried at first to be sure it had not Place between two of them, after they were severed from the Body of their Parent. To this end, I took young ones, the Moment they came from the Parent, which was alone in a Glass; or I even parted them with Scissars: Each of these young ones I put into perfect Solitude, I fed them every one separately in a Glass; they all multiplied, not only themselves, but also their Offsprings, which from Generation to Generation, as far as the seventh, were all confined to Solitude with the same Precaution. Another Fact, which I have observed, has proved to me, that they have the Faculty of multiplying, before they are severed from their Parent. I have seen a *Polypus*, still adhering, bring forth young ones; and those young ones themselves have also brought forth others. Upon Supposition, that perhaps there was some Copulation between the Parent and young ones, whilst they were yet united; or between the young ones coming from the Body of the same Parent; I made divers Experiments, to be sure of the Fact; but not one of those Experiments ever led me to any thing that could give the Idea of a Copulation. The *Polypus* multiplies more or less, as he is more or less fed, and as the Weather is more or less warm. If Plenty of Food, and a sufficient Degree of Warmth concur, they multiply prodigiously.

If the Body of a *Polypus* is cut into two Parts transversely, each of those Parts becomes a complete *Polypus*. On the very Day of the Operation, the first Part, or anterior End of the *Polypus*, that is, the Head, the Mouth, and the Arms; this Part I say, lengthens itself, it creeps,



creeps, and eats. The second Part, which has no Head, gets one ; a Mouth forms itself, at the anterior End ; and shoots forth Arms. This Reproduction comes about more or less quickly, according as the Weather is more or less warm. In Summer, I have seen Arms begin to sprout out 24 Hours after the Operation, and the new Head perfected in every respect in a few Days. Each of those Parts, thus become a perfect *Polypus*, performs absolutely all it's Functions. It creeps, it eats, it grows, and it multiplies ; and all that, as much as a *Polypus* which never had been cut.

In whatever Place the Body of a *Polypus* is cut, whether in the Middle, or more or less near the Head, or the posterior Part, the Experiment has always the same Success.

If a *Polypus* is cut transversely, at the same Moment, into three or four Parts, they all equally become so many complete ones.

The Animal is too small to be cut at the same time into a great Number of Parts ; I therefore did it successively. I first cut a *Polypus* into four Parts, and let them grow ; next, I cut those Quarters again ; and at this Rate I proceeded, till I had made 50 out of one single one : And here I stopped, for there would have been no End of the Experiment.

I have now actually by me several Parts of the same *Polypus*, cut into Pieces above a Year ago ; since which time they have produced a great Number of young ones.

A *Polypus* may also be cut in two, lengthways. Beginning by the Head, one first splits the said Head, and afterwards the Stomach : The *Polypus* being in the Form of a Pipe, each Half of what is thus cut lengthways forms a Half-pipe ; the anterior Extremity of which is terminated by the half of the Head, the half of the Mouth, and Part of the Arms. It is not long before the two Edges of those Half-pipes close after the Operation : They generally begin at the posterior Part, and close up by Degrees to the anterior Part. Then each Half-pipe becomes a whole one complete : A Stomach is formed, in which nothing is wanting ; and out of each half Mouth a whole one is formed also. I have seen all this done in less than an Hour ; and that the *Polypus*, produced from each of those Halves, at the End of that Time did not differ from the whole ones, except that it had fewer Arms ; but in a few Days more grew out.

I have cut a *Polypus* lengthways, between 7 and 8 in the Morning ; and between 2 and 3 in the Afternoon, each of the Parts has been able to eat a Worm as long as itself.

If a *Polypus* is cut lengthways beginning at the Head, and the Section is not carried quite through ; the Result is, a *Polypus* with two Bodies, two Heads, and one Tail. Some of those Bodies and Heads may again be cut lengthways soon after. In this Manner I have produced a *Polypus* that had seven Bodies, as many Heads, and one Tail. I afterwards, at once, cut off the seven Heads of this new *Hydra* :



Seven others grew again ; and the Heads that were cut off became each a complete *Polypus*.

I cut a *Polypus* transversly into two Parts: I put these two Parts close to each other again, and they re-united where they had been cut. The *Polypus*, thus re-united, eat the Day after it had undergone this Operation : It is since grown, and has multiplied.

I took the posterior Part of one *Polypus*, and the anterior of another, and I have brought them to re-unite in the same Manner as the foregoing : Next Day, the *Polypus*, that resulted, eat : It has continued well these two Months, since the Operation : It is grown, and has put forth young ones, from each of the Parts of which it was formed. The two foregoing Experiments do not always succeed ; it often happens, that the two Parts will not join again.

In order to comprehend the Experiment I am now going to speak of, one should recollect, that the whole Body of a *Polypus* forms only one Pipe, a Sort of Gut, or Pouch. I have been able to turn that Pouch, that Body of the *Polypus*, inside-outwards ; as one may turn a Stocking I have several by me, that have remained turned in this Manner ; their Inside is become their Outside, and their Outside their Inside : They eat, they grow, and they multiply, as if they had never been turned.

They are to be looked for in such Ditches whose Water is stocked with small Insects. Pieces of Wood, Leaves, aquatic Plants, in short, every thing is to be taken out of the Water, that is met with at the Bottom, or on the Surface of the Water, on the Edges, and in the middle of the Ditches. What is thus taken out, must be put into a Glass of clear Water, and these Insects, if there are any, will soon discover themselves ; especially if the Glass is let stand a little, without moving it ; for thus the Insects, which contract themselves when they are first taken out, will again extend themselves when they are at Rest, and become thereby so much the more remarkable.

In order to feed them, one must know how to provide one's self with Insects fit for their Food.

6. M. *Reaumur* observes, that though in the Histories he has already given of minute Animals in this Work, he has had Occasion to produce many new and unexpected Phænomena : One he has now to mention would exceed all Belief, if it was not confirmed by the strongest repeated Observations ; which is, that there are Species of Insects, who are multiplied by being cut to Pieces, and among which, one single Animal, divided into 8, 10, 20, 30, or 40 Parts, becomes so many entire Animals, each similar to that of which it was at first only a Piece. This Animal, being one of those that undergo no Change in their common Form, does not belong to the Design of this present Volume which treats only of some of those, which, having been first a Worm or Maggot, are then changed into a Chrysalis, and from thence, either into a Fly or Scarabee. Yet M. *Reaumur* observes, the Number

An Abstract  
of what is con-  
tained in the  
Preface to the  
Sixth Volume  
of M. Reau-  
mur's History  
of Insects, re-  
lating to the a-  
bovementioned  
Observations,  
Ibid. p. 12.



SCOLOPENDRA Aquatica Scutata.

Pl. II. Vol. IX. part 3. page 26.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 13.



Fig. 14.



Fig. 15.



Fig. 16.



Fig. 17.



Fig. 18.



Fig. 19.

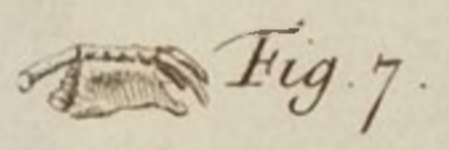


Fig. 7.

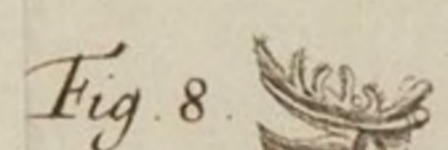


Fig. 8.

Fig. 12.



Fig. 10.



Fig. 11.



Fig. 9.

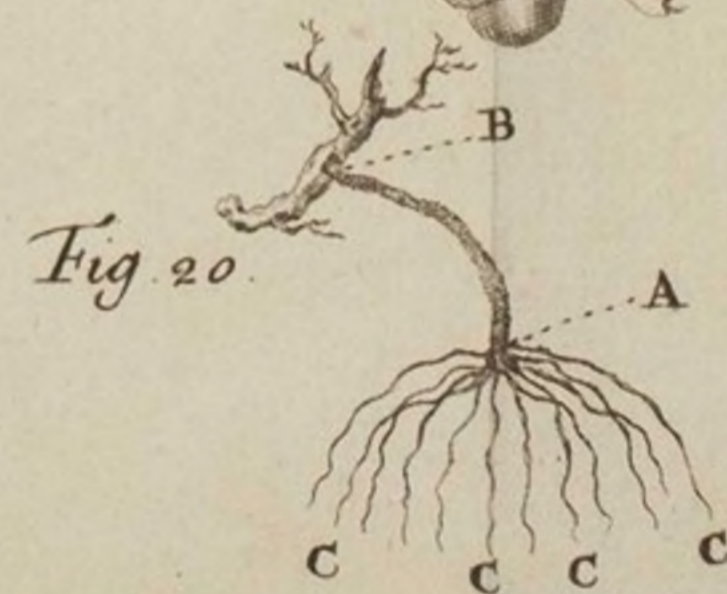


Fig. 20.







ber of Questions that had been put to him concerning this Insect, as well by Persons at home, as by his Correspondents abroad, had made him think he ought not to defer giving now some Satisfaction to the Curiosity of the Publick. Besides that he found himself obliged, to give in this Manner his Attestation to the Truth of this Fact, first observed by Mr *Tremblay*, a Gentleman of *Geneva*, now residing in *Holland*, and confirmed by Numbers of the most curious and accurate Experiments: Which Attestation he also observes, in so strange a Fact, could hardly be expected to have sufficient Weight, should he not say enough to put his Readers in a Condition to observe themselves, and see with their own Eyes, the Truth of the Particulars he relates.

Mr *Tremblay*, about 2  $\frac{1}{2}$  Years since, observing the numerous Insects, with which the Water of a Ditch, covered with Duck-weed, was plentifully stocked, discovered some odd-shaped Bodies, of a greenish Colour, concerning which he was doubtful whether to look on them as Plants or Insects; he thought, by cutting them, to assure himself to which of these Classes they properly belonged; as supposing, if to the former, they would probably not be destroyed by cutting, but vegetate again: They seemed to do so; and upon this, he was inclined to look on them as a Sort of Water Sensitives; till fresh Experiments every Day shewed him new Operations. They discovered a sort of voluntary locomotive Faculty; they seemed to seek the Light; they caught other Insects, and devoured them with great Eagerness. This threw him into fresh Amazement; yet a prudent Diffidence still hindered him from pronouncing positively concerning them; he communicated his Observations, and dispatched some of the Insects themselves to M. *Reaumur*, in Dec. 1740. He, he says, repeated all Mr *Tremblay*'s Experiments, and not only by himself, but with Mons. *Bernard de Jussieu* of the *Royal Academy of Sciences*, and of this Society, and with several more of the *Academy*. The Experiments succeeded as they had done in *Holland*, and they were all convinced they could not refuse acknowledging the Insects in question, to be really such: however new and surprising their Properties appeared.

M. *Reaumur* then gives a general and very succinct Account of the Experiments tried by Mr *Tremblay* and himself; which agrees with what is contained in the preceding Paper.

These Experiments were no sooner known among the Curious in *France*, but it was presently imagined, these Insects were not the only Species to which Nature had given so extraordinary a Faculty: And numberless Observations were made to that Purpose. M. *Bonnet* was not long before he found a very slender Water-worm, of about an Inch and a half long, that had the same Property; and Mons. *Lyonnet* discovered another above 3 Inches long, and of the Thickness of the Treble String of a Violin, that being cut into 30 and 40 Parts, afforded the same Phenomena. Mons. *Reaumur* was desirous, if possible, to see the Success of these Experiments in some Animals of a larger Size;



and inclined to believe some Sea Productions, not very unlike in Shape to these Fresh-water ones, together with other Bodies among those distinguished by the Name of *Urticæ Marineæ*, and Star-fish, might not improbably be endowed with the like Faculties; he engaged M. Guettard, and M. Jussieu, to be assistant in making Variety of Experiments by the Sea-side, on these several Sorts of Bodies; the first was on the Coasts of *Poitou*, the other on those of *Normandy*; and they were soon sufficiently satisfied, the same Laws of Nature had Place in these Sorts of Animals also. Many of the Star-fish Kind particularly, and which usually consist of five equal *Radii* or Arms, were found wanting, some one, others 2, 3, or 4, of those *Radii*; and Nature was reproducing in them the *Radii* wanting. M. Jussieu broke and cut Star-fish into several Parts; he had the Pleasure to see those several Parts continue alive, and to observe their Wounds to cicatrize and heal, though he could not stay long enough in the Country to see the new Parts break out, in the room of those he had cut away; which has been however, supplied by M. Girard de Villars, who, on the Coasts near *Rochelle*, has seen the *Urticæ* reproduce all that had been cut off, and the Parts of the Stars also putting out each new *Radii* in the Room of those he had deprived them of. M. Jussieu also reported, that this Fact in the Star-fish, so new to him, was not so to the common Fishermen of the Country, who seeing him tearing and cutting to Pieces one of those Animals, told him, *Qu'il auroit beau faire, qu'il ne parviendroit pas à leur ôter la vie*: Those poor People having been accustomed to see daily a Fact, the more philosophical Part of Men had never so much as heard of.

M. Reaumur, though very sensible that Water Insects had a considerable Advantage over others for the Recovery of their Wound, was yet willing to try if some Land Insects might not possibly afford also some like Observations; and after several Trials, both he and M. Bonnet, have met with some Sorts of Earth Worms capable of bearing the Operation. M. Reaumur has cut in two some of these Worms; the anterior Part, that to which the Head belonged, seemed to have little suffered: In less than two Days, the *Anus* was formed again, as it had been before, and the Worms were compleat to all Purposes, but that they were shorter, and wanted of their Length: They lengthened, however, by Degrees, the Number of the Rings of which they are composed increased, and they came again to their first Length at the End of some Months. But the posterior Part of the Worms, that to which the Tail belonged, wanted Matters of another Consequence; that Part had lost not a Head only, but the Parts of Generation also of both Sexes; which in those Creatures are placed not very distant from the Head: And to reproduce all these was the Work of some Months; it has, however, in many Instances, been done after that Time; and several of these hinder Parts of Worms have again become complete Worms, having each both a Head, and Male and



Female Parts of Generation, and in as complete a Manner, as the whole Worms had before their Section. Tho' many, indeed, have died during the Operation, before the Reproduction was made complete: Yet, as in various Instances, where proper Care has been taken, the Experiment has succeeded; it is equally to be regarded, as if the making it required neither so long Time, nor so much Care.

7. I received the Insects in Question, on *Thursday* the 10th of this instant *March*, in the Afternoon; the Water in which they were contained was grown foul at Sea, so that I immediately poured some of it off, and supplied it with fresh:

I have found, that most of those I have particularly viewed, and that seem pretty well grown, have 10 Horns or Arms; but I have seen a few with 11 some others with no more than 9, and one I have taken notice of, that had 14: The lesser ones have frequently but 6 of these Arms, and those have the fewest I have yet observed.

The Structure of the Arms, when looked at with the Microscope, is very curious: Each seems to consist of several Rows of Knots or small *Papillæ*, joined together by a transparent Membranous Substance, and which is endued with a most exquisite Power of Extension and Contraction; so as thereby to bring any of those Knots nearer together, or set them further asunder, and that in every possible Direction whereby the Animal is able to bend any of these Arms in any Part, and all sorts of ways: Besides which, these Arms are also capable in the whole of so great an Extension and Contraction, that I have frequently seen some of those of the same Creature extended, at one Moment, to more than 10 times the Length they were of at another.

The Body of the Insect is not much less capable of lengthning and shortning itself than the Arms. When most contracted, it looks like a little Ball, from one Part of which rises a small Knob, not unlike what is commonly seen at the Head of a Lemon: This is the Tail, and upon this the Insect in this Case generally rests: Opposite to this is the Mouth, round which the Arms appear regularly extended, and resemble a little Star, as usually represented, all whose Points seem to proceed from the same Centre. But, when extended, the same *Polypus*, which, in the Position just described, scarce appeared  $\frac{1}{5}$  of an Inch in Diameter, has drawn itself out to full  $\frac{3}{4}$  of an Inch in Length; in which State the Mouth does, for the most Part, project like a small and sharp Snout in the midst of the Arms.

Together with the Insects, M. *Tremblay* sent me over some very small Water-worms, which he informed me they readily preyed upon; and these Worms I have several times had the Pleasure of seeing them seize with great Dexterity and Eagerness; soon after which they have sucked them in, and swallowed them completely down, though apparently several times larger than themselves.

M. *Tremblay* has given a very exact and curious Description of what concerns their taking and devouring their Prey: To which I shall only add,

*Some Account  
of the same  
Insect by Mar-  
tin Folkes  
Esq; Pres.  
R.S. No. 469.  
p. 422. Read  
Mar. 24.  
1742-3.*



add, that it appears to me, that the little *Papillæ* above described on the Surface of the Arms assist them like so many Hooks or Tenters to hold their Worms barely by touching them; for I have more than once seen a *Polypus* draw a Worm to him, and nimbly turn it about with a single Arm, only laid over it, without folding or clasping it; which last Method, however, he makes use of also, when the Worm comes to struggle and strive hard to be disengaged.

Generally before the *Polypus* fixes on the Worm with his Mouth, the Mouth and his whole Fore-part begins to extend itself; and after fastening upon it, which is frequently near the Middle, the whole Body swells, the Worm commonly appears bloody, and the *Polypus* sucks down a great deal of the Blood and Juice, before he begins to swallow the Worm itself: During all this Time he continues to extend and stretch his Mouth, and that to such a Degree, that I have seen it's Breadth, when in the Act of first bending in a Worm seized by the Middle, not less than the whole Length of the Animal when in a mean State of Extension.

In the Situation just mentioned, the Mouth resembles an open Cup; and there is a conspicuous Neck between that and the Belly, which then swells out like that of a *Florence* Flask; beyond which again appears the Tail, not stretched in proportion to the rest, but whole Cavity, when the Insect is made transparent, appears to the Microscope as a Gut running from the Stomach, but which has seemed to be a *Cæcum*\*, and not open at the lower Extremity; nor have I ever yet seen any thing like an Evacuation that Way.

As the *Polypus* gets the Worm to double, and draws it further in, the Neck, just mentioned, swells, and the Mouth somewhat contracts again, so that the whole Body puts on the Appearance of a sort of Purse or Pouch; but the Tail never entirely disappears, though it shortens remarkably, on the Swelling of the Gut with the Juice drawn from the Worm: But into this Gut I have never seen any of the solid Part of the Worm to penetrate, though I have often seen it's whole Body lie coiled up in what I have looked upon as the Stomach of the Insect.

He lies for the most part pretty still during the latter Part of his Meal, like a Creature gorged with too much Food, drawing in the Worm slowly at last: But after it is all got in, he again contracts his Mouth, and stretches his Neck-part in Length, as it were, to compose the Posture of the Worm in his Stomach, where it continues to lie till digested; it soon loses it's Distinctness, and it's Shape becomes in a little time undiscernable; the *Fæces*, however, are not thrown off till several Hours after, when they come away by the Mouth in the Form of small Pellets of Cobweb, which I have not yet

\* This has since appeared to be a Mistake; the Gut is also open at the lower End, and though the larger *Fæces* are all throwa up again by the Mouth, I have since seen a thinner Slime evacuated that Way.

actually



actually seen thrown out, though I have several times seen them before they were thoroughly disengaged from that Part.

A *Polypus*, when in a middling State of Contraction, shews to the Microscope, much like a Slug or long Snail: His Sides are wrinkled, and he then appears as if made up of Rings, like a Grub or Earth-worm; but these Rings all disappear when the Insect is more extended, his whole Skin then looking as beset with little *Papillæ*, like those of his Horns or Arms, except that they are smaller.

When he hangs fixed to any thing by the Tail, his most usual Posture, he will turn his Body in all Ways, coiling and writhing it about, so as sometimes to stroke, as it were, his Tail with his Arms, and rub it with his Mouth, as if to remove some Uneasiness, possibly given him by lesser Water-insects, which I have often observed like Lice crawling upon his Body. A progressive Motion I have also sometimes seen, when he helps himself alternately with his Arms and Tail, but this sort of Motion is less frequent than his others.

These little Particulars, may serve to shew the *Polypus* is really and truly a living Creature, and, like other small Insects, provided with proper Parts and Organs for the catching, eating, and digesting, of his Food: For though the Production of the young ones from the Sides of the Parent has a near Resemblance to the shooting of the Branches from the Trunks of Vegetables, and though some other of his Properties are so very singular and surprising; yet all those above-mentioned and described, are, without all Doubt, Animal Operations.

This Sprouting of the Young Ones from the Sides of the others, is already so fully described by M. *Tremblay*, that I have very little to add to that Description, farther than to observe, that the young ones I have seen shoot out, had no Arms till they had acquired some Length: Those I have had the Beginning of before me, have not shewed them till about the Fifth Day from the first Appearance, but this might probably vary in a warmer Season.

As soon as the little ones have Arms, they will themselves take and eat Worms while fixed; and it appears, that during that Time, the Gut of the little one opens into and joins the Gut of the Parent: This I hope indeed to confirm by some further Experiments; but it has constantly appeared to me, that upon the little ones eating, the Stomach and Gut of the Parent has become extended also, and *vice versa*.

I have had one *Polypus*, that had Three young ones dependent from him at the same time, and one of these young ones has began to put out a young one itself, so that they formed a Cluster of Five of these Insects hanging together: But one of the young ones separated itself, and dropt off Yesterday Morning; and this Morning I perceive another little one just breaking out.

On Sunday the 13th of this Instant *March*, I chose a long slender *Polypus*, that appeared lively, but that had not been fed since I received it; and putting it with a Drop of Water in the Palm of my Left Hand, I watched.



*Some Account of the same Insect.*

I watched the Time of it's extending itself, and then with my Scissars cut it asunder into Two Parts, near the Middle; both which Parts I put separately into Two Phials of *New-River-Water*. This was done about 2 in the Afternoon.

On *Monday* the 14th, I observed the Arms on the Head-part to play; the Tail-part lay along on the Bottom of the Phial, but looked plump, and from time to time alternately extended and contracted itself: The Wounds of both Parts appeared contracted and drawn together.

On *Tuesday* the 15th, the Head-part seeming active and busy with it's Arms, I gave it, about 9 in the Morning, a small Piece of a Worm; it very readily seized it, and presently after eat it: I viewed this Part carefully with a Magnifying-glass, and found the Wound no-ways affected by the Extension of the Stomach. The Wound of the Tail-piece appeared well rounded off.

On *Wednesday* the 16th, the Head-piece seemed very well. The Tail-piece stirred very remarkably, and it's wounded End shewed in Shape like that of a little turned Nine-Pin.

On *Thursday* the 17th, I saw the Head-piece raised up and resting on it's posterior End, as before it was hurt. The Tail-piece discovered a very remarkable Rounding off at the wounded End, which looked also somewhat extended, and more pellucid than the rest. It both extended and contracted itself very sensibly, moved more frequently than it had yet done, and I observed a small Protrusion towards the Middle of it's Length, which I fancied like the Beginning of a young one just putting out from that Part.

On *Friday* the 18th, about 7 in the Morning, I perceived little Horns or Arms putting out from the wounded End of the Tail-part: They were yet very short, but shewed themselves distinctly all round, and I could see them play very clearly. The Protrusion on the Side was enlarged, so as now to be known evidently for a new *Polpus*. The Head-part seemed very well; and in the Afternoon the Arms of the other Part were sensibly lengthened.

On *Sat.* the 19th, I found the new Arms yet longer: I now gave a Piece of a Worm to this Part. It readily hooked it, and eat it. The little one was very conspicuous, but that it yet wanted Arms.

On *Sunday* the 20th, every thing was improved, and small Arms began to discover themselves, on the little one sprung from the Side of the Tail-piece.

On *Monday* the 21st, both Pieces appeared perfectly well, they had all the Appearance of perfect entire Insects, the same as before they were cut, and continue as fair and as good as any I have. The little one is not yet dropt off.

I have been very particular in this Account, from the Minutes I took down every Day; and I shall further observe, that I cut 3 more transversely in the same Manner, on the same Day, *Sunday* the 13th Instant



Instant, and that I had so cut one on the Day before: They all went on nearly in the same Manner, and all shewed the new Arms on their Tail parts on the same *Friday* the 18th; but I must also take Notice, that *Thursday* last the 17th was a fine warm Day, to which I impute it, that the Insects cut on *Sunday* were just as forward as that cut on the Day before. One other of the Tail-pieces of these also put forth a young one, during the time that it lay without a Head. All these Four last-mentioned had eat about 36 Hours before they underwent the Operation.

On *Tuesday* the 15th Instant, I took a *Polypus* that had eat a Worm on the *Saturday*, and, placing it as before in the Hollow of my Left Hand, I attempted, when it was most contracted, to divide it longitudinally; but my Scissars not being very good, I missed my Stroke, was forced to give a Second, and even then divided it very unequally; the Head was however split, and of 10 Horns that it had, 6 came off with the lesser Piece that was only a Slip of the Body, and the 4 others remained with the rest, which was at least  $\frac{2}{3}$  of that Body. I had very small Expectation from this Experiment, I nevertheless put both the Pieces with some Water into a Phial; and both this Day in the Afternoon and the next, I saw both Parts playing their Arms.

On *Thursday* the 17th, in the Forenoon, perceiving both these Parts to move their Horns pretty briskly, I gave to each a Piece of a Worm: Each readily seized it, eat it, and kept it as usual; and the same Day in the Afternoon, I took Notice, that a little one was putting out from the Side of the larger Piece.

On *Saturday* the 19th, I saw both the Pieces resting on their posterior Ends, and stretching out their Bodies in the usual way.

On *Monday* the 21st, both Parts seemed well, each was like an entire *Polypus*, except that one of them was, and is still, very small. I discovered some little Arms putting out in the room of those each Part had lost: There appeared also little Arms coming out all round the Head of the little one fixed to the Tail of the larger Piece.

On *Tuesday* last the 22d, I viewed both these Pieces with the Microscope, and each seemed perfectly formed like a whole *Polypus*. The larger Piece had 4 new Arms, and the lesser 2, like their others, but shorter, as yet; and they are now in all other respects, as complete as any others I have.

This same Experiment I again attempted on another *Polypus*, on *Saturday* last; but I again made the Parts unequal; they are however both alive, and promise very fairly.

I the same Day cut a fine long *Polypus* into 3 Pieces, transversely, at 5 in the Afternoon. I left the Middle-Piece the longest of the 3.

On *Monday* the 21st, the Head-Piece seemed well formed again, excepting that it was yet very short; the other Pieces looked plump and well. On *Tuesday* the Head-piece eat and kept Part of a Worm: It seized it very vigorously with it's Arms, mastered it, and swallowed



it eagerly. The Middle-piece moved pretty much, and the last looked fresh and well. This *Thursday* Morning, the Arms begin to shew themselves on the anterior Extremity of the Middle-piece.

*Fig. 21.* Represents a *Polypus* as seen in the Microscope, when in a State of Extension, the Arms spread as when feeling for their Prey, and the Mouth sharp and prominent.

*Fig. 22. and 23.* Represent the same Insect in it's most contracted State.

*Fig. 24. and 25.* Shew the Insect when in a middle State of Contraction; the Body is then wrinkled, so as to appear somewhat like a *Grub* or *Earth-worm*.

*Fig. 26.* Is a *Polypus* with a young one growing from it's Side, and another from that again: This is not so much extended as that in *Fig. 1.* and is to be supposed to have taken lately some Food, whereby the Cavity of the Inside is made more conspicuous, and the Communication of the Guts of the young ones with those of the Parents becomes sensible.

*Fig. 27.* Shews the Appearance of a *Polypus*, that has already swallowed the best Part of a Worm endways. He is grasping the remaining Part to draw that in also.

*Fig. 28.* Represents a *Polypus*, whose Mouth is greatly extended: He has just taken in the middle Part of a Worm; the Opening of the Mouth is there remarkable, the Arms seem somewhat contracted from the Effort in stretching the Mouth so wide; the Neck also may be there observed between the Mouth and the Stomach, but which will soon disappear as the Worm is sucked further in.

*Fig. 29.* Is another *Polypus*, nearly in the same State as the last; but the Worm is omitted in the *Figure*, to shew the Form of the Mouth more distinctly.

*Fig. 30.* Shews the same *Polypus* when the Worm is drawn quite double into his Stomach; here the Neck entirely disappears, and the whole is like an open Bag or Purse.

*Fig. 31.* The same *Polypus*, after he has entirely swallowed his Worm; the Mouth is now again closed and contracted, and the Worm may be discovered through the Skin, as it lies coiled in his Stomach. In these Five last *Figures* it may be noted, that, however extended and swelled the Stomach of the Insect appears, the posterior Part is not stretched in Proportion, but discovers itself every-where as a small Tail, in which is contained a Gut, with which the Stomach communicates.

*Fig. 32.* Shews one of the Horns or Arms of a *Polypus* very much magnified, for the giving some imperfect Idea of the Knots or *Papillæ* in the transparent membranous Substance, of which it is composed.

*Fig. 33.* Represents a *Polypus* that had several Young growing from him at once, some of which had also others springing out from them again. This was the same *Polypus* mentioned in the foregoing



Paper to have had three young ones dependent from him at the same time, but which, becoming still more fruitful, was drawn a few Days after as he appears in this Figure, and when, besides those here represented, Eight other young ones had at several times separated themselves from him, since I received the Insects.

8. I have seen in Mr *Tremblay's* Study at *Sorgvliet* at least a Dozen large Glasses of about a Foot high, each holding a Gallon or 6 Quarts of Water, all which are well stocked with those Insects, and he must there have many Hundreds of them. They are, in general, considerably larger than any I had before seen; and as I was first with him on a *Tuesday*, and made him a second Visit on the *Sunday* following, I had the Opportunity of seeing the prodigious Increase they had made in those 5 Days. Several single ones that I had left, had in that Time put out 5 or 6 young ones apiece; and those I had seen him perform Operations upon, were not only recovered, but had most of them produced young ones also. I saw him split the Head of one about 2 in the Afternoon on *Tuesday*, and, at about 7 the same Evening, each Head eat a small Worm. I saw him split another from the Head to the Tail, and each of those Parts also eat Part of a Worm before Night. Another Operation I saw him make, which I had not before heard of, which was that by putting one of the Points of a very small Pair of sharp Scissars into the Mouth of a *Polypus*, and forcing it out at the very End of the Tail, he then laid it quite open like a *Pigeon*, or a *Barbacute Pig* to be broiled; yet, in about 5 Hours, I saw the same *Polypus* with the Parts so reunited again, that I could not perceive any thing had been done to it; and it then eat a large Worm bigger than itself. He then shewed me another odd Particular, which was one *Polypus* that had fairly 2 Heads without any Tail; that is, with a Head at each End, *Fig. 34*. This was an accidental Production, and the Manner it came about was as follows: Two young ones grew, as from one Root, out of an old *Polypus*, *Fig. 35*. They both dropt off together, and their Tails not being separated, they appeared as in *Fig. 34*; but, when I saw them, more like the *Fig. 36*, with several young ones putting out from their Sides. Mr *Tremblay* told me, he had seen the like sometimes before, but not often; and that they have then remained 10 or 12 Days in that Condition, after which they have separated. He had in one of his large Glasses upwards of a Hundred of these Insects all full grown, and he regaled them all at once before me, with some Thousands of what he calls *des Pucerons d'Eau*, which are small aquatic *Animalcules*, not unlike Fleas, of about the Size of large ones, and which move about with great Swiftnes on the Water. These were no sooner put in, but it was really both a curious and entertaining Sight, to observe in how voracious a Manner not only every *Polypus*, but every young one also that had Arms, though fixed to the Side of it's Parent, seized and devoured these *Pucerons*: And as the Body of the *Polypus* is trans-

By the Duke  
of Richmond,  
F. R. S. No.  
470, p. 510.  
Read June 2,  
1743.



parent, every one made a very extraordinary Appearance from the Number of *Pucerons* in them; for in several I could very plainly, with my bare Eye, distinguish and count 5 or 6 of them; and, what was very particular, I could plainly discern some very small black Spots, which I was assured were the Eyes of these *Pucerons*. I had almost forgot to mention one extraordinary Observation more of Mr *Tremblay's*, which is, that in the double headed *Polypus* of the *Fig.* 34 and 36. there was at first but one common Gut between them, so that the feeding of one Head had the same Effect as the feeding them both. Mr *Tremblay* is particularly handy and dextrous in his Operations, and explains himself about them with great Exactness and Perspicuity. He places some Pieces of Packthread cross his Glasses towards the Top: To these some of the Insects fix themselves; and I have seen some that in that Posture have extended their Arms almost to the Bottom, which must have been above 10 Inches.

Some Observations on a Polype dried, by Mr Henry Baker, F.R.S. No. 471. p. 616. Nov. 1743. Read Dec. 8, 1743.

Apprehending that if a *Polype* could be dried, and well extended before the Microscope, some Particulars in it's Structure might be distinguished better than when we view it alive, and in Water, I applied myself to attempt the doing it: And, after many Trials (which were rendered fruitless by the Minuteness and extreme Tenderness of the Arms and other Parts of this Animal, that contract as soon as taken out of Water, and so cling together, as to become inseparable afterwards, without being torn to Pieces) I happened, at last, to hit on a Method of performing the Operation perfectly; which Method I shall here subjoin, as taken from my Essay on this Creature lately published\*.

The Method of drying Polypes for the Microscope.

I chuse a *Polype* to my Mind, and put it in a small convex *Lens* with a Drop of Water; where, when it is extended, and the Tail fixed, after pouring off a little of the Water (if the Quantity seems too much) I plunge it, *Lens* and all, into Spirits of Wine, in the Bowl of a large Silver Spoon. Hereby it is instantly killed; the Arms and Body contracting, sometimes more, sometimes less, at the same Time. I then rub it gently in the Spirits with a very small soft Hair Pencil, to clear away it's Lice, which may be seen to fall off, and lie dead at the Bottom of the Liquor.

Thus far the Business seems pretty easy; but all the Skill I am Master of could never enable me to take a *Polype* out of the Spirits, and extend it's Body and Arms on a Talc, though I have destroyed great Numbers in attempting it; for the Parts immediately cling together, in such a Manner, that it is not possible to separate them again, without tearing them all to Pieces.

I bethought myself, therefore, of adjusting them upon the Talc, whilst in the Spirits; and, to effect this, I slip a Talc under the *Polype's* Body lying in the Spirits; and, displaying it's Arms, &c. there-

\* *Natural History of the Polype*, p. 84.



on with my Pencil, by the Assistance of my Nippers I lift the Talc, and the *Polype* upon it, gently out of the Spirits: Then, holding it in my Nippers with my Left Hand, I dip my Pencil in the Spirits with my Right, and therewith dispose the several Parts to my Wish as near as I am able; at the same Time wiping away the Lice with my Pencil, if any are to be seen upon the Talc.

When all the Parts are rightly extended, I lay it carefully to dry, which it does very speedily, leaving the *Polype* sticking to the Talc in the Manner it was disposed.

The chief Difficulty now is over; but some Caution is still needful to secure it safely in a Slider: For if another Talc be laid upon it in the common Way, all our Labour will be rendered fruitless, by it's being broke and spoiled. To prevent this Misfortune, as soon as the Talc, whereon the *Polype* sticks, is let down into the Hole of a Slider, I cut three little flat Pieces of Cork, about the Bigness of Pins-heads, and the Depth of the *Polype*, and gum them in a triangular Position, partly on the Edges of the said Talc, as it lies in the Hole, and partly to the Ivory Sides of the Hole itself; by which means the upper Talc being kept from being able to press upon the *Polype*, it may be put on and fixed down with a Brass Ring, without any Fear of hurting it.

If you intend to dry a *Polype* in it's contracted State, it may be put directly into the Spirits without using any *Lens*; but if you desire it extended, you will find the *Lens* quite needful.

Vinegar, Water wherein Salt is dissolved, or Spirit of Wine, kills a *Polype* immediately: But Spirit of Wine is fittest for the Purpose, as it gives a greater Firmness to the Parts, dries away from the Talc soonest, and leaves no Soil or Smear behind it, as the others do.

1. As the the Body thus dried exhibits a Reticulation of minute Vessels, which appear every where most curiously interwoven, we may reasonably suppose they serve as Veins and Arteries, through which some Kind of Blood or Juices circulates, as in other Animals: But we cannot distinguish such Blood or Juices circulating in the living *Polype*, or discern any thing like Vessels, though now they are so apparent.

Observations.  
Fig. 37.

2. The *Anus* of the *Polype* may be discovered very plainly in this dried Object; whereas in a living one it requires much Attention to see it in a satisfactory Manner.

3. The Mouth, or Opening between the Arms, appears here like the Mouth of a Sack or Bag, which indeed the Body does not badly represent.

4. By observing the Arms thus dried, we obtain a clear Idea of the Means whereby this Creature catches fast Hold of it's Prey, the Moment of it's touching it, and before it can bring it's Arms to clasp about it: For we plainly see here, that the Arms are thick beset with Hairs, or rather sharp Hooks, which possibly are moveable, and can strike easily into the Body of a tender Worm. But these Hooks or  
Hairs



Hairs are not visible in the living Animal; being then, perhaps, somehow or other generally drawn in, or laid flat and close along the Sides of the Arms, as I have seen them in some Sorts of Star-fish. Besides, the Water wherein we are obliged to view a *Polype*, when alive, will not permit so strict an Examination as it can now be brought to.

Observations  
on the Mouth of  
the Eels in  
Vinegar, also  
a strange aqua-  
tic Animal, by  
the Rev. Mr  
Henry Miles.  
With a Draw-  
ing and De-  
scription of the  
said Animal,  
as viewed in  
the Microscope,  
by Mr Baker,  
F. R. S. No.  
469, p. 416.  
Read March  
10, and 17,  
1742-3.

IX. I have made an Observation on one of the *Anguille* in *Vinegar* (of which, I have a prodigious Increase, though I lost all by Accident about a Month since, to about a single Drop or two). The Observation was made with the *Camera Obscura* Microscope: First, in a very small Tube, not a capillary one, though approaching near it, I put a small Quantity of *Vinegar* with several *Anguille*: At my first Sight of the Image on the Screen, I observed one to have a Motion as if it had been wounded, about the Middle of the Back, it neither rose nor sunk in the Liquor, but lay wriggling itself: I thought it gave Signs of Pain, and would soon expire, which it accordingly did in a Minute's Time; but it coiled itself up, and stuck to the Side of the Tube very close, before I was aware: I put out the Liquor, after waiting to see whether it would revive, in vain, and viewed it several Times in the common Light, which way I had the most distinct Appearance; and must acknowledge the Exactness with which it had coiled itself, gave me no small Pleasure to behold: The biggest End, which I call the Head, was stretched out from the rest of the Body, a little Way, which gave me an Opportunity I had wished for, of examining what Mouth it had. On my first View of it in common Light, I saw what I incline to think may be called the Mouth: Repeated Trials in different Lights and Positions, and with different Magnifiers, confirmed my Suspicion; for I saw no other Appearance of it, than what I ought to expect on such Alterations of the Glasses, &c. I would only add, that after the strictest and most exact Observation I could make, I could discern it to be nothing more than a transparent Tube. Where the Instruments of Nutrition, and the Springs of Life, are, I doubt we shall not soon discover. I once indeed thought, viewing it in the *Camera*, &c. I saw a Blood-Vessel, but I believe it was no more than refracted Light, or prismatic Colour.

Fig. 38.

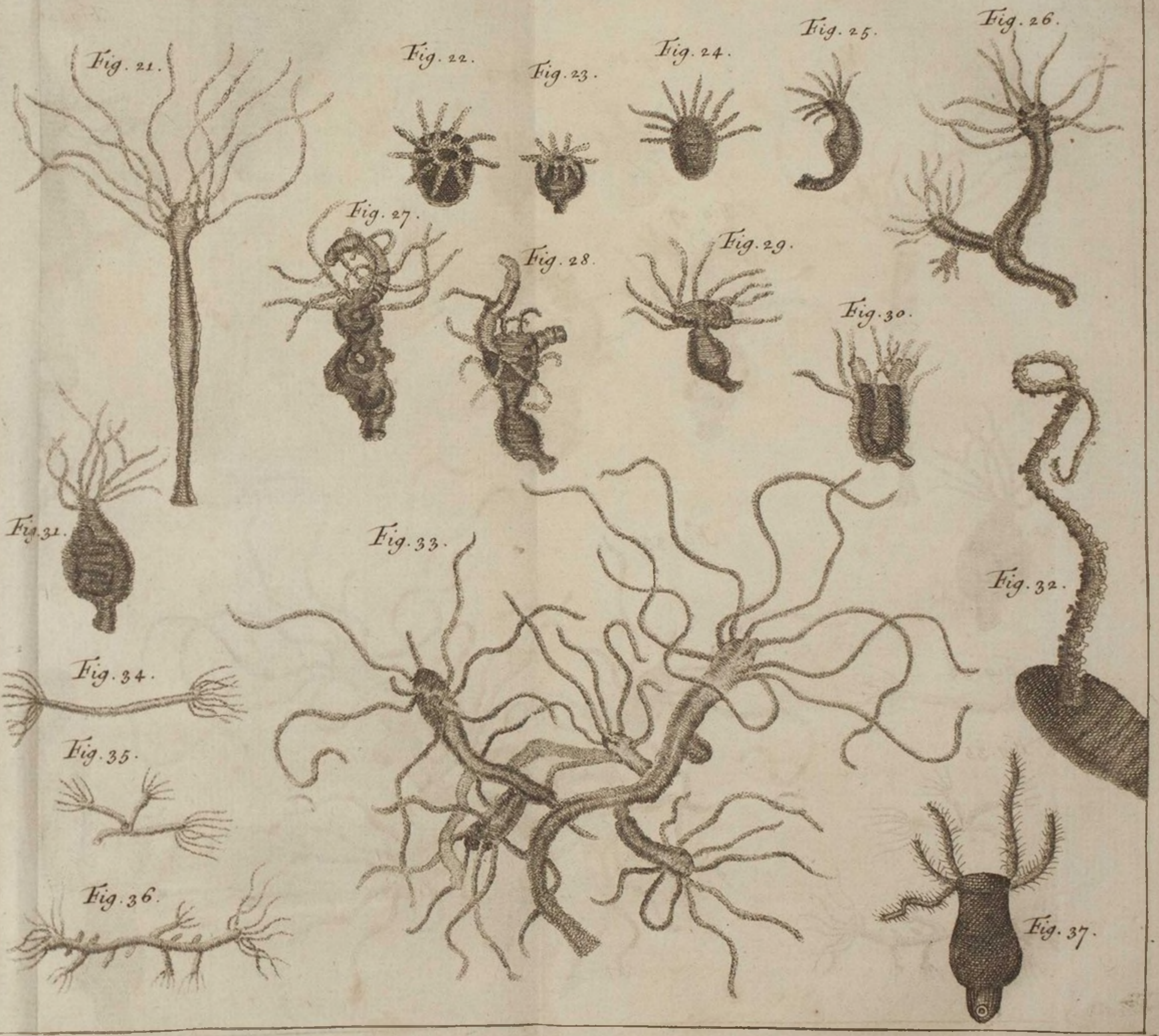
Fig. 38.

a. The Mouth, which seemed to be as wide open as it possibly could be.

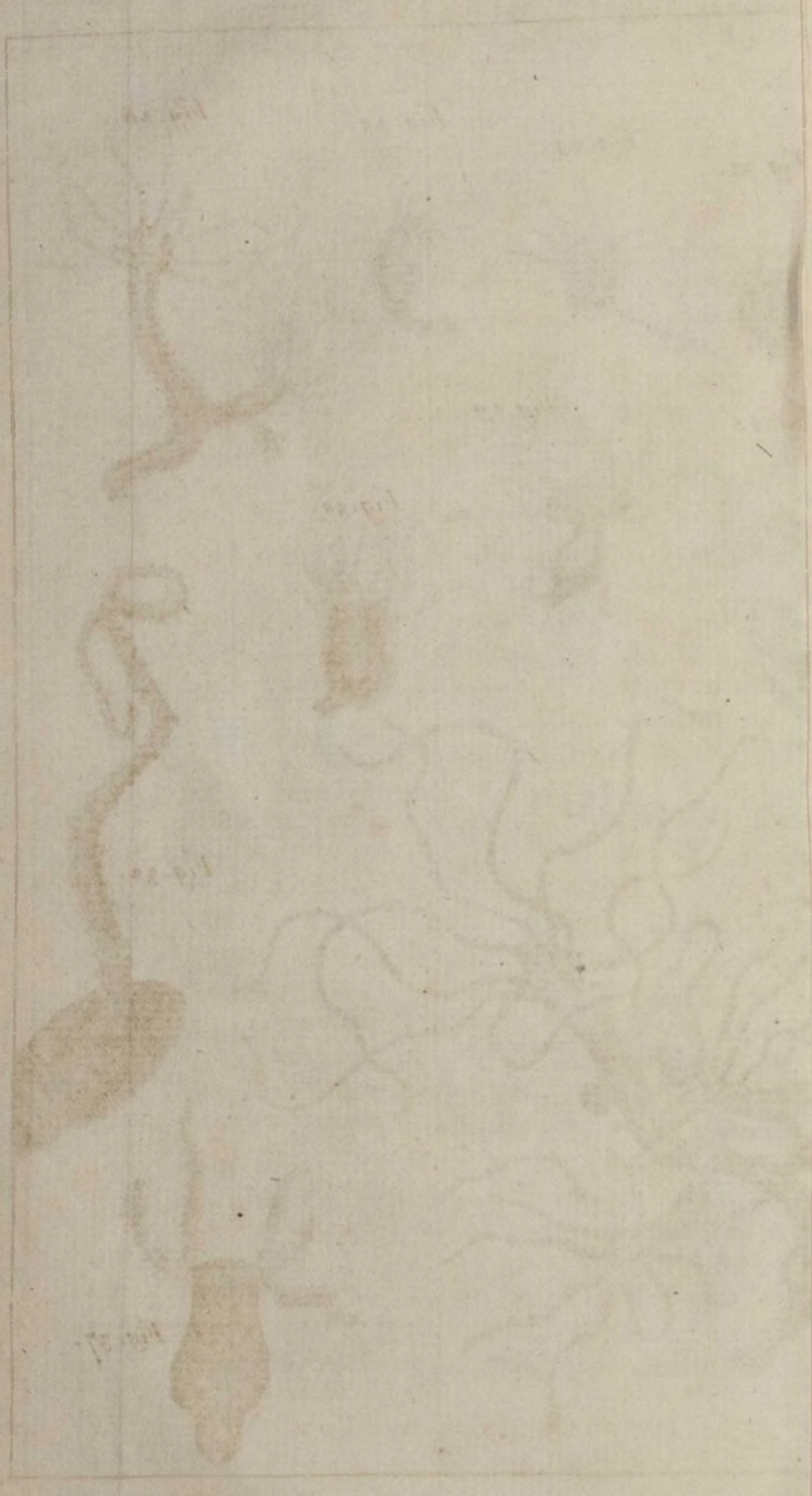
I am sensible my Figure is too small to give a just Idea of the Shape of the Mouth, but it had the Appearance which a Tube, or rather a Cone, would make cut slopewise.

I have further troubled you with an odd aquatic Animal found in standing Water: I kept some of them in their own Element in the House, but they all died in a Day and a half's Time. They seem to be nothing but Skin, and seem no thicker when alive: They have the Power, (as most aquatic Insects have) of sinking themselves to the Bottom on the Approach of a Stick, &c. and fall like a Piece of rotten











ten Wood or Leaf. When taken out of the Water, if laid on a Paper, &c. they will spring away like a *Grasshopper*. I do not at present remember ever to have seen them before, and know not what to make of them, unless they are the *Tipula*, or *Water Spider*, not yet arrived at it's mature State.

Tooting, March 9,

1742-3

Fig. 39. A. Represents an undescribed Kind of aquatic Animal, (lately observed by the Reverend Mr Miles of Tooting) in the same Size and Form as it appears to the naked Eye. Several of them were found in the Water of a Ditch; whence being taken, and laid on a Paper, they had a leaping Motion.

Explanation  
of the Figure,  
by Mr. Baker.

B. The same Animal, as examined by the Microscope, which shews it to be a triangular, oblong, opaque Body, somewhat like the Shape of a Prism, but tapering from End to End. The 3 Horns (whereof those on the Sides are a third Part longer than the Middle one) appear armed with extremely sharp Thorns or Prickles: The same Sort of Prickles are placed likewise along the Sides of the whole Body, pointing downwards from Head to Tail.

C. Shews the Form of a Body inclosed in the former, and taken out upon Dissection. This seems to be an Animal in it's Aurelia State; and if so, what has been before described is only it's Husk or Case, which will be quitted when it comes to change.

Quere, *What Animal is this in it's perfect State?*

X. It is well known, that among *Caterpillars* there are several Species, which like to live in Society, and which know how to build Nests wherein to shelter themselves against the Injuries of the Air. Of this Sort are those \* to which Gardeners have given the Name of *Liverymen*, by reason of the Distribution of their Colours. They may be ranked among the Processioners, or those that follow one another. They all go about, spinning, with great Order: But what is most surprising, is to see them straggle very far from their Nest, and this often by several Windings and Turnings, without losing their Way. Their Art in doing it deserves Notice. They spin over all the Places where they go. The 1st leads the Way; the 2d follows spinning; the 3d spins after the 2d and 1st, and so on with the rest. All these Threads form by Degrees a small shining Track, a little Path, a *Line* or two *Lines* broad; and all these Paths meet at the Nest, the Center, as it were, of all those several Rays.

New Observations upon  
Insects, by M.  
Charles Bonnet of Geneva.  
Translated  
from the  
French by P.  
H. Z. Esq;  
F. R. S. No.  
470, p. 458.  
Read at different Times  
from March  
10, to April  
28, 1743.  
Caterpillars.

But to be plainly convinced of the Use of these Threads, let one but break off the Continuation of them in some Place or other, one will see with Astonishment the little *Caterpillars* turn back as at a Loss,

\* *Memoirs pour servir à l'Histoire des Insectes*. Tom. I, and II, of the Paris Edition.



without daring to proceed, till one or other, of more Courage than the rest, has restored the Communication, by spinning new Threads.

*Caterpillars* have particular Tastes: I have observed some, to whom even the Shell of the Egg they were come out of, was agreeable Food. This Fact is not absolutely new. *M. de Reaumur* informs us \*, that *M. Maupertuis* has made the like Observation.

But what I have seen more, and which will appear singular, is, that certain *Caterpillars* are not content with gnawing the Shell of the Eggs they came out of themselves, but will gnaw also those of other *Caterpillars* of their own Species, that are near upon hatching.

Another yet more remarkable Singularity in the Taste of certain Kinds of *Caterpillars*, of the Species of smooth ones, some of the first Class, and others of the Second, is, that they are fond of eating their own *Exuviae*; they have scarcely cast them off but they fall to devouring them. And this will appear still more surprizing, if one considers the Condition in which the *Caterpillars* then are. Every one has learnt from *Silkworms*, that, after the moulting, these Sort of Insects are extremely weak; and that for a considerable Time they remain without any Nourishment, to give Time to their new Organs, particularly their Teeth, to strengthen themselves: Yet here you see *Caterpillars*, which, immediately after this critical Operation, greedily devour not only the soft or rather tough Part of their Skin, but even all that is scaly in it, as the Skull, the Legs, &c. I have even observed some, which seemed to seize upon those, preferably to the rest, and to devour those almost bony Parts, before they fell upon the others, that are much less hard.

Nothing surprizes more in Insects, than their Industry; and *Caterpillars* yield to none in this respect: Not to speak of those which build for themselves Sheaths or Cases, in which Silk, their own Down, Bits of Bark, Pieces of Paper, &c. are so artfully wrought together; there is one † which builds in Wood, and is able to give it's Case a Hardness greater than that of Wood itself. I shall mention in few Words, how this Insect goes to work: It cuts the Wood with it's Teeth, which are very sharp, and severs small Fragments from it, which it binds together with a Silk of a particular Nature, and which seems to differ in several respects from that of other *Caterpillars*; it is properly nothing but a viscous Substance drawn into Threads, which, like Glue, grows hard by degrees.

But, probably, this would not suffice for giving to the whole Work the Solidity that is required, if the industrious *Caterpillar* did not, in some measure, prepare the Fragments of the Wood, before

\* *Memoires sur les Insectes*, Tom. II. p. 165.

† The extraordinary horned *Caterpillar* of the *Willow*, *Memoires sur les Insectes*, Tom. II. p. 264. seq. *Goedart. Albin. Mrs Merian*. This *Caterpillar* is of the Kind which eat their own Skin.



it employs them; and this it does by keeping them in it's Mouth for some time, to soak and better fit them for joining themselves into one Body.

This Solidity of the Case of our *Caterpillar* is not what we need further trouble ourselves about; it suffices the best Care is taken of that Particular: But this *Caterpillar* is also to become a *Butterfly*, and we know, that *Butterflies* have neither Teeth nor Feet to dig withal: How then will this contrive to cut it's Way through a Case that is so hard, and so exactly closed up on all Sides? One guesses, perhaps, that it uses a Liquor which softnes that sort of Glue which binds the Bits of the Sawdust together. But what is the Nature of this Liquor? M. de Reaumer † has judged, that it must be of a singular Kind. In dissecting some of these *Caterpillars*, I have found near the Mouth, under the *Oesophagus*, a sort of Bladder, of the Bigness of a small Pea, full of a limpid Liquor, and of a penetrating Smell, which I found by divers Trials to be a very active Acid, and which, among other Properties it has in common with true Acids, sensibly softens the Glue of the Case. It remains now to shew, that this Liquor is not only of Use to the *Caterpillar*, but is also that very Dissolvent which enables the *Butterfly* to cut it's Way through: And this I am not without Hopes of being able to compass.

A Notion adopted by Dr *Boerhaave*\*, that there are no true Acids in Animals, except in the Stomach or Intestines, renders this little Discovery of the more Concern.

We have seen from the foregoing Observation, that *Caterpillars*, though one of those Insects the Structure of which has been most searched into, have yet something still new to present in this respect. And I shall further add, that I have discovered in these Insects a Part of some seeming Consideration, which is a sort of Nipple, or fleshy Protuberance, placed near the Head, under the first Ring; which is commonly concealed in the Inside of the Body, but is forced to shew itself by squeezing the Insect. This Nipple, or Protuberance, which at first I only found single in several *Caterpillars*, I have since met with in others double, and even quadruple; as in that singular horned *Caterpillar* of the *Willow*, which I have already mentioned, and this with some remarkable Varieties. However, they are not all provided with them: I have not found them as yet, for Instance, in those of the first Size, that is to say, the very large ones, nor in those that are very hairy. But I have observed it in all those *Caterpillars* which, from the Figure and the Stiffness of their Hairs, have been called the *Thorny-ones*. The Use of this Part remains yet unknown to me: All that I know, and that I have learnt by my Experiments, is, that it is not essential to the *Caterpillar*.

† In the Place quoted above.

\* Praxis Medica. Elementa Chem.



*Caterpillars* are of those Insects for which one has naturally such an Aversion, that it will easily be believed there are some that have an offensive Smell; and I have actually observed a small Kind of them that smell so like a Bug, that I have thought fit to give them that Name. But what perhaps will appear more strange, is, that there is also a sort of a middling Size, which are smooth, and, on the Approach of their Metamorphosis, have a very sweet Rose-like Scent; and whose Cases, being made of Earth and of Silk, preserve that Smell for Years together. The *Butterfly* of another *Caterpillar*\*, of the middle Size also, but hairy, gave, upon it's coming out of it's Case, a very sensible Scent of Musk.

Formica-Leo.

There are few Insects that have been so much and so deservedly admired as the *Formica-Leo*. However, a little Particular, curious enough, has yet escaped the most diligent Inquiries; and that is the Manner in which he goes to work, when he finds Stones in his Pit, too big to be thrown out with his Horns. Does he then forsake the Place where he settled at first? and does he go somewhere else to set a new Ambuscade? Or, does he remain in his Pit leaving the Stone there, which he has not been able to remove? Or, after all, does he at last contrive to get rid of it? and what Means does he use to bring this End about? By unwearied observing, I have at last had the Fortune to discover the Secret of his Management. I have seen, that in such Cases the *Formica-Leo* knows how to vary his ways of working: He comes out of the Ground, gets his hinder Parts under the Stone, so that it rests upon his Back, and then by Degrees pushes it towards the Top of the Opening, keeping all the while his Poise with great Care. Having thus forced it to the Edge of his Pit, he does not leave it there, for it might roll back again; he therefore pushes it farther off, and then retires to his Pit again.

But sometimes it will happen, that the poor *Formica-Leo* has not the good Fortune to keep the Stone in Poise all the Way and it rolls back again to the Bottom of the Pit, the Moment it was got to the Brink. This unlucky Accident does not, however, discourage him, but he goes patiently to his Work again, till he gets the Stone out. I have seen some of these Insects, that, after 5 or 6 Misfortunes like those I have mentioned, did not yet lose Courage.

The Naturalists will have us admire the Strength of the *Ants*, in transporting their Materials: That of the *Formica-Leo* is doubtless no less worthy of the Attention of all who shall see, as I have done, these little Animals carry to the Brink of their Pit, notwithstanding the Steepness of the Slope, and the Crumbling away of the Earth, Stones 3 or 4 times as big as themselves.

All the *Formica-Leos* that have been hitherto observed, move only backwards; but I have also discovered a Species that move forwards

\* *Memoires sur les Insects*, Tom. I. Pl. 16. Fig. 8.

with



with Activity. These do not, like the others, lie in Ambush for their Prey, but seize on it by mere Force and Dexterity.

The *Puccrons* are pretty well known, so that it will be sufficient to take notice they are that sort of *Gnats*, or *small Flies*, which stick in great Numbers to the Leaves and Stalks of Plants, and cause great Destruction among them. What they present most curious, and which hitherto has been a sort of *Ænigma*, is their way of multiplying. "In every Family of the *Puccrons*, says M. *Reaumur* \*, there are some with Wings, and others without. According to the usual Analogy, the winged ones should be the Males, and those without Wings the Females: But what is a great Singularity in the History of Insects, is, that here both Sorts are Females. I have not been able to find out the Males who impregnate both one and the other sort. They all bring forth alive, &c." Is there therefore no Copulation among *Puccrons*? Or are they Hermaphrodites like Muscles? In order to know this, I tried an Experiment proposed by M. *Reaumur* †. I brought up, in perfect Solitude, a *Pucceron* from the very Instant of it's Birth. The Expedient I had recourse to for this, was different from that which M. *Reaumur* had pointed out. It was such as gave me a Facility of observing the little *Pucceron* at any time, without Fear of letting in another. I constantly watched it from Day to Day, and from Hour to Hour, for above a Month, usually beginning my Observations about four or five in the Morning, and scarcely discontinuing them till towards nine or ten at Night. I took care to keep an exact Journal of it's Life, wherein I noted even it's least Motions, and the most trifling Circumstances. At the End of about 12 Days it began to breed, and has since brought forth 95 young ones, all alive, and most of them under my own Eyes. I have drawn up a Table, in which I have marked, with the greatest Exactness possible, the Day and the Hour when every one of them was brought forth.

I have already repeated this Experiment, 3 several times, and with equal Success. I have even brought them up successively in Solitude, as far as the Fourth Generation; and all of them have brought forth.

Perhaps one is already from hence inclined to think, that there is in general no Copulation among the *Puccrons*. But there will yet be some room for Surprize, when I say, that I have also observed a Species of them where Copulation does obtain, as it does among so many other Species of Insects or Animals. The Male, like that of the Gall-Insects, has Wings, and is a good deal less than the Female. It is, perhaps, one of the most eager Creatures in that respect that is in Nature: I have seen it copulate a great many times in one Day, both with the same Female, and with others.

The ordinary Distinction of the Sex is not the only Singularity I

\* *Memoires sur les Insects*, Tom. III. in the Preface, pag. 15.

† Pag. 329.



have met with in this Species of *Pucerons*: It has shewn me another no less remarkable. The Females, instead of bringing constantly forth live *Pucerons*: sometimes produce only *Fætuses*, which they lay one alongside of the other, as *Butterflies* do their Eggs.

Besides what relates to Generation, the *Pucerons* have afforded me many other curious Particulars. I have seen, for Instance, some, which to cast off their Coats, have given themselves Motions analogous to those of the *Chrysalis* of the *thorny Caterpillar* of the *Nettle*: But to enter into all the Particulars I have met with in these small Insects, would require a Volume.

Of Insects  
which are  
multiplied, as  
it were, by  
Cuttings or  
Slips.

M. *Tremblay*, wrote to me some time ago from the *Hague*, that he had discovered a sort of aquatic Production\* of a Nature between a Plant and an Animal; that is to say, which moved, and which had the outward Appearance of a Plant, together with the Property of reproducing what was wanting, after being cut or divided into 2 or 3 several Parts. So extraordinary a Production could not fail exciting my Curiosity, so much the more, as my Friend did not enter into any Particulars. I spared no Pains to get some of these little Bodies, but all in vain. I only discovered a sort of a long Worm, extremely nimble, upon which I resolved to try the Experiment. As nothing could leave the least Doubt, but that this Insect was truly an Animal, I was assured, that, if my Experiments succeeded, I should fully make out, that there are really Insects to which Nature has given that strange Prerogative of being multiplied, as it were, by Cuttings, and thereby strongly confirm M. *Tremblay's* noble Discovery. The Success perfectly answered my Expectation, and I soon had the Pleasure of seeing two Worms made out of one. But before I enter into farther Particulars, it will perhaps not be amiss to give a slight Idea of the Structure of those Worms. Simple as they seem at their first Appearance, we no sooner examine them with Eyes prepared and armed with Magnifying-glasses, but we discover Parts no less proper to excite and fix our Attention, than in those Animals we call the most perfect.

Their Colour is generally a reddish-brown, or, more exactly, that of the first Peel of an *Onion*. Their Length is about 2 or 3 Inches; their thickness that of a common Wire: They are slender, composed of a Series of membranous Rings, continually growing less and less as they approach the Extremities; each of these Rings is furnished in it's inferior Part with 4, 5, or 6 different sorts of whitish Thorns, supplying the want of Legs. Besides these, the outside of the Worms still presents some other remarkable Particulars, and which afford an agreeable View to the Microscope; these are the Muscles that serve for the Motion of the Rings, and which form an infinite Number of circular Lines or Folds, parallel to each other, which, from the Clearness of the Skin, appear to great Advantage: The Head has not

\* See above, Sect. VIII.



a constant Figure, like that of other Animals; the Insect stretches it, shortens it, enlarges it, and contracts it at Pleasure: Sometimes it shews 2 small Elevations one on each Side, which one would think should be the Places of the 2 Eyes; what is beyond, terminates in a Point, to make it more easy for the Worm to pierce the Mud. At the Place where the Head is biggest, between the two Elevations just now mentioned, the Mouth is placed, terminated by two brown Strokes, which may be compared to the Figure of a Half-moon, or rather that of a reversed Circumflex. When the Insect opens this Mouth, the Opening, which then appears distinctly, is of a circular Shape, and garnished all round with a pretty thick Muscle; it is in great measure this Muscle, that, by applying itself exactly with it's Circumference to a smooth and perpendicular Surface, enables the Insect to make it's Way in such Cases. At the other Extremity of the Body, is an oblong Opening, the greater Diameter of which runs parallel to the Length of the Animal, and this gives Passage to the Excrements.

But there is nothing more remarkable than the great Artery in these Worms. This Vessel, which the famous *Malpighi* looked upon as a Chain of Hearts, and which in *Caterpillars*, as well as in many other Insects, extends itself in a strait Line all along the Back, is here more or less folded in different Parts of it's Extent; from one End to the other, it is often nothing but Folds and Doublings: Through these crooked Passages, creeps along a Liquor analogous to Blood; from Moment to Moment you may see a Drop of that Liquor, which, setting out from the Extremity of the Tail, runs successively through all those Windings, and at last loses itself in the Brain. It is easy to trace it most Part of it's Way, by the alternate Motions of Contraction and Dilatation, which are successively excited from Ring to Ring. It seems as if every Part of this Artery, comprehended in the Breadth of one of those Rings, is really a complete Heart, which pushes on, to that which follows next, the Drop of Liquor it has just received from that which precedes it. One can hardly be tired with Admiration of the Appearance which those continual Motions of *Systole* and *Diastole* afford: But the better to perceive it, one should fix one's Eyes upon the Middle of the Body, where the Artery is largest in Diameter; for towards the 2 Extremities things are not to be seen so distinctly. Towards the Head, about the fifth or the sixth Ring from it, the Artery appears but like a Thread, scarcely discernible, and which, still diminishing continually till near the Mouth, there absolutely ceases to be visible: But what ought most to be taken notice of, is the prodigious Swiftmess with which the Course of the Blood is accelerated in this Place; it seems as if it were darted forcibly into the Brain. Towards the Tail, for the Length of several Lines, it looks as if there was no longer any of the same Play; those alternate Contractions and Dilatations, so remarkable in the middle of the Body, here confound themselves

themselves



themselves with each other, so as to be no longer distinguished: In the stead of them one only sees certain Undulations or Layers, as it were, of Clouds, succeeding one another with great Regularity.

Under every Junction of the Rings, are to be observed small Vessels with several Branches, all which seem to be Productions of the principal Artery.

All along, and immediately under this Artery, is extended the Channel of the Intestines, less visible of itself than by the terrestrial Matters with which it is commonly filled: It is furnished, like the Intestines of larger Animals, with different Orders of muscular Fibres, which serve to push on, and thrust out, the Remainder of the Food. If one does not discover these Fibres by the Eye, one may, at least, know and judge of them by the Effects: One may see with Amusement, how the Excrements are driven on by Degrees towards the *Anus*, the Transparency of the Skin discovering easily what is under it. However, by reason of the various Motions the Insect gives it's Body, these others just described appear for some Space retrograde.

The Earth from which these Worms receive their Nourishment, and which they digest, is not however the only Matter which is admitted into their Bodies; the Air often enters also in Bubbles that are very perceptible. But whereas Fishes have the Air in their Bodies at their own Command, and can make use of it for raising or sinking themselves; our Worms, on the contrary, are, in some measure, mastered by it: As soon as they happen to swallow a certain Quantity of it, it is hardly possible for them, notwithstanding their continual Efforts, to get to the Bottom of the Water; and they are forced to remain on the Surface, till they have got it all out again. I have seen some of these Bubbles alternately driven towards the *Anus*, and repelled towards the Head, for several Minutes together.

These are the principal Particulars, which the Microscope enables us to discover in the Structure of these Worms; which being once known to a certain Degree, we shall, without doubt, the more admire the Wonders of their Reproductions.

I mentioned above, that I had divided one of these Worms in two. I put these Halves into a Sort of Glass Cup, filled only with Water, and attentively watched them during the following Days. I observed that the first Moiety, that which had kept it's Head, moved as usual; but what seemed to me far more remarkable, was, that the other Moiety, that had no Head, moved almost as if it had one; it went forwards, resting itself upon the anterior Extremity of it's Body; and even made it's Way with tolerable Swiftnes. One could see, that this was not a Motion without Direction, a Motion produced by a Cause like that which makes the Tail of a *Lizard* move, after it has been severed from the Trunk, but a Motion quite voluntary, the Principle of which seemed not to have been destroyed: One saw it turn aside at the Meeting of an Obstacle, stop, and then creep forwards again.

When



When these two Moieties happened to meet, it was as if they had never composed one and the same Insect; they neither seemed to seek nor to fly each other; each went on it's own Way, or, if they went in Company towards the same Place, the first generally outran the second. But this latter never seemed to shew a Sort of Will of it's own more plainly, than when I exposed it to the Sun; for then it considerably quickened it's Pace.

I had many times Opportunities of admiring the extreme Nicety of the Feeling in these two Moieties, and especially in the Second. When I approached to it the End of a Splinter, at a time when it was quiet, it seemed to wake, as it were, in a Start, even almost before I had touched it.

Two Days being past, I thought fit to put into the Cup a little Duck-weed and Earth: The first Moiety soon thrust itself among it, but the second was satisfied with hiding itself among the small Roots of the Weed. I then observed, that, at the Place where it had been cut, there was come out a Sort of little Swelling, or Knob, analogous to that which commonly comes out on the Branch of a Tree stript of it's Bark. I did not distinguish this so well in the other Moiety; this Knob seemed to give the second Moiety more Ease in advancing, and it no longer seemed to be so much affected by all that touched it.

Next Day I took Notice, on the Wound of each Moiety, of a small Accretion, distinguishable by the Difference of Colour, which was there much clearer than in the rest of the Body; the following Days it became yet more perceptible. In short, at about a Week's End, each Moiety was again become a compleat Worm. The Head that had sprouted out on the second Part, was, as to it's Form, exactly the same with that of the first, and equally fit for all the same Functions. Again, the new Tail of the first was in every respect like the old one. The Heart, the Stomach, &c. had prolonged themselves in one and the other, and the Parts newly produced acted with no less Vigour than the rest; and new Rings had besides been produced successively beyond the old ones.

I took care, from Time to Time, to measure, with as much Exactness as I could, the Growth of my two Worms; and I intended to watch them on, with the same Attention; when, at the End of about 8 Days, to my great surprize, they had found Means to escape.

This Experiment, which I thus could not pursue as far as I had wished, seeming to require Repetition, I undertook it again, with the same Care: The Success did not fail answering: I soon had the Pleasure to see my two Moieties recover what they wanted, and become such as they had been before.

I afterwards tried to carry the Division farther, and to divide some of these Worms into 3, 4, 8, 10 and 14 Pieces; and all, or almost all, recovered both Heads and Tails.

In



In short, to say still more, I cut some of them, even in the midst of Winter, into 24 and 26 Parts: Of the first Division into 24, there are about 16 or 17 full of Life, and most of which begin to complete themselves. Of the second Division into 26, there still remain 7 or 8.

Since my writing what is before, some of these Pieces of Worms have perished, though they had begun to complete themselves. I have Reason to believe, that, when I shall repeat my Experiments in a warmer Season, more of the Pieces will thrive, and become complete Animals: It was proper, however, to try them in Winter, to see the Difference of their Success and Progress. It is worth Notice, that some very small Parts of those two Worms, one of which was divided into 24, and the other into 26 Pieces, lived about 3 Months, and that in the Winter. For though they were in my Closet, yet the Liquor in M. *Reaumur's* Thermometer did mostly stand between 4 and 8° above Frost, which Degree of Warmth is very inconsiderable; and often, particularly in the Night-time, it was 2 or 3° lower.

It is commonly 1 or 2 Days after the Operation in Summer, but about 10 or 12 in Winter, that the Head and the Tail begin to shoot on those Parts where they were wanting. The Head shews itself first, and lengthens itself continually, for a Week, or more, till it has attained the Length of about a Line and half; and then it ceases to grow. I do not here mean, that the proper Head has actually that Length; very far from it: But I here give that Name also to 5 or 6 Rings, which are contiguous to the Head properly so called. It is not so with regard to the Tail, which, having soon surpassed the Head in Length, does not leave off still extending itself; but increases, from Day to Day, so that I do not yet know how far it may go. I shall content myself with saying, that Pieces of those Worms, which, in the Month of *July*, immediately after the Operation, were not quite 2 Lines in Length, are at present near 2 Inches long: But what may be thought more remarkable, is, that some such Pieces have made in the same Time as much Progress, as others 4 or 5 Times as long. I have compared the different Growths of the first Moiety of a Worm about 2 Inches long, cut on the 18th of *July*, with those of some of the Pieces of a like Worm cut the same Day into 8 Pieces; and was surprised to find the Quantity of Growth near the same in both Cases. However, it appeared that when the Division was yet carried further, the Pieces thence arising reproduced what they wanted more slowly than the others.

But if, instead of making this Comparison between the Pieces of different Worms, we make it between those of the same Worm, we shall observe Variations which we perhaps would not have expected. Some of these Pieces will be 12 or 15 Lines long, whilst others will hardly be 4 or 5. I have done my utmost to find among those Variations some fixed Point, some Rule, not contradicted by Experience; and it has appeared to me in general, that the Pieces nearest to the Tail are those



those which make the least Progress. Among this Number is chiefly to be reckoned the last. As to the first, that which keeps the Head, though that is often the Piece which in an equal Time recovers the longest Tail, yet does not this happen so constantly as to build a Rule upon it. My Observations have furnished me with more than one Proof of this. Neither is it a Rule, that all the intermediate Pieces, which have recovered Heads, will also recover Tails: I have Examples to the contrary. But what seems certain, is, that the State of the Worm, the Number of it's Divisions, and other Circumstances, seem very much to influence all those Irregularities.

The Want of Nourishment, or of such as is proper, may also be a Cause, and that a very natural one, of like Variations. I said above, that those Worms love to be in the Mud, and that they digest it. Those Pieces which I left purposely in clear Water, have usually very well recovered what they wanted to become true Worms; though afterwards they made but little Progress, and almost all successively perished.

The learned Dr *Hales* \* relates a curious Experiment; by which he proves, that the Bones of Animals, when they are ossified to a certain Degree, do not grow any longer but at their Extremities. Many Observations have convinced me, that it is the same with our Worms. The old Piece, I mean that which was originally cut from the Worm, does not itself lengthen, but it's Increase is only owing to the Growth of those additional Parts, that put out at each Extremity.

\* *Vegetable  
Statics.*

It is certainly very singular, that the Circulation of the Blood, the Regularity of which appears so essential, yet in certain Insects suffers considerable Changes. Such are those which *Malpighi* has observed in the Silk-Worm. And I do not know if it is not as remarkable, that those I am speaking of, have never shewed me any of those Variations, at whatever Time, or in whatever State I have yet observed them, either whilst entire, or when cut into several Pieces. I have constantly, in all these Cases, seen the Liquor that serves them instead of Blood, circulate from the Tail towards the Head, and that in Pieces which were scarcely half a Line in Length, or which, to speak more properly, were only *Granula* of Flesh.

I was, by this, able to distinguish the anterior End from the posterior; and to be as sure as possible, that it is always the anterior, on which the Head appears again.

Among those Plants that may be raised from Slips and Cuttings, there are some that seem to have this Property to such a Degree of Perfection, that the least Twig will become a compleat Plant again. Hath the great Author of Nature, when he ordained, that certain Insects, like our Worms, should resemble those Plants in this Particular, allowed them the Power of being reproduced to the same Degree? Or, which is the same thing, will this Reproduction take Place in whatever Part the Worms are cut? I have thought this worth inquiring



into. In order to it, I cut off from one of these Worms both the Head and the Tail; that is to say, I parted from each of it's Extremities a Piece of the Length of about a Line. Both Pieces perished in about 24 Hours, the Tail first and the Head after. As to the Body, it continued to move almost as if I had not made the Operation. I have even seen, what appeared to me extremely remarkable, that, a few Moments after, it thrust itself into the Mud, making use of it's anterior Extremity, as of a Head, to bore it's Way through. I have repeated this Experiment with the same Success: So that I am confident I may assert, that there are in the Body of these Worms at least 2 Points, where, if they are cut, the Reproduction will not take Place. The one is about the 5th or 6th Ring from the Head; the other, at an equal Distance from the Extremity of the Tail. Is not, perhaps, the Condition of the great Artery in these two Parts the Cause of it? This indeed seems to me probable; remembering, however, that what I have just said only relates to the 2 Pieces detached from those Extremities; for, as to the intermediate Body, it not only continues to live, but it is even not long before it regains all that was taken from it. Where then does the Principle of Life reside in such Worms, as after having their Heads cut off, still shew not only the same Motions, but even the same Inclinations? Yet what is this Difficulty, compared with many others, that at the same time present themselves to our Mind? This wonderful Reproduction of Parts, is it only a natural Consequence of the Laws of Motion? Or does it rather depend on a Chain of minute Buds or Shoots, a Sort of little Embryos, already formed, and lodged where the Reproductions are to begin? Are these Worms only mere Machines, or are they like more perfect Animals, a Sort of Compound, the Springs of whose Motions are actuated by a kind of Soul? And, if they have within themselves such a Principle, how can this Principle afterwards appear in every distinct Piece? Shall we grant, that there are in these Worms as many such Souls as there are Pieces of the same capable of becoming complete Worms? Shall we believe, with *Malpighi*, that these Sorts of Worms are all Heart and Brain, from one End to the other? This may be; and yet we know but little the more for it.

The Nicety of the Sense of Feeling in Spiders has been much talked of; yet do not I know whether our Worms may not, in this Particular also, shew something still more surprising. I have already observed, that upon bringing near them the End of a Splinter, they begin to frisk about, almost before it reaches them: And I have since made other Experiments, which leave me in doubt, whether it is not rather to their Sight than to their quick Sense of Feeling, that I ought to ascribe what I observed in this respect. I have found, that, when the first Rays of the Sun came to fall upon the Vessels of Water in which I kept those Insects, their Motions seemed presently to become more lively. I have fancied, at least, that I saw the same thing, when, after  
having



having put them into the Shade, I threw the Light of the Sun upon them from a Looking glass, or when I observed them by Candle-light: But what seems less liable to Mistake, is, that I have seen some of them creeping about in the Moon-shine, that in the Day-light kept themselves constantly folded together. I would not, however, venture to determine any thing upon this, till I am better satisfied by new Experiments.

A Twig of *Willow*, *Poplar*, &c. planted in the Earth, takes Root there, and soon becomes a Tree, the least Twig of which will, in it's Turn, become another. There is no End of this; and it is the same with our Worms. If we cut those that have been produced by Section, and do not carry the Division at once beyond 12 or 15 Pieces, we shall not fail of having so many Animals. I have had Worms from the Fifteenths, and even the Twentysfourths, of former Halves and Quarters; and I reckon, that in Two Years time I might, if I would, breed after this manner 40 or 50 thousand Worms from one single one.

But how do these Worms propagate? Are they *viviparous* or *oviparous*? I shall just mention an Observation that to me seemed singular: As I divided one of these Worms into 8 Pieces, I saw some earthy matter ouising out of one of the Pieces near the Head, in the midst of which I perceived something moving like a whitish Thread. I, at first, made no doubt but it was some Vessel, or like Piece of the Body of the Insect, which, not being quite separated from it, might still draw from thence the Principle of it's Motion: But, taking to my Assistance a good Magnifying-glass, I was much surpris'd when I saw, that this supposed Vessel was a small Worm, and exactly of the Figure of that, in the Body of which it had before been inclosed. I immediately resolv'd to bring it up; and, to this End set it apart in a small Vessel filled with Water, into which I put also a little Earth. It was not long before I was sensible, from the Quickness with which it thrust itself into it, that I had satisfied it's Wants: However, from time to time, it came out again, and swam about. I could not but admire the Liveliness of all it's Motions; and it was much like one of those little *Eels*, which, by the Microscope, are discovered in Vinegar. I watch'd it thus above 6 Weeks, when, by an unforeseen Accident, I lost it: I was, however, already, in part, inform'd of what I hop'd to learn; I mean, whether this Worm, which I had brought into the World by a sort of *Cæsarean* Operation, would not only continue to live, but would also acquire a greater Length; and this I had seen happen; for the Worm, which at first was hardly a Line in Length, was above as long again, when I had the Accident of losing it. It seems therefore natural to think, that if it had lived longer, it would have been a Worm exactly like that it came from. And I have look'd upon this as



the more probable, because thirds of those Worms have also produced others and exactly like themselves.

I have examined some of these little Worms with the Microscope, and observed 2 Particularities in them, which I have thought worth Notice: 1<sup>st</sup>, Long Hairs placed on the Sides of the Body, Two at each Joining of the Rings. 2<sup>dly</sup>, That the Chanel of the *Intestines*, the great Artery, &c. appeared interrupted for about  $\frac{1}{3}$  of the Length of the Body, so that for a Space, which to the Microscope appeared of about 2 Lines, the whole was so transparent, that nothing could be distinguished; whereas every-where else, except about the 5 or 6 first Rings, the Parts in Question were plainly visible: And especially the Stomach, by reason of the earthy Substance it was filled with. I have Reason to think, that these small Worms, observed again with fresh Attention, will shew me still something new, in their internal Parts. I divided one on the 28<sup>th</sup> of *March*, in the Place where I have said that the *Viscera* appeared interrupted. Next Day the 2 Pieces buried themselves in the Mud; and on the first of *April*, being both applied to the Microscope, the latter was found to have already got a Head as well formed as that of the other Piece, and which had already begun to perform it's natural Office of giving Admittance to the Food. It is remarkable, that Worms so tender, and so small, go through the Operation so well, and complete themselves so speedily even in cold Weather. This confirms what I shall observe below, that the more slender these Insects are, the sooner they complete themselves.

This unexpected Observation set me upon examining more carefully the internal Parts of these Worms. With the Help of a good Magnifying-glass, I thought I distinguished, in the Inside of one of the biggest on both Sides of the greatest Artery, small Worms like those I have spoken of above: I saw them move different Ways, extend themselves, and wriggle about. But, having had recourse to the Microscope, I began to doubt whether that I had before seen was really what it seemed to be. It then appeared, that what I had taken for Worms, were rather the Branches of those Vessels, accompanying the great Artery, and participating of the Motions of the *Systole* and *Diastole* of that Vessel. Nevertheless, having again resumed several times these Trials, I have again been persuaded, I saw the same Appearances of small living Worms; which makes me still uncertain of the Truth of this Particular, and unable to determine what I ought to think.

We cannot enough admire nor acknowledge the wise Conduct of Nature, in the Multiplication of the Species of Animals and Vegetables; forasmuch as we see, that those which are most useful to us, commonly multiply, either in a greater Proportion, or may be raised with greater Ease. But what End could that Wisdom, which does nothing in vain, have proposed to itself, in granting to such Insects as  
these



these a Property and Prerogative, which Animals, far more excellent in our Judgment, seem no ways intitled to? It is even certain, that these Insects naturally make use of this Power; and it is really true, that the same Wonders I have seen operated in my Glasses, are also performed every Day in the Brooks where they live. I have there met with Worms, some of which had yet no Heads, and others that only began to recover them. But, which is more, I have found some in the same State as those which had lost both their Heads and their Tails, or which had been divided into more than 2 Pieces; and all these have afterwards fully completed themselves under my Eyes. Can this therefore be a natural way of multiplying with these Insects? Is it necessary, that, in order to bring forth new Worms, their Body should be divided and broke to Pieces? Or those which I have found divided, were they so only by any Accident? I could hardly have hoped, that my Observations would have furnished me with Answers to these or the like Questions: But Worms of this sort, which I kept entire, having divided themselves of their own Accord, have made me think, that this Accident sometimes proceeds from their having thrust themselves too far into the Earth, or from that Earth's being of too hard and resisting a Nature. It may therefore seem the more fit, that these Insects, whose Bodies are very tender, and liable to be separated, should reproduce what they lost in the manner I have been speaking of. I have farther observed, that they are subject also to a sort of Distemper, analogous to the Gangrene, that sometimes rots off considerable Parts of their Body; which, however, they recover afterwards, like those others which have had the same Parts cut away.

Another sort of Worm, upon which I have begun to make Trials, is also found in the Water. It differs particularly from that I have been speaking of, in that it is considerably thicker. I have divided some of these in the Summer Season into 2, 3, and 4 Pieces. Some have recovered the Head and the Tail; but that only after the Space of 20 Days, during which they always lay like dead. They lived above a Month after, in a State very little different, as to outward Appearance; and afterwards perished, without making any farther Progress. The considerable Difference between the Times in which the Pieces of these last Worms complete themselves, and those employed by the former, with the greater Difficulty in their Success, do they not chiefly proceed from their Thickness? And is it not possibly a Rule, that the slenderer Worms of this Class are, the sooner the Pieces separated from them will resume what is wanting? I should incline to think it is so.

But if the Water has it's Insects, thus produced from Cuttings, the Earth is not absolutely without them. It also contains some perhaps yet more deserving our Admiration, than all that have hitherto been observed in this Kind. Every body now knows that the Earth-Worms are *Hermaphrodites*, but not such as I have shewn the *Pucerons* to be: That is to say, that an Earth-Worm, though it is of both Sexes,

cannot



cannot engender without the Concurrence of it's like. I have therefore divided some of these into 2 and others into 4 Pieces; and some of them, at the End of about 3 Months, which they have passed in a sort of Lethargy, did then proceed to resume both Heads and Tails. The Reproduction of the *Anus* is no long Work, a few Days are sufficient for it; but it is otherwise with the Head; that does not seem to perform it's Functions in the Pieces of divided Worms, till about 7 Months after the Operation. Now what further excites my Curiosity, is, to know, whether they will copulate; if they do, the Wonder will be at it's highest Pitch. As for what remains, I have made a Remark, not to be here passed over, both upon Earth-worms and Water-insects; which is, that the posterior Parts always appear to suffer more in the Operation than the anterior. We see the former immediately giving itself, as it were, convulsive Motions, whilst the latter, almost constantly, moves about as usual.

I have also made Experiments, but without Success, on some sorts of terrestrial Millepedes; likewise on several of those kinds of Worms which metamorphose themselves into *Tipula*, or Water-spiders; but no one of them has succeeded.

These are the Observations I have begun to make upon so interesting a subject. If they are compared with what still remain to be made, they must appear extremely imperfect; and I myself look upon them as no other than a rough Sketch of what others may possibly do hereafter.

Geneva, March

14. 1742. N. S.

Concerning the  
*Squilla aquæ  
dulcis*, by  
Richard Rich-  
ardson M. D.  
F. R. S. No.  
433. p. 331.  
dated Sept. 5.  
1733.

XI. I do not remember that any Naturalist; has taken notice of the great Destruction that is made amongst the small Fry of Fish by the *Squilla aquæ dulcis*, which abound in most standing Waters. In a small breeding Pond nigh my House, where I had formerly plenty of small Carp and Tench every Year, and of late scarce any young Breed to be met with, my Gardener not long ago observed one of the *Squilla*, with a Carp in it's Mouth almost as large as itself; and has since observed these Insects hunting amongst the Weeds, and vigorously pursuing the small Fry. I ordered the Gardener to catch some of these Insects, and bring them home alive, with some of the smallest Fish he could meet with. We put them together in a large Bason of Water. The Insects were so rapacious, that they fell upon the Fish immediately, and destroyed several in my Sight; and before Morning had devoured all that were in the Bason.

Conjectures on  
the Charming  
or Fascinating  
Power attri-  
buted to the  
Rattle-Snake:  
grounded on  
credible Ac-  
counts, Expe-

XII. 1. The various Relations not only of curious and credible Authors, who have given us Accounts of *Virginia*, *Carolina*, and the neighbouring Countries, but also the Testimonies of several Men of Integrity by word of Mouth, concerning what they call Charms, Inchantments, or Fascinations by Snakes, have often seemed to me greatly surprizing, without my being able to satisfy myself of the true Cause of such Appearances.

These



These Opinions are the greatest Support of a common Notion, that several chronical wasting Diseases, and such Disorders of the Nerves as are not easily accounted for, not only in Men, but in cattle, are believed to be the Effects of an evil Eye of old malicious Women, &c. thought to be Witches and Sorcerers, or assisted by the Devil.

*riments and Observations. By Sir Hans Sloane, Bart. Pres. R.S. and Coll. of Physicians, &c. N<sup>o</sup>. 433. p. 321. July, &c. 1734.*

In particular as to *Rattle-Snakes*, they all agree in their Relations, that those Snakes keeping their Eyes fixed on any small Animal, as a Squirrel, Bird, or such like, though sitting upon the Branch of a Tree of a considerable Height, shall, by such stedfast or earnest Looking, make or cause it to fall dead into their Mouths. This is a Thing so well attested, that they think there is no reason to question their belief of it.

Mr *Read*, an eminent Merchant in the City of *London*, had a *Rattle Snake* sent him alive in a Box with some Gravel from *Virginia*, which he did me the Favour to give me. It had lived 3 Months before without any Sustenance, and had in that time parted with it's outer Coat, or *Exuvia*, which was found amongst the Gravel. Mr *Ranby* undertook the lodging it: And Captain *Hall*, ventured to take the Snake out of the Box; notwithstanding the Poison from the Bite thereof is almost present Death: For he gave us an Instance of a Person bitten, who was found dead at the Return of a Messenger going to the next House to fetch a Remedy, or Antidote, though he was not gone above half an Hour. Nay, so certain are the mortal Effects of this Poison, that sometimes the waiting 'till an Iron can be heated, in order to burn the Wound, is said to have proved fatal. This Gentleman told me he thought the securest Way was immediately to cut out the Part where the Wound was made; for he had seen several, who carried these hollow Scars about them, as Marks of the narrow Escape they had had, and never felt any Inconvenience afterwards.

Though Providence hath produced a Creature so terrible to other Animals, yet it seems to have provided it with the Rattle at it's Tail, that the Noise thereof might give warning to them to get out of it's way.

I desired an Experiment should be tried before several Physicians; which was accordingly done in the Garden belonging to their College in *London*. The Captain, by keeping the head fast with a forked Stick, and making a Noose, which he put about the Tail of the Snake, tied it fast to the end of another Stick wherewith he took him out of the Box, and laid him upon the Grass plat. Then a Dog being made to tread upon him, he bit the Dog, who thereupon howled very bitterly, and went away some few Yards distant from the Snake: But in about one Minute of time he grew paralytic in the hinder Legs, after the manner of Dogs who have the *Aorta descendens* tied. He died in less than three Minutes time, as is related by Mr *Ranby*, in an Account of this Experiment, and by Captain *Hall*. See Vol. VII. Part III, Chap. I. §. vii. 2, 3.



In my Opinion the whole Mystery of their enchanting or charming any Creature is chiefly this: that when such Animals as are their proper Prey, namely small Quadrupeds or Birds, &c. are surprized by them, they bite them; and the Poison allows them time to run a small Way, as our Dog did, or perhaps a Bird to fly up into the next Tree, where the Snakes watch them with great Eagerness, 'till they fall down, or are perfectly dead, when having licked them over with their Spawl or Spittle, they swallow them down, as the following Accounts relate.

‘ Some People in *England* (says Colonel *Beverley* †) are startled at  
 ‘ the very Name of the *Rattle-Snake*, and fancy every Corner of that  
 ‘ Province so much pestered with them, that a Man goes in constant  
 ‘ danger of his Life, that walks abroad in the Woods. But this is as  
 ‘ gross a Mistake, as most of the other ill Reports of this Country.  
 ‘ For in the first Place, this Snake is very rarely seen; and when that  
 ‘ happens, it never does the least Mischief, unless you offer to disturb  
 ‘ it, and thereby provoke it to bite in it’s own Defence. But it never  
 ‘ fails to give you fair warning, by making a Noise with it’s Rattle,  
 ‘ which may be heard at a convenient Distance. For my own part,  
 ‘ I have travelled the Country as much as any Man in it of my Age,  
 ‘ by Night and by Day, above the Inhabitants, as well as among  
 ‘ them: And yet before the first Impression of this Book, I had  
 ‘ never seen a *Rattle-Snake* alive, and at Liberty, in all my Life. I  
 ‘ had seen them indeed after they had been killed, or pent up in Boxes  
 ‘ to be sent to *England*. The bite of this Viper, without some  
 ‘ immediate Application, is certainly Death: But Remedies are so well  
 ‘ known, that none of their Servants are ignorant of them. I never  
 ‘ knew any killed by these or any other of their Snakes, altho’ I had a  
 ‘ general Knowledge all over the Country, and had been in every part  
 ‘ of it. They have several other Snakes, which are seen more frequently,  
 ‘ and have very little or no hurt in them: *viz.* such as they call *Black-*  
 ‘ *Snakes*, *Water-Snakes*, and *Corn-Snakes*. The black *Viper-Snake*,  
 ‘ and the *Copper-bellied Snake*, are said to be as venomous as the *Rattle-*  
 ‘ *Snake*; but they are as seldom seen. These three poisonous Snakes  
 ‘ bring forth their Young alive; whereas the other three sorts lay Eggs,  
 ‘ which are hatched afterwards; and that is the Distinction they make,  
 ‘ esteeming only those to be venomous, which are viviparous. They  
 ‘ have likewise the *Horn-Snake*, so called from a sharp Horn it carries  
 ‘ in it’s Tail, with which it assaults any thing that offends it, with that  
 ‘ Force, that, as it is said, it will strike it’s Tail into the But end of  
 ‘ a Musket, from whence it is not able to disengage itself.

‘ All Sorts of Snakes will charm both Birds and Squirrels, and the  
 ‘ *Indians* pretend to charm them. Several Persons have seen Squirrels  
 ‘ run down a Tree directly into a Snake’s Mouth. They have like-

† *Hist. of Virginia*, Ed. 2. p. 260. Lond. 1722. 8vo.



' wise seen Birds fluttering up and down, and chattering at these Snakes,  
 ' 'till at last they have dropt down just before them.  
 ' In the End of *May* 1715, stopping at an Orchard, by the Road-  
 ' side, to get some Cherries, being three of us in Company, we were en-  
 ' tertained with a whole Process of a Charm between a *Rattle-Snake*  
 ' and a *Hare*, the *Hare* being better than half grown. It happened  
 ' thus: One of the Company in his Search for the best Cherries, espied  
 ' the *Hare* sitting, and although he went close by her, she did not  
 ' move, 'till he (not suspecting the Occasion of her Gentleness) gave  
 ' her a Lash with his Whip. This made her run about ten Foot, and  
 ' there sit down again. The Gentleman not finding the Cherries ripe,  
 ' immediately returned the same Way, and near the Place where he  
 ' struck the *Hare*, he spied a *Rattle-Snake*. Still not suspecting the  
 ' Charm, he goes back about twenty Yards to a Hedge to get a Stick  
 ' to kill the Snake, and at his Return found the Snake removed and  
 ' coiled in the same Place from whence he had moved the *Hare*. This  
 ' put him into immediate Thoughts of looking for the *Hare* again,  
 ' and soon spied her about ten Foot off the Snake, in the same Place  
 ' to which she had started when he whipt her. She was now lying  
 ' down, but would sometimes raise herself on her Fore-feet, struggling  
 ' as it were for Life, or to get away, but could never raise her hinder  
 ' Parts from the Ground; and then would fall flat on her Side again,  
 ' panting vehemently. In this Condition the *Hare* and Snake were  
 ' when he called me; and tho' we all three came up within 15  
 ' Foot of the Snake to have a full View of the whole, he took no No-  
 ' tice at all of us, nor so much as gave a Glance towards us. There  
 ' we stood at least half an Hour, the Snake not altering a Jot, but the  
 ' *Hare* often struggling and falling on it's Side again, till at last the  
 ' *Hare* lay still as dead for some Time: Then the Snake moved out  
 ' of his Coil, and slid gently and smoothly on towards the *Hare*, his  
 ' Colours at that Instant being ten Times more glorious and shining  
 ' than at other Times. As the Snake moved along, the *Hare* hap-  
 ' pened to fetch another Struggle, upon which the Snake made a Stop,  
 ' lying at his Length, till the *Hare* had lain quiet again for a short  
 ' Space, and then he advanced again, till he came up to the hinder  
 ' Parts of the *Hare*, which in all this Operation had been towards  
 ' the Snake. There he made a Survey all over the *Hare*, raising Part  
 ' of his Body above it, then turned off, and went to the Head and  
 ' Nose of the *Hare*, after that to the Ears, took the Ears in his Mouth  
 ' one after the other, working each apart in his Mouth as a Man does  
 ' a Wafer to moisten it, then returned to the Nose again, and took the  
 ' Face into his Mouth, straining and gathering his Lips sometimes by  
 ' one Side of his Mouth, sometimes by the other. At the Shoulders  
 ' he was a long Time puzzled, often halling and stretching the *Hare*  
 ' out at Length, and straining forward first one Side of his Mouth,  
 ' then the other, till at last he got the whole Body into his Throat.  
 ' Then



Then we went to him, and taking the Twist-band off from my Hat,  
 I made a Noose, and put it about his Neck. This made him at  
 length very furious; but we having secured him, put him into one  
 End of a Wallet, and carried him on Horseback five Miles to Mr  
*John Baylor's* House, where we lodged that Night, with a Design to  
 have sent him to Dr *Cock* at *Williamsburgh*; but Mr *Baylor* was so care-  
 ful of his Slaves that he would not let him be put into his Boat, for  
 fear he should get loose and mischief them. Therefore the next Morn-  
 ing we killed him, and took the Hare out of his Belly. The Head  
 of the Hare began to be digested, and the Hair falling off, hav-  
 ing lain about 18 Hours in the Snake's Belly.

I thought this Account of such a Curiosity would be acceptable,  
 and the rather because though I live in a Country where such things  
 are said frequently to happen, yet I never could have any satisfactory  
 Account of a Charm, though I have met with several Persons who  
 have pretended to have seen them. Some also pretend that those  
 Sort of Snakes influence Children, and even Men and Women by  
 their Charms. But this that I have related of my own View, I aver  
 (for the Satisfaction of the Learned) to be punctually true, without  
 enlarging or wavering in any Respect, upon the Faith of a Christian.

In my Youth I was a Bear-hunting in the Woods above the In-  
 habitants; and having straggled from my Companions, I was enter-  
 tained at my Return with a Relation of a pleasant Rencounter be-  
 tween a Dog and a Rattle-Snake, about a Squirrel. The Snake had  
 got the Head and Shoulders of the Squirrel into his Mouth, which  
 being something too large for his Throat, it took him up some time  
 to moisten the Furr of the Squirrel with his Spawl, to make it slip  
 down. The Dog took this Advantage, seized the hinder Parts of  
 the Squirrel, and tugg'd with all his Might. The Snake on the  
 other Side would not let go his Hold for a long time, till at last,  
 fearing he might be bruised by the Dog's running away with him,  
 he gave up his Prey to the Dog. The Dog eat the Squirrel, and  
 felt no Harm.

Another Curiosity concerning this Viper, which I never met with  
 in Print, I will also relate from my own Observation.

Some time after my Observation of the Charm, my Waiting-  
 Boy being sent abroad on an Errand also, took upon himself to bring  
 home a *Rattle-Snake* in a Noose. I cut off the Head of this Snake,  
 leaving about an Inch of the Neck with it: This I laid upon the  
 Head of a Tobacco Hogshead, one *Stephen Lankford*, a Carpenter,  
 now alive, being with me. Now you must note, that these Snakes  
 have but two Teeth, by which they convey their Poison; and they  
 are placed in the upper Jaw, pretty forward in the Mouth, one on  
 each Side. These Teeth are hollow and crooked like a Cock's Spur:  
 They are also loose or springing in the Mouth, and not fastened in  
 the Jawbone as all the other Teeth are. The Hollow has a Vent  
 also



also through by a small Hole a little below the Point of the Tooth.  
 These two Teeth are kept lying down along the Jaw, or shut like  
 a Spring-knife, and don't shrink up as the Talons of a Cat or Pan-  
 ther: They have also over them a loose thin Film or Skin of a  
 Flesh-Colour, which rises over them when they are raised; which I  
 take to be only at the Will of the Snake to do Injury. This Skin  
 does not break by the rising of the Tooth only, but keeps whole till  
 the Bite is given, and then is pierced by the Tooth, by which the  
 Poison is let out. The Head being laid upon the Hog'shead, I took  
 two little Twigs or Splinters of Sticks; and having turned the Head  
 upon it's Crown, opened the Mouth, and lifted up the Fang or  
 Springing-Tooth on one Side several Times; in doing of which I  
 at last broke the Skin. The Head gave a sudden Champ with it's  
 Mouth, breaking from my Sticks; in which I observed that the Poi-  
 son ran down in a Lump like Oil, round the Root of the Tooth.  
 Then I turned the other Side of the Head, and resolved to be more  
 careful to keep the Mouth open on the like Occasion, and observe  
 more narrowly the Consequence. For it is to be observed, that tho'  
 the Heads of Snakes, Ferrapins (*a Sort of Tortoise*) and such like  
 Vermin be cut off, yet the Body will not die in a long Time after,  
 the general Saying is, till the Sun sets. After opening the Mouth on  
 the other Side, and lifting up that Fang also several Times, he en-  
 deavoured to give another Bite or Champ; but I kept his Mouth  
 open, and the Tooth pierced the Film, and emitted a Stream like  
 one full of Blood, in Blood-letting, and cast some Drops upon the  
 Sleeve of the Carpenter's Shirt, who had no Waistcoat on. I advi-  
 sed him to pull off his Shirt, but he would not, and received no  
 Harm; and though nothing could then be seen of it upon the Shirt,  
 yet in washing there appeared five green Specks, which every wash-  
 ing appeared plainer and plainer, and lasted so long as the Shirt did,  
 which the Carpenter told me was about three Years after. The Head  
 we threw afterwards down upon the Ground, and a Sow came and  
 eat it before our Faces, and received no Harm. Now I believe, had  
 this Poison lighted upon any Place of the Carpenter's Skin, that was  
 scratched or hurt, it might have poisoned him. I take the Poison  
 to rest in a small Bag or Receptacle in the Hollow at the Root of  
 these Teeth, but I never had the Opportunity afterwards to make a  
 farther Discovery of that.

I will likewise give you a Story of the violent Effects of this Sort  
 of Poison, because I depend on the Truth of it, having it from an  
 Acquaintance of mine of good Credit, one Colonel *James Taylor* of  
*Metapony*, still alive. He being with others in the Woods a survey-  
 ing, just as they were standing to light their Pipes, they found a  
 Rattle-Snake, and cut off his Head, and about three Inches of the  
 Body. Then with a green Stick, which he had in his Hand, about  
 a Foot and half long, the Bark being newly peeled off, urged and



provoked the Head, till it bit the Stick in Fury several Times. Upon this the Colonel observed small green Streaks to rise up along the Stick towards his Hand. He threw the Stick upon the Ground, and in a quarter of an Hour, the Stick of it's own Accord split into several Pieces, and fell asunder from End to End. This Account I had from him again at the Writing hereof.

Father *Labat* likewise tells us \*, that Serpents, when they bite their Prey, retire, to avoid being hurt by them; and when dead, cover them with their Spittle, extend their Feet along their Sides and Tails, if Quadrupeds, and then swallow them.

Concerning a Cluster of small Teeth observed at the Root of each Fang or great Tooth in the Head of a Rattle-Snake, upon dissecting it, by John Bartram, M. D. N<sup>o</sup> 456, p. 358, dated July 17, 1734.

2. Near *German-Town*, about six Miles from *Philadelphia*, we found a Rattle-snake, which is now become a Rarity so near our Settlements. I took it home, and dissected it: In the Head I met with what has not been observed before by any that I can remember; that is, a Cluster of Teeth on each Side the upper Jaw, at the Root of the great Fangs, thro' which the Poison is ejected. I observed, in the same Case that the two main Teeth were sheathed in, lay four others at the Root of each Tooth, in a Cluster together, of the same Shape and Figure with the great ones, and I am apt to think for the same Use and Purposes, if by Accident the main Teeth happen to be broken, as was the Fellow to this that I send you. May not these Clusters of Teeth be placed to supply such a Defect successively, for the Support and Defence of this Creature?

Concerning the Viper catchers, and their Remedy for the Bite of a Viper, by William Burton, M. D. at Windsor. N<sup>o</sup> 445. p. 312. dated M 4, 1731.

XIII. 1. *William Oliver*, and his Wife, called upon me last Week with their *Vipers*, and either of them offered to be bit by any *Viper*, and to suffer their Arm to swell for some Time; and then, by the external Application of a common cheap Remedy, in a few Hours to remove all the Symptoms. The Experiment was made last *Wednesday* in our Town-Hall, before *Dr Derham*, F. R. S. *Dr Waterland*, the Physicians, Apothecaries, and Surgeons of this Town, and many other Gentlemen of this Neighbourhood. He was bit in the upper Joint of the Thumb, and higher up on the same Arm, by two different fresh *Vipers*: His Thumb, Hand, and Arm soon after swelled much, and all the usual Symptoms of a *Viper* Bite followed; he applied the Remedy before us, with the promised Success: But all the Contributors engaged not to divulge the Remedy.

A Narration of the Experiments made June 1, 1734, before several Members of the Royal Society, and others, on a Man, who suffered himself be bit by a Viper, or common Adder;

2. *William Oliver* and his Wife, from *Bath*, who followed the Business of catching and selling *Vipers*, offered themselves to be bit by any *Viper* that should be procured, trusting to the Virtue of a Remedy they had lighted on by chance in trying Variety of Things, when the Woman was once accidentally bitten, and the usual known Medicines, even the *Oil of Vipers*, had no Effect in asswaging her Pains, especially of her Breast of the same Side as the Hand in which she had received the Wound. This Remedy, which is only common OIL of OLIVES, and, from it's Use with *Sallad*, is vulgarly known by the Name of *Sallad-Oil*, recommends itself not only for it's Efficacy,

\* *Nouveau Voyage aux Isles de l'Amerique*, Tom. iv. p. 96 & 106. Ed. Paris, 1722, 8vo. but



but likewise on account of it's being readily to be come at, when Accidents happen, there being no Town, or even Gentleman's House in the Country, where *Sallad-Oil* is not at hand; whereas the *Oil of Vipers* is never to be had, but at *Apothecaries*, and not one in an Hundred of them keep it by them.

June 1. 1734, in the Presence of a great Number of Persons, the said *William Oliver* was bit by an old black *Viper*, or *Adder*, brought by one of the Company, upon the Wrist and Joint of the Thumb of the Right Hand, so that Drops of Blood came out of the Wounds. He said that he immediately felt a violent Pain and shooting from the Wounds, both to the Top of his Thumb and up his Arm, even before the *Viper* was loosened from his Hand; soon after he felt a Pain, resembling that of burning, trickle up his Arm; in a few Minutes his Eyes began to look red and fiery, and to water much: In less than half an Hour, he perceived the Venom seize his Heart, with a pricking Pain, which was attended with Faintness and Shortness of Breath, whereupon he fell into violent cold Sweats: In a few Minutes after this, his Belly began to swell, with great Gripings, and Pains in his Back, which were attended with violent Vomitings and Purgings. He told me, that, during the Violence of these Symptoms, his Sight was gone twice for several Minutes at a Time, but that he could hear all the while. He said, that in his former Experiments he had never deferred making use of his Remedy longer than when he perceived the Effects of the Venom reaching his Heart; but this Time, being willing to satisfy the Company thoroughly, and trusting to the speedy Effects of the *Oil*, which had never failed him, when used in Time, he forbore to apply any thing, till he found himself exceeding ill, and quite giddy.

About an Hour and Quarter after the first of his being bit, a Chafing-dish of glowing Charcoal was brought in, and his Arm, the Cloaths being stript off of it, was held over it as near, as he could bear it, while his Wife rubbed in with her Hand the *Sallad-Oil*, (which I had procured and kept myself in my Pocket, lest they should privately add any Thing to it; I bought it by the Name of *Lucca-Oil*) turning his Arm continually round, as if she would have roasted it over the Coals: He said that the Pain soon abated, but the Swelling did not diminish much; most violent Vomitings and Purgings soon ensued, and his Pulse became so low, and so often interrupted, that it was thought proper by the Physicians present, to give him the following Cordial Draughts, at about a Quarter of an Hour's Distance between each.

1. ℞. Aq. Laet. Pæon. comp. aa. ℥iij. Sp. Lavendule ℥i. m. pro duobus Haustibus.
2. ℞. Confect. Raleigh. ℥ss. Aq. Theriacal. ℥iss. Sp. C. C. g<sup>ss</sup>. x. m. f. Haustus.
3. ℞. Confect. Raleigh. Theriac. Andromach. aa. ℥ss. Sal. C. C. gr. v. Aq. Theriacal. ℥ij. pro duobus Haustibus.

and on other  
Animals like-  
wise bitten by  
the same, and  
other Vipers, by  
Cromwell  
Mortimer,  
M. D. Secr.  
R. S. N<sup>o</sup> 443.  
p. 313. Oct.  
1736.

He



He said he was not sensible of any great Relief from these Cordials; but that a Glass or two of *Olive-Oil* drank down, seemed to give him some Ease.

Continuing in this dangerous Condition, he was put to Bed as soon, as one could be got ready for him, where his Arm was again bathed with his Remedy over a Pan of Charcoal set by the Bed-side: But continuing to complain much of his Back and Belly, I advised his Wife to rub them likewise with *Sallad-Oil*, heated in a Ladle over the Charcoal; which she did accordingly: whereupon he declared he found immediate Ease, as tho' by some Charm; and he had not above 2 or 3 Reachings to vomit and Stools afterwards, but made Water plentifully, which was not discoloured: Then he soon fell into a sound Sleep, only was often interrupted by Persons coming to see and inquire after him, till near 12, from which Time he slept continually to 5 or 6 next Morning, when he awaked, and found himself very well: But in the Afternoon, on drinking some Rum and strong Beer, so as to be almost fuddled, the Swelling returned, with much Pain, and cold Sweats; which abated soon, on bathing the Arm as before, and wrapping it up in brown Paper soaked with *Oil*.

Two *Pigeons* were bit by the same *Viper* immediately after the Man: They soon sickened, and seemed giddy. Nothing being applied, the one died in about an Hour's Time, the other half an Hour after. The Flesh of both was turned quite black as if mortified; the Blood was coagulated, and looked black.

*June 3*, the Man's Arm remained swelled, looked red, marbled with Spots of Yellow, but felt soft; and he had the perfect Use of it, and even of his Fingers, no Pain or Stiffness being left. He then caused a small *Spaniel Dog* to be bit on the Nose by a fresh *Viper*: Some *Oil* was immediately applied hot, and rubbed well in, till all the Hair of his Nose was thoroughly wet: The *Dog* did not seem very uneasy; his Nose only swelled a little; he eat soon after; his Nose was bathed once more that Evening; he was found very well next Morning; but his Nose was bathed again, to make sure of his Cure: He remained perfectly well without any Symptoms ensuing, and was alive and well a Year after. Another *Pigeon* was likewise bit under the Wing at the same Time as the *Dog*, but by a fresh *Viper*; the *Oil* was immediately applied hot, and rubbed well in, and the Feathers of the Wing were thoroughly wetted with it. This Bird did not seem at all disordered with the Venom, but eat soon after, and was found well the next Morning, without any remarkable Inflammation or Swelling about the Part. The hot *Oil* was rubbed in again for 2 or 3 Days, twice a Day, and the Bird continued well, so that the *Viper-Catchers* carried it with them out of Town in Triumph, having never before experienced the Efficacy of their Remedy on so small an Animal; which, as it receives the same Quantity of Venom by a Bite as a larger one doth, is more liable to die under it; and they kept it alive above 3 Months, when they killed it and eat it. They said that they had experienced



experienced their Remedy to take Effect on *Cows, Horses, and Dogs*, 10 Hours after being bit; but that for themselves, who are frequently bit in the Fields, as they catch the *Vipers*, they always carry a Vial of *Sallad-Oil* along with them, that, as soon as they perceive themselves wounded, they without any Loss of Time bathe the Part with it; and if it be the Heel, they wet the Stocking thoroughly with it; if the Finger, which happens ofteneft, they pour some of it into that Finger of their Glove, which they immediately put on again, and thus never feel any farther Inconvenience from the Accident, not even so much as from the Sting of a common *Bee*. Perhaps it may be found of Use for the Bite of *Rattle-Snakes*, and other venomous Animals; especially if we consider, that in the Fields a Man seldom or never receives more than one Bite at a Time, which doth not infect him with so much Venom, as was instilled into the Man's Blood, when in these voluntary Experiments he suffered himself to be bitten twice together; and had likewise been bitten 3 times but about a Week or 10 Days before; some Remains of which Venom, it is highly reasonable to imagine, might still infect his Blood at the Time he repeated the Experiments, so as to make a fresh Quantity of the Venom operate with greater Violence upon his Body, than if he had been quite a fresh Man, never infected with the like Poison before, or at least at so great an Interval of Time, that his Blood might have been entirely free from all Remains of such an acrid Infection. From these Experiments is it not reasonable to imagine, that the *Oil* by itself may be as efficacious against the Sting of a *Scorpion*, as if *Scorpions* were infused in it?

3. The Man who was lately bitten by a *Viper* in the Presence of several Members of the *Royal Society*, having been recommended to some in this Place by Dr *Oliver* of the *Bath*, the following Experiments were made here. July 3d, the Man was bit in the Presence of several besides myself, in the public Hall of this College. He received two Punctures in the Wrist, a little above the Thumb: The Blood issued, and more Venom lay upon the Orifices, than could be immediately imbibed. The Man complained in about half an Hour's Time, that the Poison was got up to his Shoulder, and entering his Body; but notwithstanding this, we did not suffer him to apply his Medicine till an Hour and ten Minutes after he was bitten: by which Time he began to be flushed and in a Sweat, his Hand swoln and discoloured. Upon an Application of his Medicine, he found some Abatement of his Pain; but the Swelling appeared more visible, and spread itself farther into his Arm. In about a quarter of an Hour the Man sunk under the Table, and complained of violent Pains in his Back and Bowels, nor could he bear to be moved. At last, his Pulse failing, his Jaw being fallen, his Countenance changed, and Eyes fixed, we stretched him upon the Table, and applied the Medicine to his Belly and Stomach. Soon after which, recovering a little, he began to vomit, and brought up more than a Quart of Phlegm and Bile. In this

*Observations  
on a Man and  
Woman bit by  
Vipers, by  
Joseph At-  
well, D. D.  
F. R. S. and  
Principal of  
Exeter Col-  
lege, Oxford.  
N<sup>o</sup>. 444. F.  
394. dated,  
July 24.  
1734.*



this Condition he lay for more than an Hour; and then was removed into my Lodgings; where he was seized again with a Fit of vomiting, and likewise purging, and continued so till Midnight. I kept him in my own House above an Hour, in Hopes of his growing better; but his Disorder still continuing, and the Man being too weak and feeble even to stand, I sent him in a Chair home to his own Lodgings; where he was put into Bed, and after Midnight fell asleep, and awaked the next Morning perfectly well; excepting that his Arm was still swoln, and the Flesh pitted, as if it had been dropsical. His Arm was bound up in Papers, dipt in his own Medicine; and this was all, as far as I could observe or learn, that was applied to it. The same Day we caused 2 young Chickens to be bit; one died in 2 Hours, and the other in 4 Hours Time. A Third was bit 3 times, and then had the Medicine applied; but it died at the End of 10 Hours. The Flesh of this last was grown very black, and there was much extravasated Lymph between it and the Skin, which stunk insufferably; but I could not perceive, that the Viscera were at all discoloured.

*July 4th*, We had another Fowl, half grown, bit in two Places, and the Medicine was applied: Half an Hour after which, the Fowl eat Meat, and seemed much recovered, but was dead in 14 Hours Time.

*July 6th*, We caused two half-grown Cocks to be bit; the first was bit but once, yet violently, and turned black immediately; it had the Medicine applied, eat Meat afterwards, and seemed pretty well; yet died in twenty Hours. The other was bit 2 or 3 times, but hardly wounded, and not half so much discoloured as the former: We bathed the Wound with *Viper-Oil*, but the Fowl died in a little more than 2 Hours. *July 8th*, We caused 2 young Pigeons to be bit; the one had *Viper-Oil* applied immediately, but sickened and died in 4 Hours: The other had *Olive-Oil* applied, and recovered perfectly; the Flesh beginning to return to it's natural Colour in about an Hour's Time.

*July 17th*, The Woman was bit in the publick Hall of *Brazen-Nose-College*, in Presence of *Dr Frampton*, *Dr Frewin*, and several other Physicians, myself, and many others. It had been suspected, that they played some Tricks with their *Vipers*, and made them spend their Rage and Venom beforehand: To obviate which, a Physician of the Company had provided some fresh *Vipers*, which he had caught himself a Day or two before, and kept in his own Custody till that Time. The Woman was bit twice by one of these and received 3 Wounds, one in the Thumb and 2 in the Fore-finger. Her Hand was soon swoln and spotted, and her Finger turned black. After 23 Minutes, she applied the Medicine to her Hand, but not farther than the Swelling went; in which, I think, she was to be blamed, and I suspect the following Illness was in some Measure occasioned by it. She walked home very well in Appearance: But about 3 Hours after the Bite was received, she grew very sick, and in great Pain; was seized with Vomiting, Purging, and Fainting-fits, which continued upon her all Night, in-



much that the People of the House despaired of her Life : Nor had she any Sleep till Noon the Day following. I saw her about 6 that Evening, when she awaked, and found her very well in Spirits, but complaining of most acute Pains in her Finger. Her Arm, Shoulder, Back, and Breast, on that Side, were much swoln and inflamed : All those Parts thus affected were bound up in Papers soaked in the Medicine. After this there appeared upon her Finger two large Bladders, full of a black corrupt Matter ; and this not only upon the Wound, but one of them was upon a distant Part of the Finger from it. She could not be persuaded to open them, which I believe would have eased her considerably. July 20th, the Swelling was considerably abated, and almost reduced entirely into her Hand, which begun to pit : But she complained still of her Finger, and could hardly endure to have it dressed with fresh Papers. She continued in Bed till the 22d, for the Sake of keeping her Hand in a more easy Posture ; and then came abroad. The same Day that the Woman was bit, we caused a Fowl to be bit ; but the Wound was not deep, and little more than a Scratch. Nothing was applied to it, and it died in 20 Hours. A large Puppy was bit the same Day 3 times in the Head, had the Medicine applied, but died in about an Hour. It was known that these People kept themselves fasting those Days when the Experiment was to be tried upon them : This occasioned a Suspicion that they might take some Antidote to prepare their Bodies : For which Reason, I ordered the Man to bring me some Vipers after Dinner, last Monday, under Pretence of making some farther Experiments upon Dogs. We had provided at the same Time some fresh Vipers without his Knowledge, and then proposed to him to be bit by one of them, and apply his Medicine immediately. His Hand was besmeared with the Medicine in applying it to a young Dog, upon which we had just made an Experiment. Two Vipers were tried upon the Man, but neither would bite him : One of them attempted it several times, and spilt his Venom, but always caught back his Head again, as if there had been something in the Hand offensive. Upon this, suspecting that the Smell of the Medicine might occasion it, we made him wash his Hand, after which another Viper bit him immediately : But whether our Conjecture was right or not, must depend upon farther Trial. The Man received the Bite upon the Joint of the Thumb, and the Blood issued at the two Orifices. He applied the Medicine instantly : The Thumb appeared black soon, the Hand was swoln, and the Flesh pitted instantly. He drank a Mug of Ale after it, and then went home to Bed. Yesterday Morning, his whole Arm was swoln, but the Man was so well that he went 6 Miles out of Town, and came home again in the Evening. I have seen him again this Morning ; the Swelling is almost gone above the Elbow, but the Flesh pits below : The Wound has blistered, but the Bladders were filled with a Water, and not any thing of that black Matter which appeared upon the Woman's Finger. We caused a young Dog (men-



tioned before) to be bit the same Day, and applied the Medicine: Another Dog was 3 times bit in the Nose, and nothing applied: Both are much swoln, but very likely to live. We likewise thrust the Teeth of a Viper's Head cut off 24 Hours before, into the Flesh of a Fowl, which turned black immediately, but the Fowl is perfectly recovered without any Application.

*Concerning the Viper Catchers, and the Efficacy of Oil of Olives in curing the Bite of Vipers, by Stephen Williams, M. B. F.R.S. No. 445. p. 26. Jan. &c. 1737.*

4. *William Oliver*, in Presence of several Gentlemen of the Faculty of Physick, suffered himself, on *June 26, 1735*, to be bit by a Female Viper; which being enraged, fixed her Fangs in the middle Part of his Fore-finger. Blood soon issued out at the Wounds: But that the Poison might more strongly appear, the same Viper immediately bit a Pigeon in the Breast, which expired in less than half an hour. Another Pigeon was also bit by the same Viper, which expired also, though not so soon as the first. *Mr Oliver* immediately complained of an acute Pain in the wounded Part. It soon looked red, then became of a livid Colour: His Finger swelled to a great Size, and he could not bend it. Soon upon this his Hand also began to swell: He complained of Faintness, and Pains flying to his Arm, Shoulder, and Arm-pit. In half an Hour's Time from the Bite, we persuaded him to try his Specifick; which being applied, and strongly rubbed into the Part affected, procured him immediate Ease. His Pain lessened, his Finger became flexible, his Spirits seemed more chearful: The Specifick being several times repeated and applied, his Pains gradually diminished. The next Day, *June 27*, his Finger and Hand remained tumefied, but without Pain: The Skin began to appear yellow, and Pustles appeared, like Bladders, on his Finger; which being pricked, emitted a sanious Liquor. In two Days time all his Symptoms vanished, and he became perfectly well.

*June 30*, the Gentlemen of the Faculty met again, when we tried several Experiments on Puppies, Cats, and Pigeons; wherein we found the Efficacy of *Mr Oliver's* Specifick, and gave the Company great Satisfaction.

*An Abstract of an Inaugural Dissertation published at Wittemberg, 1736, by Dr Abraham Vater, F. R. S. concerning the Bite of a Viper, cured by Sallad Oil, by C. Mortimer, M. D. Secr. R. S. No. 451. p. 440, Dec. 1738.*

5. This Tract is intituled, *Dissertatio Inaug. Medica, de Antidoto novo adversus Viperarum morsum præstantissimo in Anglia haud ita pridem detecto, quam præside Dn. Abr. Vatero pro gradu Doctoris ventilandam proponit Fridericus Genslerus Gedanensis, Sept. 11. 1736. Vittembergæ, in 4to.*

Our Author was first informed of the Use of Oil of Olives against the Bite of Vipers by a Letter written to him by *Sir Conrad Sprengell*, Anno 1734, wherein he gives him an Account of the above Experiments: He had communicated the Contents of this Letter to *Dr Vater* at *Dresden*, who had an Opportunity of trying the Efficacy of this Remedy, by an Accident happening in that City; which Case being remarkable, he hath related it at large in the abovementioned Dissertation, and is as follows:

The head Journeyman in the Royal Dispensary at *Dresden*, being the last Year preparing some *Italian Vipers* for a Patient of Distinction,



tion, was, through Negligence, bitten by one of them in one of his Fingers. The Man finding himself wounded, was mightily frightened, and immediately fell to turning over Physic Books, in order to find out a Remedy, whereby he might ward off the Danger which he was sensible hung over him. But he found little Comfort in those Books; on the contrary, he was grieved in the highest Manner, upon reading in one of them, that Wounds from Vipers are commonly deadly, and that there remains very little help to be given. Being in these Streights, he tried various things; among others he applied *Theriaca* outwardly to the Wound, but felt no Relief from it, and in the Space of a few Hours, his whole Arm swelling to an enormous Degree, he felt great Pain in it, with remarkable Tensions under his Arm-pit towards his Heart, attended with a Faintness. Therefore, almost despairing of Recovery, having tried all things in vain, he went to Dr *Vater*, and asked his Assistance. He having been informed of the Virtue of Olive-Oil in this Case, as I have before mentioned, ordered the Man to anoint his whole Arm therewith hot, and several times, upon which the desired Effect soon followed: For the Arm, after one or two Anointings, began to grow less; the Pains, with the other Symptoms, were assuaged, and gradually ceased, and the Patient recovered perfectly in a Day or two. He took nothing inwardly besides a simple Mixture\* with an anodyne mineral Liquor, by the Advice of my Cousin, whereupon a copious Sweat ensued, which sensibly relieved the Patient. We do not disown but that this Medicine contributed greatly to the Cure, although the chief Part in this Affair is to be ascribed to the *Oil of Olives*, because upon anointing therewith, the Symptoms abated instantly. I had this whole Case from the Mouth of the Man himself, who was bitten, and thus cured.

I shall pass over what our Author saith concerning the Nature and different Species of Vipers; concerning the Effects of the Bite of Vipers on Men and Brutes; his Examination of the Venom of Vipers; the *Phænomena* observed upon opening Brutes killed by the Bite of Vipers; the Cure of these Bites by the Application of external Remedies, and by giving Antidotes internally; the two famous Antidotes, the *Mungos-root*, and the *Serpentine-stone*, called the Magnet of Poisons; as being only Collections from Authors, and containing nothing new. But speaking of the *Serpentine* or *Viper-stone*, he relates a very extraordinary Accident, if true, from *Kæmpfer's Amœnit.* p. 579. The Case was this: In the House of a *Dutch* Governor on the Coast of *Choromandel*, a Servant Maid happened to be bit in the Foot by a *Cobra Cabelo*. The *Serpentine-stone* was immediately laid on, which falling off, and no other being to be had, nor any new Milk being at hand to wash out the Pores of the Stone in, a wet Nurse being in the House, who was anxious for the sudden Effects of the Poison, milked

\* *Sp. Vitriol. dulcif. Sp. Vitriol. p. i. Sp. V. p. iii.*



some Milk upon the Stone out of her own Breasts; whereupon her Nipple began immediately to be painful, and soon after the whole Breast of that Side swelled, and was inflamed, even to the Hazard of her Life for 3 Days together, and the Hardness did not leave her Breast in less than 10 Days. It must be remarked, that her Nipple was before somewhat excoriated by the Gums of her Nursling, whereby the small Veins being laid bare, it was readier to receive the Infection of the Venom rendered more active by the Warmth of the Milk.

When he comes to speak of *Oil of Olives* in particular, and it's Effects against Poison in general, he cites a remarkable Passage from *Matthiolus* \*: Where he says, I have found by Experience, that Oil prepared by myself, into which a great Number of *Scorpions* had been put, being anointed on the Heart, and where the Pulsations of the Arteries of the Hands and Feet are felt, frees from all Poisons; nay, it likewise cures those who have been bit by *Vipers*, or stung by any other venomous Animals. Our Author, comparing this with the Virtue of the Oil alone, for the Bite of a *Viper*, concludes, that the *Scorpions* infused in it, add nothing to it's real Virtue.

He concludes this Dissertation, by endeavouring to explain the Manner of it's operating, which he attributes to it's fat inviscating Nature, whereby it sheathes the Spicula of the Poison. He remarks, that *Celsus* †, advises, after dipping a Person in an *Hydrophobia* in cold Water, to put him into warm Oil. Last of all he mentions the great Secret of the *Viper-Catchers*, that is, the Fat of *Vipers*: which, he thinks, acts in the same manner as the *Olive-Oil*.

Concerning the Efficacy of Oil of Olives in curing the Bite of *Vipers*, by M. Dufay, at Paris, dated Aug. 8. 1737. Translated from the French, by T. S. M. D. *Ibid.* p. 444.

— *Ibid.* the same, dated at Paris, Dec. 11. 1737. *Ibid.* p. 445.

6. After I had given the Academy an Account of your Observations on the Remedy against the Bite of *Vipers*, a Committee was appointed to make the same Experiments here. But whether it be, that our *Vipers* are more venomous than yours, or that the Bites were more considerable, of the several Pigeons and Fowls that were bit, not one recovered, though they were immediately rubbed with Oil. They died in a Quarter of an Hour, or in an Hour's time at farthest. The like Experiments have been made on several other Animals; but as the Gentlemen are resolved to repeat them, I do not send you an Account of them. All I can say at present is, that the Remedy seems to be not so sure here as in *England*, where I find by the publick News-papers, that a *Rattlesnake* has been lately brought, and that it's Bite has been cured by the same Remedy.

7. Two Members of the Academy have been employed to make the Experiments relating to the Cure of the Bite of *Vipers*, and they have accordingly made some upon Dogs, Cats, Pigeons, Chickens, Ducks, and Turkeys; some of which have been cured, but some

\* *Comment. in Dioscor. Lib. ii. p. 232.*

† *Lib. 5. c. 27.*



others died notwithstanding this Remedy; and there were even some that did not die, though they were bit very deep, and yet no Application of *Oil* was made. This is the Report they have made us of these Experiments; and they are determined to make new ones. All that can be thought concerning the Difference of the Success of this Remedy at *London* and at *Paris*, as it seems to me, is, that all *Vipers* are not equally venomous; that all Bites are not perhaps equally easy to be cured; and, in a word, that the *Vipers* in *France* are more dangerous than those in *England*. Finally, the Sequel of these Experiments will probably teach us, in what Cases this Remedy may be applied in this Country, *France*.

XIV. Having procured one of the lightest Colour, and most transparent, I put it into a glass Tube, of a Bore just big enough to receive it; the smaller the Tube, the better, provided you can get it in without injuring it. When I had fixed the Tube in the Body of the Microscope, I found the exact *Focus*, before I placed the Microscope on the Tube which receives and conveys the Sun's Rays to the Animal; and, having darkened the Room as much as I possibly could, I had a most entertaining Sight of it on my Paper Screen, at the Distance of 3 and 4 Feet. The Magnifier I used was the 4th in *Wilson's* Pocket Microscope. And at the Distance of 6 or 7 Feet, but not so distinct.—You have in Fig. 40 the exact Dimensions of the Field of Vision (as I call it), taken with a black Lead Pencil, on the Sheet of Paper which was strained in a Frame on purpose, at the Distance of about  $3\frac{1}{2}$  Feet from the *Focus*. You have there the true Dimensions of one of the larger Vessels, not the largest, which, being near the Middle of the Tail, appeared but obscure. And I have added the Dimensions of one, the Screen being removed to 6 or 7 Feet Distance.

In the larger Vessels, the Motion seems to equal that of the Stream of Water which is forced out of a Vessel by condensed Air; and makes an Appearance not altogether unlike it, when the Fountain is placed in the Sun: Here you can discern no Shape or Form at all of the Globules, but they seem all confounded: As the Current proceeds, you have beautiful luminous Reflexions continually. But in the lesser Vessels, and in the Parts most free from Spots, I several times saw the Globules of an oblong Form, resembling *Emmet's Eggs* in Shape, which I have endeavoured to represent, gliding along one after another, and often at the Distance you see them in the Figure, sometimes joined together; but I have never yet been able to discern any Commixture of them. I do not remember ever to have seen the Globules to approach this Form, in viewing the Circulation in the common way; but here every thing is magnified to that Degree, that the least Departure from the globular Form appears plainly. Another thing I observed, more than once, with Pleasure; that the Globules would, in some Places, gradually slacken their Motion, at length seem

Remarks concerning the Circulation of the Blood, as seen in the Tail of a Water-Eel, through a Solar Microscope, by the Rev. Mr Henry Miles.

No. 460.

p. 725. April  
&c. 1741.

Fig. 40.



seem to be about to stand still; in an Instant, a Globule would be compressed, in the Manner I have endeavoured to describe it; and then, as if it had squeezed through a narrow Passage, resume it's former Shape, and pass on with great Swiftnes.

But the most remarkable *Phænomenon* of all was, the Shape and odd Motion of some of them, near the Extremity of the Edge of the Tail which exactly resembled the *Tadpole* in Figure and Motion too, abating that they had not quite so much of the wriggling Motion of the Tail of those Creatures in a Pond of Water; but the Head (as I call it, for Distinction-sake) had exactly the same Motion. They seemed to be roaming about, as if in Quest of somewhat; would turn to the Right and Left, and sometimes seem to be repulsed a little, or to draw back of themselves, as I have seen the *Animalcula* in *Pepper-water* do. I have endeavoured to describe the Figure of them; the Motion has all the Resemblance that can be of that of the Animals mentioned. I began to suspect at first, they might be *Animalcula*, contained in the Water out of which the *Water-Est* came, which might remain in the Tube, under the Tail: But, on Examination, I found it dry; for indeed the Creature had been out of Water half an Hour, or more, and had been handled (which I scruple not to do), and so was drained well; so that I am certain the Appearance was in the Vessels of the Creature, though I would not be so rash as to suggest they were real *Animalcula*; for I presume the Figure and Motion may be accounted for, without supposing them to be any other than Globules of Blood, from the State in which the Blood might be, and from some Alteration of the State of the Vessel itself: The Blood, indeed, seemed to be about stagnating. It came into my Head, that I had seen a Drop of Water proceed somewhat like it, in it's Descent on a smooth dry Surface (as a glass Plate held nearly perpendicular); and, on Trial, I found the Drop to proceed in a kind of *Meatus*, not altogether unlike the Motion of the said Globules. In the Course of the Blood from *A* to *B*, sometimes a Current would turn off to the Branch at *a*, for a good while together, then cease to do so, passing on to *B*; and leaving the Branch *a* empty; and then again you might see it fill the Branch again: This I saw successively several Minutes together.

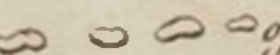
Fig. 41.

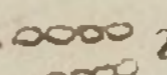
At first it was no easy Matter to make a Creature, coming out of so cold an Element, bear even the *reflected* Rays of the Sun, when converged though far enough from the *Focus*; for I was obliged to make use of a Looking-glass because of the Sun's Position: I once, indeed, tried to perform it without, but found the direct Rays too hot; but a Glance or two I had of it, convince me it might be seen to much greater Perfection. Another Difficulty is, that the Tube is rather too thick, and besides is apt to be smeared with the Tail of the Animal: However, it requires Time and Patience to perform it; yet, in the Manner I have seen it, it is to me the most entertaining Sight my Eyes  
ever

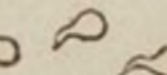


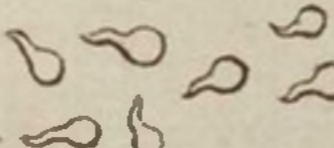


Fig. 40.

The figure  of  $\gamma$  Globules.

And figure  United.

Globules  Compress'd.

Globules of a Tadpole form. 

4 The curl'd Edge of  $\gamma$  Tail.

1. 2. 3. 4. 5. The limits of  $\gamma$  Field



Fig. 41.



Fig. 39.

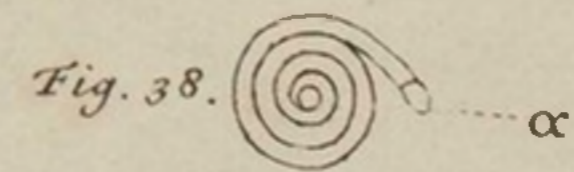


Fig. 38.







ever saw. I am not without Hopes, that I shall be able to remove some of the Difficulties this Summer.

I forgot to mention, that the Blood appeared a little discoloured, but not more in Proportion than it appears to be when you view it in the common way; and that the Tube, with the *Lens* receiving the Sun's Rays, was exactly parallel with the Horizon, and perpendicular to the Plane of the Screen which received the Image.

XV. 1. Towards the End of *Jan.* last, N. S. we had the Curiosity to catch a sort of Whale called the *Narbual* or *Sea Unicorn*. It was taken in the River *Ost*, near the Village *Bellum*, where it falls into the *Elbe*, (in the Dutchy of *Bremen*, which belongs to our Monarch) 4 German Miles from the Sea. They took a great Quantity of Fat out of it, to make (Thrann or) Whale-Oil; but observed, that this Train-Oil was of a Stench almost intolerable, by reason that this *Narbual* feeds on Carcasses: For *Nar* signifies a Carcass or dead Body, according to *Valentini* \*.

There was such Care taken of the Skin, before the Dissection, that it was cured with Salt and Alum, and stuffed so as to give the just Figure of the Fish: Having left with it the Bones of the Skull, and some *Vertebræ* near the Tail.

The Skin was spotted with dark brown Spots upon a white Ground. The Epidermis was transparent, and under it was another Skin very thin and spotted; but the true Skin was brown, and near an Inch in Thickness. On the Top of the Head they only found a semilunar Hole, as in the Porpoise, according to the Description given by *John Daniel Major* †. This Hole opens into the two Canals which run through the Skull to the Palate, and are called by *Major*, *Ductus hydragogi*. They did not remark in the Skin any Opening or Outlet for the Excrements; and I have been told, that this *Narbual* voided them through this Hole on the Top of the Head.

Concerning the Horn, I agree in Opinion with *Wormius* and others who take it for a Tooth; but I cannot believe that it's sole Use is to break the Ice: It rather serves the Fish for seeking it's Food. A Captain of a *Greenland* Vessel has assured me, that being upon the Coast a Whale-fishing, and having taken one, as he was turning the Whale to get at the Fat, he found on the opposite Side to him, a *Narbual*, that had stuck this Tooth into the Whale's Belly, up to it's Mouth, and had sucked the Blood and Humors.

I am sorry I have not an exact Account to send you of every Particular that was observed in the Dissection of this *Narbual*; for I have only seen the stuffed Skin, and consequently the outward Shape, as it was carrying to *Leipsic* Fair, and on the way shewn here at *Hanover*. And

\* *Museum Museorum*, Lib. III. c. 30.

† *Miscell. Academ. Nat. Curios. Dec. 1. An. 3. p. 22. &c. seqq.*

*Account of a Narhual or Unicorn Fish, by Dr. Steigertahl, F.R.S. dated at Hanover Apr. 20. O. S. 1736. Translated from the French by T.S. M. D. &c. N<sup>o</sup>. 447. P. 147.*



as I find that the Figure engraved and printed at *Hamburgh*, has a good Likeness to what I have seen, I have hereto annexed a Print of it.

Fig. 42.

## EXPLANATION of the PRINT.

1. A Semilunar Hole, through which the Fish cast out Water and Blood, upon dying.
2. A small Rising on the Middle of the Back, and fleshy as the Fins.
3. The Mouth very little, without Teeth in the upper Jaw, except this *Dens prominens*, or Tusk; which has by some been taken for a Horn: And there was no lower Jaw found.
4. The Eye, very small.
5. The Fin on the right Side, which, as well as the opposite, is fleshy.
6. The Tail fleshy, like the Fins; which, taken according to it's Width, is not vertical, but horizontal.
7. The prominent Tooth or Tusk, generally taken for a Horn. The Length of this *Narhual* from N<sup>o</sup>. 3 to 6, was measured, and found to be 17 Feet 9 Inches. The Tooth 6 Feet 3 Inches. The greatest Thickness, measured round, was 14 Feet. The Skin was smooth, without Scales, like that of an Eel; and was white marked with blackish Spots.

*A Description of the same Narhual, communicated by John Henry, Hampe, M.D. F.R.S. Ibid p. 149. Jan. &c. 1731.*

2. In a Creek called the *Belubmer Wadt*, belonging to the Bailiwick of *Newhaus* in the Dutchy of *Bremen*, hath been caught alive, an unknown Fish of a large Size, 18 to 20 Feet in Length, and four in Diameter. He hath on the Fore-part of the Head, just above the Mouth, which is very small, a Horn 6 Feet long, white like Ivory, and curiously twisted. The Body is white, sprinkled with black Spots, and smooth like an Eel. The Head is, in Proportion to the Body, very small, about 16 Inches in Length, and the same in Diameter. The Eyes are also small, about the Bigness of a Sixpence. On the upper part of the Head, is a Hole about three Inches in Diameter, out of which probably he spouts Water, like the Whales. On each Side of the Neck are placed two black Fins, one above another, and at a small Distance from one another. They are half an Inch in Thickness, of one Hand's Breadth, and two Feet in Length, round on the Fore-part all fleshy, and of a Liver-colour.

*An Account of the horn of a Fish struck several Inches into the side of a Ship, by C. Mortimer, M.D. R.S. Sec. N<sup>o</sup>. 461. p. 862. Aug. &c. 1741.*

XVI. Mr *Bankley* shewed me the *Horn* of a *Fish* that had penetrated above 8 Inches into the Timber of a Ship, and gave me the following Relation of it: 'His MAJESTY'S Ship *Leopard*, having been at the *West-Indies*, and on the Coast of *Guiney*, was ordered by Warrant from the Honourable *Navy-Board*, dated *Aug. 18. 1725.* to be cleaned and refitted at *Portsmouth* for Channel-Service: Pursuant thereto, she was put into the great Stone-dock; and, in stripping off her Sheathing, the Shipwrights found something that was uncommon in her Bottom, about



‘ about 8 Feet from her Keel, just before the Fore-mast; which they  
 ‘ searching into, found the Bone or Part of the Horn of a Fish of the Fig. 43.  
 ‘ Figure here described; the Outside rough, not unlike *Seal-Skin*; and  
 ‘ the End, where it was broken off, shewed itself like coarse Ivory,  
 ‘ The Fish is supposed to have followed the Ship, when under Sail,  
 ‘ because the sharp End of the Horn pointed toward the Bow: It pene-  
 ‘ trated with that Swiftness or Strength, that it went through the Sheath-  
 ‘ ing 1 Inch thick, the Plank 3 Inches thick, and into the Timber  
 ‘ 4 1/2 Inches.’

With what prodigious Force must this Fish have moved? For had it met the Ship, the Motion of the Ship would have assisted the Penetration of the Horn; but the Direction of it pointing from the Stern towards the Head, shews that the Fish struck against the Ship, either while at Anchor; or that it overtook it, while under Sail; in which case the Force of the Fish must have been still greater; and this was probably the Case, because nobody in the Ship remembered the Shock. Several able Workmen on the Spot assured me, that, with a Hammer of a Quarter of an hundred Weight, they could not drive in a Pin of Iron, of the same Form and Size, into such sort of Wood, and to the same Depth, in less than 8 or 9 Strokes.

XVII. There was brought to *Plymouth*, June 29, 1734, struck the Day before in the River, a *Sun-Fish* weighing about 500 Pound Weight. The Form of it nearly answers that given by Mr *Willoughby*, except that the Tail of this was scolloped.

This Fish differed very much in one thing from that described by Mr *Willoughby*, whose Flesh, he says, was very soft: On the contrary, the Flesh of this was hard and firm, rather a gristly Substance than soft Flesh.

A Gentleman of my Acquaintance, Commander of a Vessel, tells me, his People took a *Sun-Fish*, South of *Newfoundland*, which, by his Description, was considerably larger than that brought hither. They made no Use of the Flesh; but he remembers it was a gristly Substance, hard and firm.

A Piece of the Flesh boiled, to try how it would look and taste, to our Surprize, was all turned into a Gelly. Being soft and tender, it could not be taken out of the Saucepan with a Fork, but only with a Spoon; in Colour and Consistence nearly resembling boiled Starch when cold. It had little or nothing of the fishy, but a grateful and pleasant Taste.

By the sticking together of my Lips, and from what I observed by touching it with my Fingers, I took Notice, that this boiled Flesh was clammy and glutinous; which brought to my Mind, that what the Antients made use of to serve the Purposes of Glue, was made from Fish. I then tried it upon Paper and Leather, and found it to answer the Use of Paste very well: And it was owing in part to Neglect, and partly to Accident, that it was not also tried upon Wood.

*Concerning the  
 Mola Salu, or  
 Sun-Fish, and  
 Glue made of  
 it; communi-  
 cated by the  
 Rev. Mr  
 William Bar-  
 low, No. 456.  
 p. 343. Jan.  
 &c. 1740.*



From this Discovery of the glutinous Nature of the Flesh of the *Sun-Fish*, I would recommend it to those who have Opportunity to make farther Experiments upon it ; and probably something useful, or curious at least, may be a satisfactory Reward for the Trouble they shall give themselves on that Account.

From the Descriptions given us of the *Ichthyocolla* by *Dioscorides* and *Pliny*, the Glue-Fish seems not to be the same as our *Sun-Fish*. Whether the Fish from which our Isinglass is made, be the same as the *Ichthyocolla* of the forementioned Authors, as the Name usually given to it seems to import, I cannot tell: But neither the *Ichthyocolla* of *Rondeletius* or *Bellonius*, nor the *Huso* taken in the *Danube*, from the Bladder of which Fish-glass is made, can, by the Descriptions given of them, be the same as the *Sun-Fish*.

Some Account  
of the Phoca,  
*Vitulus mari-*  
*nus*, or Sea-  
calf, by James  
Parsons, M.D.  
F. R. S. No.  
469. p. 383.  
Read Feb. 17,  
1742-3.

XVIII. The Figures given by *Aldrovandus*, *Johnston*, and others, (being Profils) lead us into two Errors: 1<sup>st</sup>, They make a Cubit in the Fore-limb, which is not visible in any Shape, from the Surface of the Body ; and, 2<sup>dly</sup>, make the posterior Parts terminate in two Fins, which on the contrary are actually webbed Feet (like those of Water-Fowl) consisting of five Toes, each having three Articulations, and ending with Nails of a darkish Colour.

The Nails of the Fore-paws are very considerable, being like the Paws of a Mole, contrived for crawling upon Land, and partly for swimming, by a narrower Web between each Toe ; but the hinder Feet are extensive Webs, serving alone to drive or row the Creature in the Waters.

*Rondeletius*, as cited by *Gesner*, blames *Aristotle* for saying this Animal has Nails ; which is strange, as that Historian is one of great Reputation ; for it has very considerable ones.

The Animal, which was a Female, died Yesterday Morning, and the *Viscera* were as follows :

The Stomachs, Intestines, Bladder, Kidneys, Ureters, *Diaphragm*, Lungs, great Blood-Vessels, and *Pudenda*, were like those of a Cow. The Hairs of the Whiskers are very horny and clear. The Spleen was 2 Feet long, 4 Inches broad, and very thin. The Liver consisted of 6 Lobes, each hanging as long and lank as the Spleen, with a very small Gall-Bladder. The Heart was long and flabby in its Contexture in general ; having a large *Foramen Ovale*, and very great *Columnæ carnosæ*.

In the lower Stomach were about 4 Pounds Weight of flinty Pebbles, sharp and angular, as if the Animal chose them of that Form for cutting the Food. I believe this may be common to all the larger Sea-Animals, as they swallow many considerable Fishes whole, that after some Maceration in the first Stomach, they may be more easily ground small by these Pebbles in the other, for the Nourishment of the Creature.

The



The *Uterus* is of the horned Kind, each *Cornu* being considerably thicker than the Body or Duct leading to them: It is very fibrous, and the Fibres seem all longitudinal with the *Uterus* and *Cornua*, making a muscular Appearance. The *Ovaria* are very large, being granulated on the Surface with the *Ova*, under a very thin Membrane; and the Opening into the Tubes leading to the *Cornua* is a great Hole. I have annexed a Drawing of this Part, as it is very particular.

The Authors necessary to be read upon this Animal, are *Aristotle*, *Pliny*, *Aldrovandus*, *Rondeletius*, *Gesner*, *Wolfgangius*, *Jobnston*.

As to the particular Figures of the Animal, that of *Aldrovandus* seems to have been taken from a stuffed Skin, having the hinder Feet like a Fish-Tail, and not at all like the Creature. *Rondeletius's* Figure has as little Truth as the former; and that given by *Gesner* in his Corollary on *Rondeletius*, is worse than any; having the Fore-parts upright like a *Sphinx*. This last Author has another Figure of the *Phoca*, which is rather like a *Lump fish*, and almost triangular: These could never convey a just Idea of the Creature to such as delight in Natural History, which, I hope, I have made some amends for in my Figure, having taken it from the living Animal with the utmost Care, and which is thought perfectly like the Creature by all who have seen both.

The Animal is viviparous, and suckles it's young by the *Mamillæ*, like Quadrupeds, and it's Flesh is carnous and muscular. This was very young, though  $7\frac{1}{2}$  Feet in Length, having scarce any Teeth, and having 4 Holes regularly placed about the Navel, as appears by the Figure, which in time become *Papillæ*.

*Fig. 44.* Represents the *Phoca* lying upon the Right Side, that the Belly and Parts of Generation may be the better observed. *A.* The Fore-feet and Breast. *B.* The *Umbilicus* and Holes of the *Mammæ*. *C.* The external Orifice of the *Vagina*, and the *Anus*. *D.* The hinder Feet, which are *webbed*. *E.* The Tail. Fig. 44.

*Fig. 45.* Shews the *Uterus* taken out and extended. *A.* The Body of the *Uterus* or *Vagina*. *B.* The *Cornua Uteri*. *C.* The Holes leading into the slender Tubes that end in the Extremities of the *Cornua*. *D.* The *Ovaria*. *E.* The Continuations of the *Peritonæum*. Fig. 45.

XIX. There are requisite for this Purpose, a Pair of Scissars, with very fine Blades, and sharp Points; small wooden Plates of the Lime-tree, or wooden Trenchers, a very fine Needle, Slips of Parchment as large as the Fishes; and Minnikin, or small Pins.

Take hold of the Fish with your Left-Hand, so as that the Belly may be towards the Hollow of your Hand, and it's Head pointed to your Breast. Then with the Needle make a Wound behind it's Head, into which introduce one of the Points of your Scissars, cutting gently from thence along to the Tail. If you would preserve the Right Side, the Scissars are to be conducted on the Left Side of the Fin. This being done from the Head to the Tail, the Scissars are to be pointed deeper

*A Method of preparing Specimens of Fish, by drying their Skins, as practised by John Frid. Gronovius, M.D. at Leyden, No. 463. p. 57. Read March 4, 1741-2.*



deeper, and the Flesh divided quite to the Back-bone. Then turn the Fish with it's Back downward, and it's Belly upward, and proceed in the same Manner, cutting with the Scissars through both Head and Jaws. Take away the Brain and Gills. The Fish then easily parts, the Intestines appear, which may be easily taken away. The Back-bones are then to be cut asunder, the Fish is to be washed, rubbed till it is dry with a Linen Cloth, and placed upon a Board, in such a Manner as that the Skin, covered with it's Scales, may lie uppermost, and all the Fins and Tail are to be expanded with Pins. Let it then be exposed to the Sun, if in Summer, or, if in Winter, to the Fire, till the Skin grows quite dry and hard, when it must be turned, and the Flesh exposed to the Sun or Fire, till it is also dry; and then the Skin may be separated from the Flesh with very little Trouble, and, being put betwixt Papers, must be pressed flat. But as a Sort of glutinous Matter, in pressing, is always forced out from betwixt the Scales and the Skin, a Piece of Parchment is to be laid under the Fish, which is easily separated from the Scales, but Paper always sticks: For this Reason it is necessary, that after an Hour or two, a fresh Piece of Parchment should be applied: And thus, in the Space of 24 Hours, the Fish is prepared.

*A Dissertation concerning the Flying Squirrel, by Ja. Theodore Klein, Sec. to the Republick of Dantzick, and F. R. S. No. 427, p. 32. Jan. &c. 1733.*

XX. 1. The flying Squirrel is mentioned by *Levinus Vincentius* \*, under the Name of *Sciurus Virginienfis volans*, without any farther Description. I have also been informed, that a Gentleman at London had a *Virginia Squirrel*, which slept the whole Winter, without ever waking, unless it was brought near to the Fire.

There is one in *Grew's Catalogue of Rarities*, p. 20, under the Name of Flying Squirrel; which the Author takes to be the same Animal that *Scaliger* † meant under the Name of *Felis volans*.

Another is mentioned by *Laxson*, in his History of *Carolina*; and another by *Gesner* ‖, under the Name of *Mus Ponticus aut Scythicus sive Sciurus volans & latus*. He saw only the dried Skin, and gave a Figure of it.

March 19, 1727. Two of this last mentioned Sort were presented alive at *Warsaw*, to King *Augustus II.* They were observed by *M. à Heucher*, his Majesty's chief Physician, who also dissected one of them which hapened to die, and favoured me with a Draught of the Body expanded, and of the Skeleton.

The same Year the Princess *Radzivil* promised to send me one alive, which I received in the Summer of 1728, by *Dr Floercke*, her chief Physician; and it is now alive.

Fig. 47, 48.

It was found in the Woods of *Kriczow*, in the Borders of *Russia*. The Inhabitants relate that these Animals live in hollow Oaks, and, wrapping themselves up in the Moss of the Birch-trees, sleep all Day;

\* *Cat. & Descript. Animalium*, 1726, p. 8. Cent. 1. No. 92.

† *Exerc.* 217. §. 9.

‖ *De Quadrup.* p. 743.

but



but get up at Night, and seek their Food. This Points out the following Method of taking them.

When the Huntsmen judge that a Squirrel is hidden in any hollow Tree, they spread their Nets over the Holes in the Trunk, and make a Fire at the Root. As soon as the Smoak gets into the Tree, the Squirrels forsake their Nest, fall into the Nets and are taken.

The natural Size of this Animal is expressed in *Fig. 46.* It is frequently smaller than the common Squirrel, and larger than the Dormouse, which frequent our Woods. Our People call the flying Squirrels, *Kings of their Family, Koenige der Grauwercke.* Fig. 46.

The Skin is very soft, and beautifully diversified with hoary and dark grey Hairs. It has large, black, prominent, beautiful Eyes, and very sharp Teeth, with which it bites severely; for most of them are very malicious. Mine is pretty gentle, and does not bite one's Finger, when one gives it any thing; but I would not advise any one to provoke it. When it does not leap, it presses it's Tail handsomely to it's Back; but when it springs, it waves it to and fro. It eats Bread made without Salt, is very fond of the fresh Tops of Birch, but does not care either for Nuts or Almonds. It makes a neat Bed of the Moss of the Birch-trees, and drawing it with wonderful Facility by it's Feet, lies as it were buried in it; and for a whole Day together does not come out of it, unless compelled by Thirst.

As for what relates to it's flying Instrument, the Skin may be expanded about a Palm from it's Sides like a Sail; and this Sail adheres to the Knees of it's hinder Legs, and is connected with the bony Articulation of the Fore-legs: and the Skin is in a manner feathered at the Extremity of that Articulation.

When it sits still, or only walks, this Articulation, being parallel with the Legs, cannot be distinguished; but as soon as the Animal makes a Leap, it is moved, and makes almost a right Angle with the Fore Leg, whence the Skin, as was said before, is expanded; tho' at the same time a strong fleshy Sinew, going thro' the whole Skin, greatly forwards the Leap.

Hence I infer, that this Animal does not properly fly, but reaches more distant Places with greater Ease than other Animals of the same Kind can leap to, and makes greater Leaps, because it can hang longer in the Air by means of it's Sails.

Compare with this Squirrel of ours the *Vespertilio admirabilis Bontii* \*. *Piso* was doubtful whether it ought to be ascribed to the Family of Bats. ' As it is of the Size of a Cat, with a thick, fleshy Belly and ' Breast, and is covered from the Neck to the Extremity of the Claws ' almost, with a continued Membrane like a Sail; and as this Sail is ' membranaceous underneath, and covered, as in the rest, with Down, ' Veins, and Fibres, but on the Outside is cloathed with a soft Furr

\* *Hist. Nat. & Med. Ind. Orient. Cap. 16. apud Pisonem, p. 68.*

‘ like



‘ like a Rabbet, composed of very soft, hoary and dark grey Hairs ;  
 ‘ also as it is destitute of those Folds by which the Wings of others  
 ‘ are contracted and extended, and is about 3 Feet long, and as much  
 ‘ broad.’

As for what *Bontius* asserts, that these wonderful Bats fly like *Wild-geese in Flocks*, I cannot bring myself to believe it, when I consider the Bulk and Structure of this Animal, but rather that they come near to our flying Squirrels, and use their Sails like ours for the same Purpose. Nor am I the more convinced by what *Bontius* affirms, *That about Evening they are seen hanging in the Air or upon Trees*. Nay I think it rather shews, that these Bats, as well as our flying Squirrels, sleep in the Day-time, and about Evening frequent the Trees, and as they leap about, look like Tumblers hanging in the Air, and when their Leap is finished, hang upon the Trees.

As for these wonderful Bats deserving the Name of *Flying Cats*, as well as our Flying Squirrels, which *Gesner* has called by that Name, I am not at all solicitous about it.

I shall only add, that I have had confirmed what *Gesner* relates from *Vincentius Beluacensis*, and *Olaus Magnus*, that the common Squirrels, when they have a Mind to cross the Water, lay a very light Piece of Wood upon the Water, and getting upon it, sail over with their Tail not erected, as he says, but in continual Motion, and not when the Wind blows, but when it is calm. This has been observed more than once by my faithful Emissary to the Islands of *Gotbland*,

— by Mr Samuel Dale,  
 N<sup>o</sup> 444. P.  
 389, Nov.  
 &c. 1736.

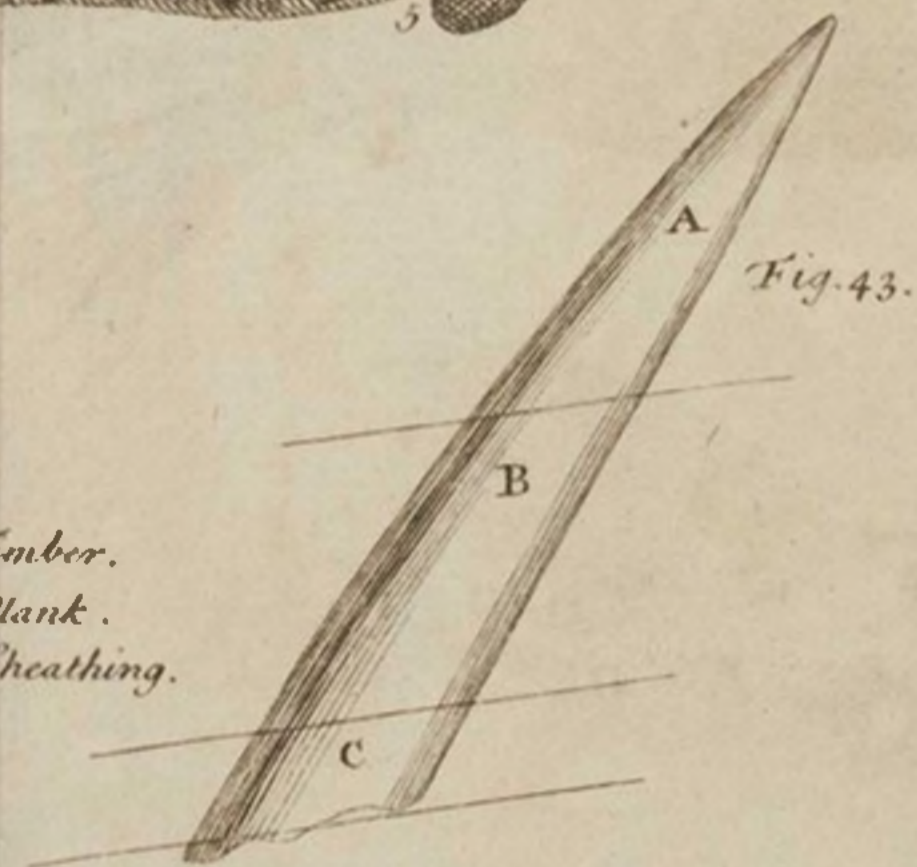
2. I find that Mr *Ray* in his *Synop. Quad.* p. 215, rather refers the *Sciurus Americanus volans*, to the *Mouse* than to the *Squirrel-kind*; because their Tails are broad and plain, and not turned over their Backs when they sit; which Mistake may perhaps arise from only seeing the Skin of one dead, when the Hair of the Tail had been eaten off by *Mites*; for in one that I did see alive, which was brought over from *Virginia*, the Tail was hairy, as in others of the *Squirrel-kind*, tho’ rather more thin, and did turn over the Back as other *Squirrels* do.

Anatomy of a  
 Female Beaver,  
 and an Account of  
 Castor found  
 in her. By  
 C. Mortimer,  
 M. D. R. S.  
 Sec. N<sup>o</sup> 430.  
 p. 172. Nov.  
 &c. 1733.

XXI. In the *Acta Erudit. Mense Aug.* 1684, p. 360, & seq. I find the Account of the Dissection of a Male and Female *Beaver* by *E. G. H.* who mistakes, in opening the Male, the Receptacles of the *Castor* for the *Uterus*, and the two Glands below them for *Dugs*; and as they found a *Penis* and *Testicles* in the same Animal, they were ready to conclude it to be an *Hermaphrodite*: But on dissecting the Female, they found a *Uterus*, with two Horns like that of *Bitches*, beside the Receptacles of the *Castor*, which I should have thought sufficient to have set our Anatomist to rights, as to the former *Beaver’s* being an *Hermaphrodite*.

*Johannes Francus*, a German Physician, hath published a Treatise called, *Castorologia explicans Castoris animalis naturam & usum Medicobchemicum*, August. Vindel. 1685, 8vo. being a Commentary on a Treatise formerly written by one *Johan. Marius*, a Physician at *Ulm*.





A The Timber.  
B The Plank.  
C The Sheathing.









*Marius* \*, describes the Receptacles of the *Castor*, as being Bags near as big as a Goose-Egg; and that they have been wrongly called the *Testicles*, being in Females as well as Males, but that they have no Communication with the *Pudenda*. His Commentator *Francus* recites the Opinions of some modern Writers, who are still in the old Error as ancient as *Ælian*, who says, that the *Beaver* bites out his own *Testicles*, when pursued by the Hunters, as if he were conscious those were the Parts his Persecutors want, and seek his Life for. He cites *Adam Zwikerus* as having this Notion, and likewise *Job. Harderus* and *Job. Schapplerus*; nay, some have thought so absurdly, as to imagine that the *Beaver* had four *Testicles*: And he says, that *Gulielmus Rondeletius* was the first Person who dissected a *Beaver* with Accuracy sufficient to refute the old Error; shewing that the *Castor* was not the *Testicles*, but peculiar Bags lying in the Groin.

*Marius* †, says, that *Beavers* are found in the *Ilera*, and the *Danube*, particularly in a small River near *Leipheim*, called the *Biber*. The Commentator saith this River hath it's Name from the vast Numbers which were formerly found thereabouts, *Biber* being *German* for a *Beaver*, but that now they are all destroyed, and none to be found in the *Danube*, except in *Austria*; that there are a few in some Rivers in *Switzerland*, in *Poland*, in *Muscovy*, in the *Volga*, in the *West-Indies*, especially in *Canada*. The greatest Quantity of *Castor*, which is brought to *England*, comes from *Maryland*, *New-England*, and *Hudson's-Bay*.

He ‖ tells a Story of a peculiar Virtue in the Fur of the *Beaver*, which he had from a *Jew*, who informed him, that by wearing on one's Head a Cap made of the Fur of the *Beaver*, and by anointing the Head once a Month with Oil of *Castor*, and taking two or three Ounces of *Castor* in a Year, one's Memory will be so strengthened, as to be able to remember every thing one reads. Though this seems to be only a superstitious Fancy, yet I mention it, because probably such a Notion might have at first brought the Use of the Flock of this Animal into Request for making Hats.

In the Memoirs of the *Academy of Sciences* at *Paris* †, is an Extract of a Letter from *M. Sarrafin*, the King's Physician in *Canada*, concerning the Anatomy of the *Beaver*, dated *Octob. 25. 1700*, at *Quebec*. He says, the largest are 3 or 4 Feet long, and about a Foot or 15 Inches broad in the Chest, and in the Hanches; that they commonly weigh about 50 Pounds; and they usually live to the Age of 20 Years; but *Francus* says, they live 30 or 40 Years, and that he heard of a tame one being kept 78 Years: Perhaps the *European* may generally be longer liv'd than the *American*. Dr *Sarrafin* says farther, that a great Way North these Animals are

\* *Seç. VII.*† *Seç. IX.*‖ *Seç. XI.*† *An. 1704. p. 48, & seq.*



very black, though there are some white ones to be seen; those in *Canada* are commonly brown, but their Colour grows lighter, as they are found in more temperate Countries; for they are yellow, and even almost of a Straw colour in the Country of the *Illinois* and *Chaouanons*. Our Author then gives a very particular Account of the several Parts External and Internal of this Animal: He takes especial Notice of the Stomach, which, he says, is above a Foot long, and about 4 Inches broad in the Part next to the Spleen; that at about  $\frac{2}{3}$  of it's Length, it is contracted to half it's former Capacity for an Inch in Length; that then it widens again to 3 Inches towards the *Pylorus*, which is raised very high, is round, and drawn towards the *Spleen* by a Membrane which adheres to the *Œsophagus* by it's other End. Tho' this Dilatation seems to make a second Stomach, it only serves to retain the Aliments a longer time, especially the more solid, as the Wood which only undergoes a slight Extraction, passing thro' with very little Alteration, whereas Herbs, Fruits, and Roots are perfectly dissolved. The Membranes of the Stomach are very thin, so that this second Part will scarce bear being distended with Wind.

In a *Beaver* full grown the *Cæcum*, which is in Form of a Sickle, is 18 Inches long on the hollow Side, and 30 Inches on the round Side, and 4 Inches broad at the larger End, and will contain between 5 and 6 Pints of Water.

When he describes the Receptacles of the *Castor*, he says that the uppermost Bags contain a soft resinous Matter, but that the lower ones are filled with an oily Matter; the greatest Bags weigh but two Ounces.

Dr *Sarrasin* says, that he was never able to discover what use this *Castor* was of to the *Beavers* themselves, being well assured that they do not themselves swallow it to excite their own Appetite. It is likewise false, that the Hunters use it as a Bait to draw the *Beavers* into their Toils, though they do use it to entice those Animals which infest the *Beavers*, as Martins, Foxes, Bears, &c.

Our Author having finished the Anatomical Description of this Animal, subjoins several things regarding their manner of living, as that they choose a low level Ground watered with a small Rivulet, that it may be easily overflowed, which they do by making Damms a-cross it; They make these Damms by thrusting down Stakes of 5 or 6 Feet long, and as thick as one's Arm, pretty deep into the Ground; these they will wattle a-cross with tender pliable Boughs, and fill up the Spaces with Clay, making a Slope on the Side against which the Water presses, but leaving the other perpendicular. They make their Houses after the same manner; the Walls are upright, 2 Foot thick, and at Top in Form of a Dome; they are usually oval, 5 or 6 Feet long on the Inside and near as broad; being sufficient to lodge 8 or 10 *Beavers*, and 2 or 3 Stories high, which they inhabit as the Water rises or falls.

Sometimes



Sometimes they build several Houses near together, which communicate with one another. He says there are some *Beavers* called *Terriers*, which burrow in the Earth: They begin their Hole at such a Depth under Water as they know that the Water will not freeze so deep; this they carry on for 5 or 6 Feet, and but just large enough for them to creep through; then they make a Bathing-Place 3 or 4 Feet every Way; from whence they continue the Burrow, always ascending by Stories, that they may lodge dry as the Waters rise; Some of these Burrows have been found to be 100 Feet long. They cover the Places where they lie with Weeds; and in Winter they make Chips of Wood, which serve them for Matelas's: They live on Herbs, Fruits, and Roots in Summer, but against Winter they lay up a Provision of Wood, a Stack of 25 or 30 Feet Square, and 8 or 10 high, is the usual Quantity for 8 or 10 *Beavers*: They only eat those Pieces which are soaked in the Water. The above-cited *Marius* says, they only live on such Vegetable Food; but his Commentator *Francus*\* says that they prey upon Fish, Cray-fish, and Frogs likewise, as do *Otters*: And that they make Burrows in the Banks of the Rivers, opening under the Water.

In the *Memoires pour servir à l'Histoire Naturelle des Animaux*, composed by Order of *Lewis XIV*, printed at *Paris* 1671, in *Folio* †, I find an Anatomical Description of a *Beaver*, with a Plate, in which are represented some of the most remarkable Parts, as the Brain, the Fore-foot, the *Intestinum Cæcum*, and the Parts of Generation of a Male *Beaver*, with the Receptacles of the *Castor* delineated in their natural Situation ||. Our Author says, that the real Testicles resemble those of Dogs; that they lie close to the *Os Pubis*, on the outward Part of the Sides, and that they are not at all discernible thro' the Skin. The *Penis* had a sharp-pointed Bone, in it's Extremity, like that of a Dog; but instead of lying with it's Point towards the Navel of the Creature, it lay with it towards the Tail, and was so deep buried in the *Fissure*, which serves in common for the *Anus*, for the *Penis*, and the *Excretory Ducts* of the *Castor*, that they could not distinguish what Sex the *Beaver* was of, 'till the Skin was taken off.

Our Author says, that in opening the *Intestines* they found in them 8 large Worms resembling common Earth-Worms, 3 of which were 7 or 8 Inches long, the rest only 4.

In the Heart were the plain Footsteps of the *Foramen Ovale*.

A little below the *Coronary-Vein*, he mentions a *Valve*, which he says is called *Valvula nobilis*, and closes the whole *Vena Cava*, but opens so that the Blood can flow readily from the *Liver* towards the *Heart*, and not from the *Heart* back again towards the *Liver*.

This Author says, that the *Brain* was but  $1 \frac{2}{3}$  Inch long, and  $1 \frac{1}{2}$  broad, which was very small in Proportion to the Size of the Creature

\* *Ad Sect.* IV.† *Pag.* 64, & *seq.*|| *Pag.* 69.



and still more so in Proportion to the Sagacity with which it is said he is endowed.

These are the most remarkable Particulars I met with in reading over the above-mentioned Books. I shall now add only such as they have passed over, or what especially regard the Sex of this Female *Beaver*.

This Creature was kept in Sir *Hans Sloane's* Garden, for about 3 Months. She was but about half grown, not being above 22 Inches long from the Nose to the Root of the Tail; the Tail 8 Inches long. She was very thick, paunch-bellied; the Shape of the Head, and indeed of the whole Animal, except the Tail, and Hind-feet, very much resembled a great over-grown Water-Rat.

Her Food was Bread and Water; some Willow-Boughs were given her, of which she eat but little; but when she was loose in the Garden, she seemed to like the Vines much, having gnawn several of them as high as she could reach quite down to the Roots: She gnawed the *Jeffamy* likewise, but least of all some Holly Trees. I am told that in *Carolina* they particularly love the *Sassafras*, and will cut down Trees of between 2 and 3 Feet Diameter. She was turned into a Fountain with some live Flounders, but never offered to strike at them, as an *Otter* would have done. When she eat, she always sat on her hind Legs, and held the Bread in her Paws like a Squirrel. When she slept she commonly lay upon her Belly, with her Tail under her. In swimming she held her Fore-feet close up under her Throat, and the Claws closed, as when one brings the Ends of one's Thumb and of all the Fingers close together, never moving her Fore-feet 'till she came to the Side, and endeavoured to get out. She swam with her Hind-feet only, which had 5 Toes, and were webbed like those of a Goose; the Tail, which was scaly, and in Form of the Blade of an Oar, served as a Rudder, with which she steered herself, especially when she swam under Water, which she would do for 2 or 3 Minutes, and then come up to vent, sometimes raising her Nostrils only above Water: She swam much swifter than any Water-Fowl, moving under Water as swift, I believe, as a Carp. The Hind-Legs being much longer than the Fore, made her walk but slowly, or rather waddle like a Duck when on dry Land; and if drove along fast, she could not run, but went by Jumps, flapping her Tail against the Ground. Her Excrements were always black and extraordinary fetid; her Urine turbid and whitish, and very strong scented. I never heard her make any Noise, except a little sort of a grunting, when driven fast and angred. She seemed very brisk, and thrived well with the above-mentioned Food, being turned into the Fountain to bath 3 or 4 times a Week; but the Author of the *Memoires* &c. above-cited, says, that the Male *Beaver* they dissected, had lived several Years at *Versailles* without being permitted to go into the Water. Our *Beaver* had one Day Convulsion Fits, very like the Epilepsy in Men, from which she recovered soon, and was very well after them,

'till



'till at last she was killed by a Dog; when she was so torn, that we could see nothing Particular in the *Heart*, or in the *Lungs*. In the *Abdomen* the *Liver* and *Kidnies* were quite torn a-pieces. There were several Holes bit through the *Stomach*, out of one of which crawled a Worm about 6 or 7 Inches long, like a common Earth-Worm, being probably of the same Sort as those mentioned before by the Author of the *Memoires*, &c. The *Bowels* in general seemed very much to resemble those of Dogs, except the *Intestinum Cæcum*, which was of that prodigious Size as is above-mentioned. This Creature being a Female, we found the *Ovaria* and the *Uterus* divided into two Horns, in the same Situation as in Bitches: The *Bladder* was contracted about the Size of a Walnut, very much wrinkled on the outside; it lay exactly over the Body of the *Uterus*; the *Meatus Urinarius* ran upon the *Vagina* above 2 Inches in Length. Just below the *Os Pubis*, on each Side of the *Vagina*, and above the *Meatus Urinarius* (supposing the Animal to lie on her Back, as when we opened her) we found a Pair of Bags in Form of Pears, about an Inch and three quarters long, and one Inch broad, diverging at their Bottoms, or broad Ends, but joined almost close together at their Necks, or narrow Ends, which were Canals communicating with the adjoining *Glands*. The *Membranes* which formed these Bags were very tough, full of Wrinkles and Furrows, and of a livid dirty Colour; they were hollow, and able to contain about an Ounce of Water. Upon opening one of them, we found a small Quantity of a dark brown Liquor like Tar, of the Consistence of a thick Syrup, which smelt exactly like *Castor*, and had a Sort of Pungency like Spirit of Hart's-horn, which the dried *Castor* doth not retain. It is very probable that the Youth of our Animal was the Reason why these Bags were not full; and that the *Castor* itself was not of that soft resinous Consistence as mentioned by Dr *Sarrazin* \*. These must be the Bags mistaken in the *Act. Eruditor.* for the *Uterus*. About one Inch lower were situated a Pair of *Glandular* Bodies, one on each Side the *Vagina*, about  $1\frac{1}{2}$  Inch in Length, and  $\frac{1}{2}$  an Inch in Breadth: They were of an oblong irregular Shape, of a pale Flesh-colour, like the *Pancreas*, or other *Glands*, and having several Protuberances outwardly. These *Glands* seem to communicate with the above-described Bags, the Canals coming down from them being implanted into the *Glands*, and both the *Bag* and *Gland* on each Side hath but one Orifice, which is black, beset with long black Hairs, and opens into the lower Part of the *Rima*, or great *Fissure*, into which likewise open the *Vagina* and the *Anus*. From the Structure of these *Glands*, and their Connection with the Bags, I conclude, that the *Castor* is secreted in these *Glands*, where it is fluid like Oil, light coloured, and hardly having any Smell; that it runs down into the Bags, which serve as Receptacles to collect a large Quantity together for the Use of the

\* *Loc. citat.*



*Beaver*, and that in these Receptacles it loses it's thinner Parts, becomes more inspissate, of an higher Colour, and of a stronger Scent, much in the same manner as the *Gall* in the *Gall-Bladder*, which there becomes so different from what it was in the *Liver*.

It is certain that Ducks, Geese, and all sorts of Water-Fowl, have a *Gland* in their Rump, from which they express with their Bill an oily Matter, and with it anoint or dress their Feathers, to prevent their being soaked by the water in which they swim; and the *Glands* of that large Sort of Duck commonly called the *Muscovy-Duck*, or more properly the *Musk-Duck*, afford such an Oil, as sweet-scented as *Civet*: I therefore think it probable, as the *Beaver* is an Animal, which frequents the Water as much as those Water-Fowls, that the *Castor* is a Substance provided by Nature for him to grease and anoint his Fur with, to prevent the Water from soaking quite to his Skin; and as the *Castor* is impregnated with penetrating pungent Particles, it may likewise contribute to keep off the Cold and Chill which the Water might otherwise strike to his Body, by remaining a long time in it.

As none of the Authors I have met with have given any Delineation of the Parts of Generation, or of the Receptacles of the *Castor* in a Female *Beaver*, I have drawn them after Nature, as they are represented in the Figure.

Fig. 49.

A. The two *Ureters*. B B. The *Ovaria*. C. The *Uterus* lying under the *Bladder*. D. The *Bladder*, contracted and empty of *Urine*. E. The *Meatus Urinarius*, above 2 Inches long. F F. The *Receptacles*, containing the *Castor*. G G. The two *Glandules*, which open by one common Orifice, with the *Receptacles*, at H H. the Orifices of the *Castor-Ducts*. I The *Vagina* cut off. K. The *Anus*. L. Part of the *Tail*.

Descriptions of  
the Moose-  
Deer of New-  
England, and  
a sort of Stag  
in Virginia; by  
Mr Samuel  
Dale. No.  
444. P. 384.  
Nov. & Dec.  
1736.

XXII. 1. This Animal hath been mentioned by several Authors, but their Accounts have generally been so very imperfect, that little Satisfaction hath thereby been given to the curious Enquirers after Natural History. The first Mention that I find of this *Moose-Deer* is by Mr *Josselyn*, in a little Tract called *New-England Rarities*, where\* that Author writes, *That 'tis a goodly Creature, some of which being 12 Foot high, their Horns exceeding fair, with broad Palms, some being 2 Fathoms from the Tip of one Horn to the other.* Much to the same purpose is the Account he gives of this Animal in another Book of his, called *Two Voyages to New-England* †, in which he saith, that *The Moose, or Elke, is a Creature or rather a Monster of Superfluity, when full grown, being many times bigger than an English Ox.* What *Neal* in his *History of New-England* ††, hath of this Animal, called by him the *Mose*, is copied from the aforesaid *Josselyn*. The best and fullest Account of this Animal was sent by the Hon. *Paul Dudley*, Esq; F. R. S: This is published in the *Philos. Trans.* \*\* where he makes them to be of

\* Pag. 19.

† Pag. 88.

‡ Vol. II. p. 573.

\*\* See Vol. VII.

Part iii. chap. 1. §. 18.



two Sorts, viz. The common light grey Moose, called by the Indians, *Wampoose*; and the large or black-Moose, which is the Beast whose Horns I herewith present\*. As to the grey Moose, I take it to be no other than what Mr John Clayton, in his Account of the *Virginian Quadrupedes* †, calls the *Elke*; which Beast by the *Parisians*, in their *Memoirs for a Natural History of Animals*, englished by Mr Pitfield ††, is called by the Name of the *Stag of Canada*, of which I have seen a single Horn, sent by Mr Mark Catesby from *Virginia*, by the Name of an *Elk's-horn*, and was in all respects like those of our *red Deer* or *Stags*, only larger, weighing about 12 Pounds *Haverdupoize*, and from the Burr to the Tip, measured by a String, about 6 Foot high. Mr Dudley writes, that his *grey Moose* is most like to the ordinary *Deer*; that they spring like them, and herd together sometimes to 30 in a Company: But whether he means by that Term the *Red*, the *Virginian*, or the *Fallow-Deer*, is uncertain, he having said nothing of their *Horns*, which was needful to distinguish them. The *black Moose* is (by all that have hitherto writ of it) accounted a very large Creature. Mr Josselyn (as I before mentioned) makes it many times bigger than an *Ox*; and Mr Dudley writes, that the Hunters have found a *Buck* or *Stag-Moose* 14 Spans in Height from the Withers, which at 9 Inches to the Span, is 10  $\frac{1}{2}$  Feet; and that a *Doe* or *Hind* of the fourth Year, killed by a Gentleman near *Boston*, wanted but one Inch of 7 Feet in Height. The *Stag*, *Buck*, or *Male* of this kind, hath a *palmed Horn*, not like that of our common or *Fallow-Deer*, but the *Palm* is much longer, and more like to that of the *German Elke*, from which it differs, in that the *Moose* hath a branched *Brow-Antler* between the Burr and the *Palm*, which the *German Elke* hath not.

Nor doth the *Horn* of this *New-England black Moose* agree in Figure with either of those mentioned in the *Philos. Trans.* \*\* to be found *Fossil* in *Ireland*, the last of which, Mr Kelly writes, that for want of another Name they called them *Elks-Horns*. I suspect that those *Horns* which the late Reverend and Learned Mr Ray mentions in his *Synopsis Method. Animal. Quadrup.* to have seen with one Mr Holney, an Apothecary of *Lewis* in *Suffex*, as likewise in divers *Museums*, were not the

\* The Dimensions of these Horns, are as follow.

Fig. 50, 51

	Inches.				Inches.		
Fig. 50.	A	B	56	Fig. 51.	a	b	11
	C	A	34		a	cb	20
	C	E	31		a	d	12 $\frac{1}{2}$
	C	D	34		d	f	12 $\frac{1}{2}$
	D	H	30		d	e	11
	F	G	9 $\frac{1}{2}$		g	h	2 $\frac{3}{4}$
	F	I	14				
	K	L	7				

† See Vol. VIII. Part ii. chap. 3. §. 19.  
chap. 3. §. 36. & Vol. VI. Part ii. chap. 3. §. 16.

‡ Pag. 167.

\*\* See Vol. II.





Horns of this *black* or *American Moose*, but of the *German Elke*, because that inquisitive Gentleman takes no Notice of any *Brow-Antlers* that they had; which, I think, was too notorious to have escaped his Observation, had there been any such.

Concerning the Number of young ones, or *Calves*, which the *Moose* brings forth at a time, Authors vary; for Mr *Dudley* saith, that they bring forth but two; but *Josselyn* in his *Two Voyages* †, and from him *Neal*, that they are three, and that they do not go so long pregnant as our *Hinds* by 2 Months. What these two last mentioned Authors write concerning their calving their *Calves* a Mile distant from each other, doth not seem to me probable. Nor do I find that *Neal*, in his Description of this Beast, makes any Mention of their having a long Tail, tho' so charged to do by Mr *Dudley*, who likewise omits the *Brow-Antlers* in his Description of their *Horns*.

There is another Beast of the *Deer-kind*, which, tho' very common in *Virginia*, and without doubt in other of the northern Provinces of *America*, yet I think it is not described by any Author; Mr *Beverly*, in his *Present State of Virginia*, mentions both *Elke* and *Deer* in that Country, but doth not describe either: But by what I have received from Mr *Catesby*, the first should be the *Canada-Stag*, and the other the *Deer* I have here mentioned. Mr *Clayton* likewise mentions the *Elke*, which he saith are beyond the inhabited Parts, and are the same with Mr *Beverly's*; as also the *Deer*, of which he saith there are Abundance, yet doth not describe them, but calls them *Red-Deer*, tho' they are not the same as we here call by that Name, but of those which follow. Mr *Neal* likewise mentions *Deer* in *New-England*, but gives only the Name, which being general, nothing can be inferred from it.

That which I take for the undescribed *Deer*, is a Beast of the *Stag-kind*, having round Horns like them, not spreading out as in the *Stag* or *Red-Deer*, but meeting nearer together at their Tips, and bending forward over the Face of the Animal; the *Brow-Antlers* likewise are not crooked and standing forward, but strait and upright. The Skin of this *Deer* is of a sandy Colour, with some black Hairs intermixed, and spotted all over, while young, with white Spots, like some Sorts of our *Fallow-Deer*, being also about the Bigness of them when fully grown. The *Dama Virginiana Raii* ‖, which was formerly in *St James's Park*, seems to be different from this, if Mr *Willoughby* was not led into a Mistake in taking it be of the *Palmate-kind*, by only seeing it when the Horns were shed. Perhaps this last of Mr *Ray* may be the *Maurouse* of *Josselyn's Voyages* \*, which, he saith, is like the *Moose*, but his Horns are but small, and the Beast about the Size of a *Stag*; but his Description is too short to be satisfactory.

There are other Sorts of *Deer* mentioned by Mr *Josselyn* in his last quoted Book †, as Inhabitants of that Country, as the *Buck*, *Stag*, and

Fig 51.

† Pag. 89.

‖ *Synsp. Animal. Quad.* p. 86.

\* Pag. 91.

† Pag. 87.  
Rein-



*Rein-Deer*; but whether they are the same with those called by the same Names in *Europe*, I cannot determine, the Descriptions of them being omitted. He mentions likewise, for another Sort of *American-Deer*, an Animal called a *Maccarib*, *Caribo* or *Pobano*; but by the Account he gives, it seems to be a Fiction, no such Animal being, I believe, in *Rerum Natura*.

2. As to the large Horns found *Fossil* in *Ireland*, I have taken particular Notice, (in several I have seen) beside the main Horns being palmated, that the Brow-Antlers are likewise palmated; which is a Circumstance peculiar to the *Rein-Deer* Species, being of great Service to them in removing the Snow, in order to get at the Grass or Moss underneath, which is their chief Subsistence in *Lapland*.

XXIII. In the Year 1728, I was busied in endeavouring to prove, that the extraordinary large Teeth and Bones found under Ground, and digged up in several Places of *Siberia*, by the Name of *Mammoth's*, or *Mammut's*, Teeth and Bones, were, 1. True Bones and Teeth of some large Animals once living; and, 2. That those Animals were *Elephants*, by the Analogy of the Teeth and Bones with the known ones of *Elephants*. 3. That they were brought and left there by the universal Deluge. I made likewise several useful Inferences about this Matter.

At the same time there flourished in our City a Society of some learned and ingenious Gentlemen, who met once a Week in a certain Place: In one of those Meetings in the Month of *March*, I had the Honour to read and communicate my Thoughts and Observations about this Subject; which I have here translated into the *English* Tongue.

After that, in the Year 1730, Dr *Messerschmidt* returned to *Dantzick*, from his Travels through *Siberia*, and was pleased to communicate to me some curious Draughts of a Part of a Skeleton, to wit, of a very large Skull, *Dens exsertus & molaris*, with the *Os femoris*, belonging to the Animal commonly called *Mammoth* found in *Siberia*; by which our Assertion, that the Teeth and Bones, called in *Russland* *Mammoth's* Bones, are the true Teeth and Bones of *Elephants*, is, if I am not mistaken, demonstrated beyond all Doubt. Dantz. 28 Sept. 1735.

Dr *Daniel Gottlieb Messerschmidt*, who was sent some Years ago, by his late *Czarish* Majesty, *Peter the Great*, into *Siberia*, to search after the Products of Nature in this uninhabited and cold Country, was pleased to send me in the Year 1722, amongst some other Samples of Natural Things out of *Siberia*, two very large Teeth, called there, *Mammoth* or *Mammut's* Teeth, with the following Inscription: *Dens molaris, ut videtur, diluvianus, Belluæ cujusdam hæcenus incognitæ, nisi pro Elephantino habendus sit, cujus jam penes te esto arbitrium, Russis Mammoth, repertus in montium altissimis jugis ad Thomam fluvium. Alterum est frustum aliud Eboris Denti exerto Elephantis non absimile, ab aliis repertum in Thomæ Montibus.*

After I had made an accurate and nice Examination of them, I thought it worth my Pains, to shew you the same here.

A Remark by C. Mortimer, R. S. see *ibid.* p. 319.

Observations, and a Description of some Mammoth's Bones dug up in Siberia, proving them to have belonged to Elephants, by John Phil. Breyne, M. D. F. R. S. N<sup>o</sup> 446. p. 124. July, &c. 1737.

Observations on the Mammoth's Bones and Teeth found in Siberia: Read in a Meeting of some learned Gentlemen at Dantzick, in the Year 1728, by J. P. E.





One is a *Dens Molaris*, or Grinder, a Foot broad,  $\frac{1}{2}$  Foot long, and 3 Inches thick, weighing 8 lb and  $\frac{3}{4}$  lb. pretty entire, except that it is broken in two Pieces, and the Extremities of the Roots spoiled. The Substance is between that of a Bone and Stone, except that on the upper Part of the Outside some parallel undulated Lines appear, which have still preserved the Enamel of the Tooth.

The other is a Piece of a *Dens exertus*, 8 Inches long and 3 Inches thick, of 1 Pound and 6 Ounces Weight; in some Places not different from Ivory, but in others calcined like the common *Unicornu Fossile*.

What *Ysbrand Ides* † mentioneth of the *Mammoth's* Teeth and Bones, deserves to be looked at; as also the Journal of *Laurens Lange's* Journey to *China* †, and the Remarks of Capt. *John Bernard Muller* \*.

Those abovementioned, as far as I know, are the chief Authors which have treated of the *Mammoth's* Teeth and Bones, as a very remarkable and particular Curiosity of *Siberia*.

It would not be worth while, nor our Pains, to detain you with the Refutation of some partly merely fabulous Opinions, quoted by the said Authors, about the Origin of those Teeth and Bones: Therefore I design only to pick out of the Testimonies of Matters of Fact of the foresaid Authors, the following points to my Purpose:

1. That those Teeth and Bones are found in *Siberia*, chiefly in the Northern Parts, near the Rivers *Jenizea*, *Trugau*, *Mongam-Sea*, *Lena*, &c. towards the icy Sea; at the Time when the Ice has broken the Banks of those Rivers, so that Part of the adjacent Mountains do fall down; and that they are found in such Quantity as is sufficient for Trade, and to make a Monopoly for the *Czar* \*\*.

2. That some Skeletons of this Kind are found very near complete.

3. That those Teeth and Bones are not found always of the same Size, but sometimes very large; as *Dentes molares*, or Grinders, of 20 or 24 Pound Weight †, and *Dentes exerti*, two of which weighed 400 Pound ||; sometimes of a middle Size, as mine above-mentioned, and at other times still smaller.

4. That of those Teeth, *viz.* *Dentes exerti*, some are used as Ivory, to make Combs, Boxes, and such other Things. Capt. *Muller* saith |||, that it in every thing resembles the common Ivory, being but a little more brittle, and easily turning yellow by Weather or Heat.

Out of these quoted Remarks joined to ocular Inspection, I think I may advance three Things.

I. That those *Mammoth's* Teeth and Bones are truly natural Teeth and Bones, belonging heretofore to very large living Animals; because they have not only the external Figures and Proportions, but also the

† In his Travels from *Mosco* to *China*. †\* To be found in the *Present State of Russia*. \*\* *Vid. The Present State of Russia*. † Capt. *Muller loc. cit.* || *Ysbrand Ides, loc. cit.* ||| *Vid. Ysbrand Ides, and Capt. Muller, loc. cit.*



internal Structure analogous to natural Teeth and Bones of Animals.

II. That those large Animals have been *Elephants*; which appears by the Figure, Structure, and Bigness of the Teeth, which do accurately agree with the Grinders and Tusks of *Elephants*.

To be convinced hereof, one needs but to compare these Teeth with the Figures of those which some Years ago were digged up in *Ireland*, and those which represent the very natural Teeth of *Elephants*, and consider the accurate Remarks made by *Dr Molineux* and other curious Fellows of the *Royal Society* thereon.

Nor needs any body to doubt, that they are true Teeth of *Elephants*; from the uncommon Size of the *Mammoth's* Teeth before-mentioned; because *Vertomannus*, as the famous *Mr John Ray* tells us, has seen in *Sumatra* a Pair of *Elephant's* Tusks of 336 Pound Weight; and *Terzagus*, in *Museo Septaliano*, makes Mention of one 2 Yards long, and 160 Pound Weight.

III. That those Teeth and Bones of *Elephants* were brought thither by no other Means but those of a Deluge, by Waves and Winds, and left behind after the Waters returned into their Reservoirs, and were buried in the Earth, even near to the Tops of high Mountains. And because we know nothing of any particular extraordinary Deluge in those Countries, but of the universal Deluge of *Noah*, which we find described by *Moses*; I think it more than probable, that we ought to refer this strange *Phænomenon* to the said Deluge. In such Manner, not only the holy Scripture may serve to prove Natural History; but the Truth of the Scripture, which says that *Noah's* Flood was universal, a thing which is doubted by many, may be proved again by Natural History.

Here I must take Notice, that such Teeth and Bones also are to be found in several other Countries besides *Siberia*, as *Poland*, *Germany*, *Italy*, *England*, *Ireland*, and many others; but less common than in *Siberia*, and not so well preserved, but more wasted and calcined, without doubt by the greater Warmth of those Climates.

Hither are also be referred the large Bones found under Ground, or rather Tusks of *Elephants*, known by the Names of *Ebur, seu Unicornu fossile*, which are of the same Origin with the *Mammoth's* Teeth, but different, as they are better preserved, and therefore, for a great Part, have still the natural bony Substance, and may serve the Workmen as natural Ivory, and in some measure the Physicians and Apothecaries as *Ebur, seu Unicornu fossile*.

Fig. 52. A Front View of the Head. It weighs 130 lb 3ij. 3v. 3j. Apothecaries Weight, or 152 Russian Pounds. It's Length or greatest Height is 48 Inches. It's greatest Breadth near the Ears, 29 Inches, 5 Lines. It's Thickness from the Forehead to the Nape of Neck, 22 Inches, 5 Lines. *a a.* The *Os frontis*. *b b.* The *Sutura sagittalis*, hardly to be discerned. *c.* The bony *Septum Nasi*, or the

An Explanation of the Draughts of the above-mentioned Antediluvian Bones of an Animal commonly called, The Mam.



moth of Siberia ; or of the Bones of the fossil Skeleton of an Elephant ; done to the ancient Roman Scale contracted, and exhibited in six Figures.  
Translated from the Latin by T. S. M.D. F. R. S.  
Fig. 52.

external Process of the *Os ethmoides*, without it's Fellow. *dd*. The Coronal Suture appearing imperfect. *ee*. The *Ossa Sincipitis*. *ff*. The *Sutura squamosa* of the Temples. *gg*. The *Sutura lambdoidea* of the *Osciput*. *b*. The external *Processus zygomaticus* of the *Os temporum*. *i*. The posterior lateral, or zygomatic Process of the *Os male* (or Cheek-bone). *k*. The upper Process of the *Os male*, joined with the outer Process of the *Os frontis*, and constituting a Part of the Orbit of the Eye. *l*. The outer Process of the *Os frontis*, forming the upper Part of the Orbit. *m*. The anterior Process of the *Os male*, joined with the *Os maxillare*. *nn*. The anterior Process of the *Os maxillare*, forming the Sockets of the foremost Teeth. *oo*. The lower lateral Process of the *Os maxillare*, constituting the Sockets of the Grinders. *p*. A Grinder in it's Socket, one on each Side. *q*. A surprizing Cavity of the Nose, stretching above the Palate, through which, by means of it's *Proboscis*, the Water, upon drinking, is conveyed to the Throat, in the Manner peculiar to the *Elephant*.

Fig. 53.

Fig. 53. A View of the Right Side of the Head.

*a*. The round Process of the *Os occipitis*, entering into the *Pelvis Atlantis*. *bb*. The occipital Bone of a monstrous Size. *cc*. The Lambdoidal Suture. *d*. The *Os petrosum* with the *Meatus auditorius*. *e*. The outer zygomatic Process of the Temple-bone. *f*. The *Sutura squamosa* of the Temple-bone. *g*. The *Os Sincipitis*. *h*. The outer Process of the *Os frontis*, forming the upper Part of the Orbit, *i*. The Bottom of the Orbit. *k*. The Hole of the optic and pathetic Nerves, pointed to by a prick'd Line. *l*. The upper Process of the *Os male*, joined with the outer Process of the *Os frontis*, constituting Part of the Orbit. *m*. The anterior Process of the same *Os male*, joined with the *Os maxillare*. *n*. The posterior lateral or zygomatic Process of the same *Os male*. *o*. Another zygomatic Process of the same *Os male*, peculiar to this Skeleton. *p*. A Hole near the foregoing Process. *Quære*, If to let a Nerve pass to the Teeth? *qq*. The anterior Process of the *Os maxillare*, constituting the Sockets of the Fore Teeth. *rr*. The inferior lateral Process of the *Os maxillare*, supporting the Socket of an upper Grinder. *ss*. A Grinder fast in it's Socket, one on each Side ; which is no small Argument that this Skeleton belongs to an *Elephant*, and not to the chimerical *Behemoth* of the *Rabbins* ; or the *Behæmaeth* supposed different from the *Elephant* ; of which *Buxtorf*, the learned *Bockart*, and others have treated.

Fig. 54.

Fig. 54. gives the back View of the same Head.

*a*. The great Hole of the Occipital Bone, for the Passage of the *Medulla oblongata* to the Spine. *bb*. The *Processus globosi* of the Occipital



cipital Bone covered with a Cartilage, entering into the *Pelvis Atlantis*. *c*. The *Os sphenoides* (*cuneiforme*, or *basilare*). *d*. A peculiar and very remarkable *Sinus* of the Occipital Bone, deeper than an *Ostrich's* Egg, serving, in all Appearance, for the Insertion of the Muscles of the Neck. *e e*. The outer Surface of the Occipital Bone entire. *ff*. The Surface of the same Occipital Bone broken through, exhibiting deep winding Cells running on every Side. *g*. The *Os petrosum*, with the *Meatus auditorius*. *h*. *Quære*, If this be the Place behind the Ears, wherein *Elephants* are wont to be killed, and here damaged by the Knife? *i*. The outer zygomatick Process of the Temple-bone. *k*. The outer Process of the Frontal-bone, constituting the upper Part of the Orbit (of the Eye). *l*. The Bottom of the Orbit, and the Hole that gives Passage to the optic and pathetic Nerves, mark'd by a small Line. *m*. The upper Process of the *Os malæ* join'd with the Process of the *Os frontis*, and making up a Part of the Orbit. *n*. The posterior lateral or zygomatic Process of the *Os malæ*. *o*. Another zygomatic Process of the same *Os malæ*, peculiar to this Skeleton. *p*. The lower lateral Process of the *Os maxillare*, supporting the Socket of an upper Grinder. *q*. The transverse Process of the Maxillary-bone, or the greater *Os palati*, which is very short in the Skeleton of an *Elephant*; whose Tongue is scarce longer than a Man's Hand: Which leaves no room to doubt but this must be the Skeleton of an *Elephant*. *rr*. The upper Grinders, one on each Side, to which their Opposites answer in the lower Jaw: And as the *Elephant's* Grinders are commonly four in Number, this Circumstance is another Proof of our Opinion. *s*. The Passage from the Nostrils into the Proboscis, and ending in the *Fauces*, with the *Os vomer* very visible: though ill drawn by the Neglect of the Painter. *tt*. The anterior Process of the *Os maxillare*, constituting the Sockets of the Fore-teeth, which are to be expressed in *Fig. 57*.

*Fig. 55*. A Grinder, which seems to be the Left one of the lower Jaw, seen on the Outside. It weighs viij ℥. ʒix. ʒij. Apothecaries Weight, or 10 Pound *Russian*. *Fig. 55.*

It's greatest Length 12 Inches. It's perpendicular Height 5 Inches. It's Thickness, or Breadth, 3 Inches. 'Tis made up of above 20 transverse *Lamellæ*, a Finger thick, perpendicularly erect, lying close to one another, and it's Root composed of two Apophyses. *aa*. The plane Surface of the exerted Part of the Grinder, scarce making half the Length of the Tooth, contrary to what is observed in the Grinders of the upper Jaw. *bb*. The Ends of the transverse *Lamellæ*, terminating in the Surface of the exerted Part, and here of the Hardness of Stone. *cc*. The anterior *Lamellæ*, not extending to the exerted Part, and, perhaps, lying hid either in the Socket of the *Os maxillare*, or under the Gums. *d*. The anterior *Apophysis* or Root of the Tooth, not quite



entire. *e.* The posterior *Apophysis* or Root, broken as the foregoing. *f.* A deep *Sinus* between the two *Apophyses*.

Fig. 56.

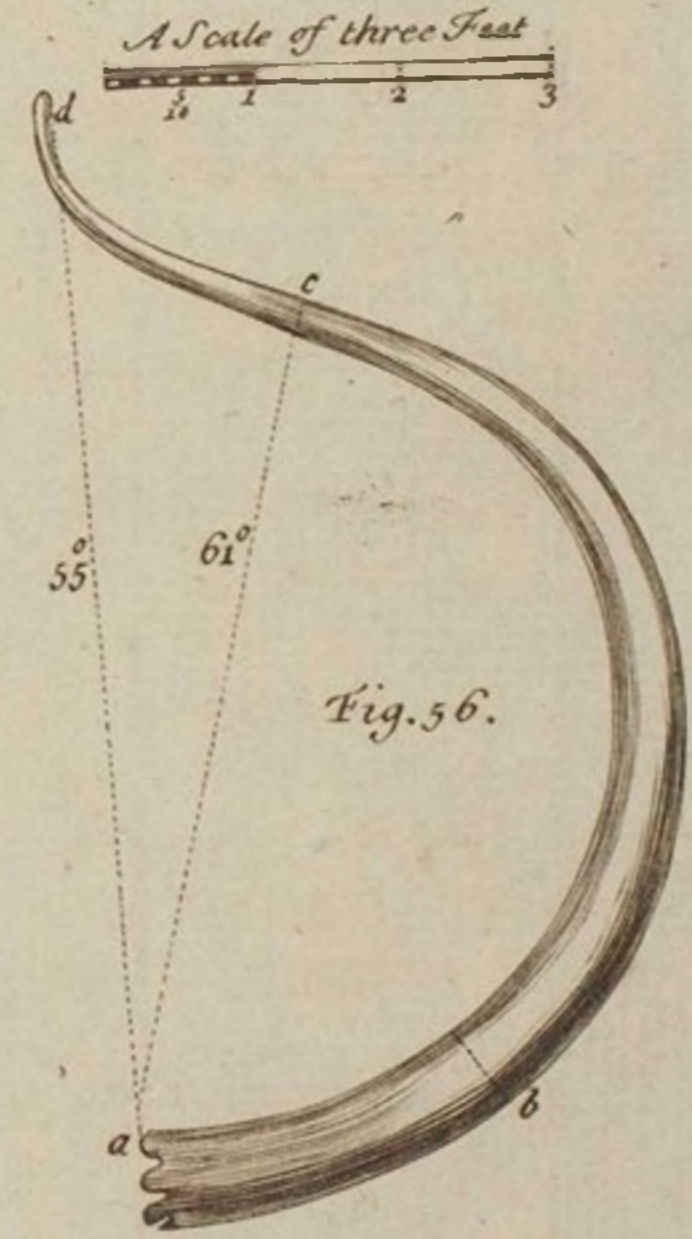
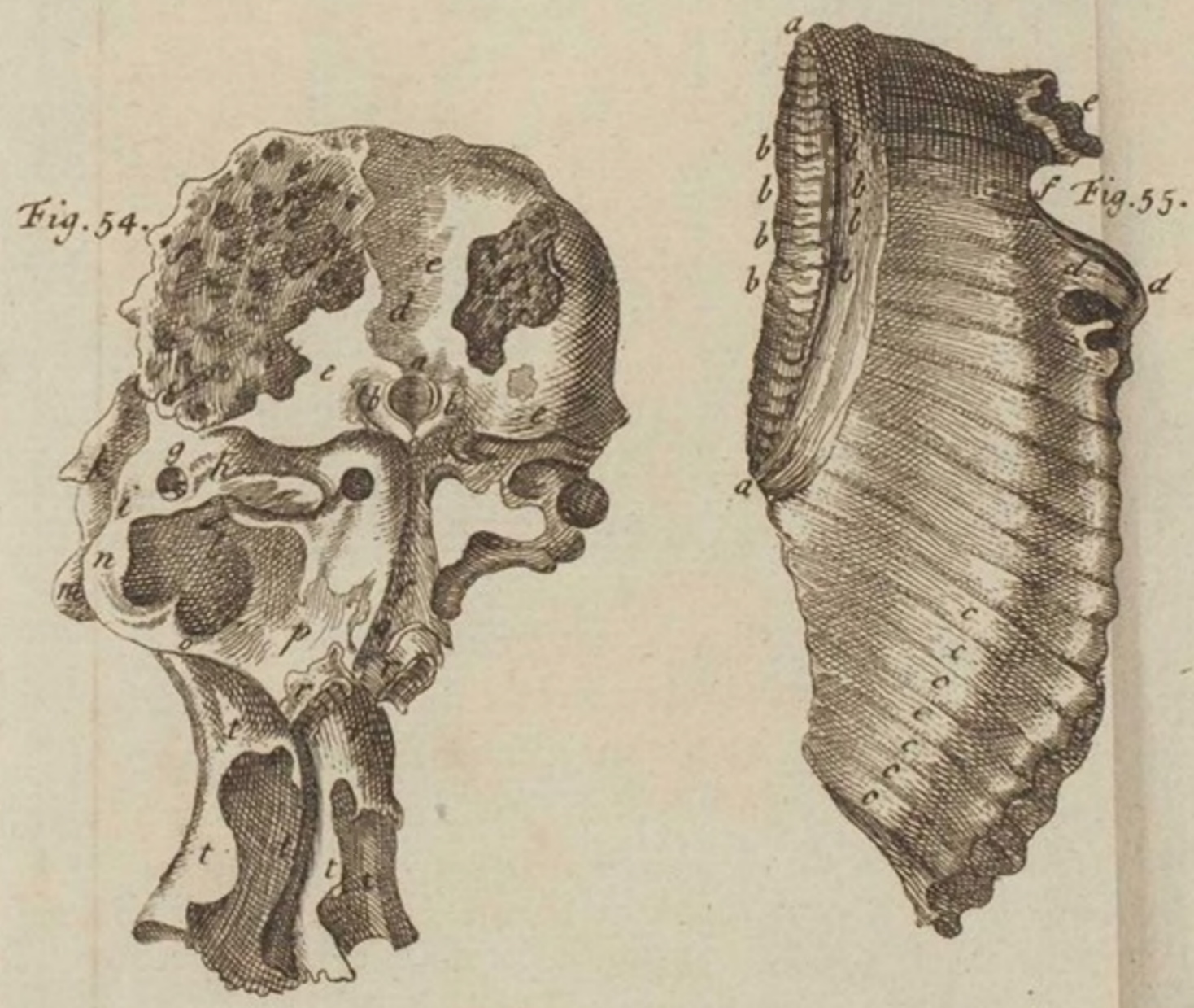
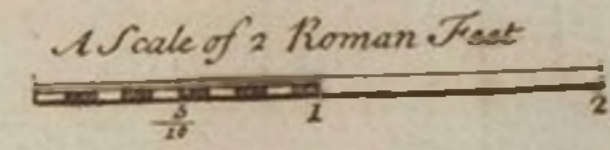
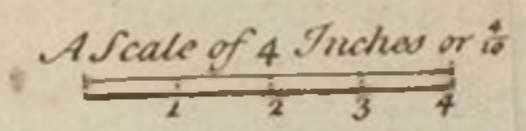
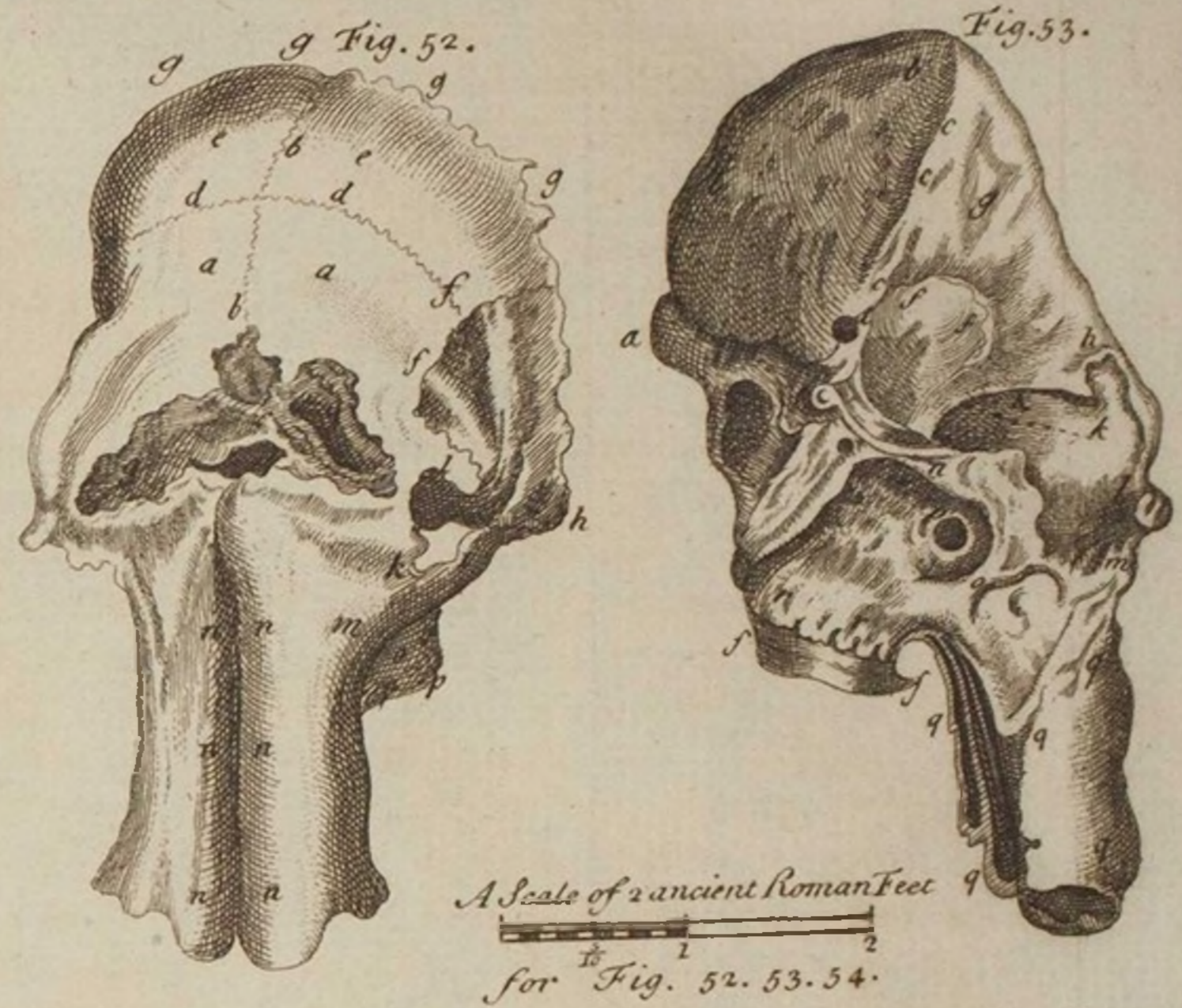
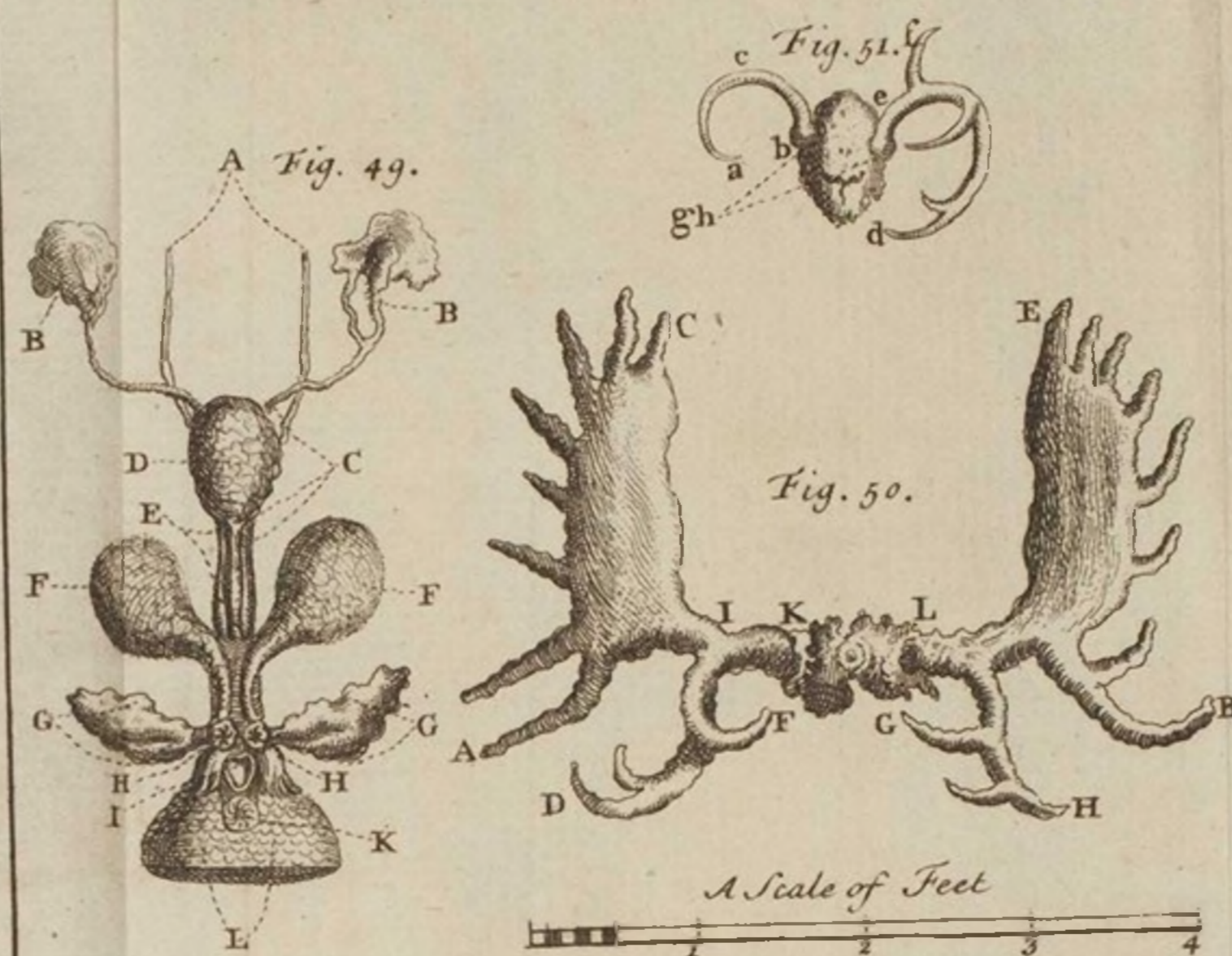
*Fig. 56.* The Tusk, by some improperly called the Horn, of the Right Side, having a twofold Direction by being bent outward and backward, which is peculiar to the Male *Elephant*, it being straiter in the Female. It is the *Ebur fossile* of the Shops, and weighs cxxxvii lb. ʒj. ʒij. ʒij. Apothecaries Weight, or 160 Pound *Russian*. It's Length, or the exterior Circumference of it's back Part, was 136 Inches 5 Lines. The Circumference of the Root, where it got clear of the Socket, was the greatest, being 18 Inches, 5 Lines. The subtended Arch from one Extremity to the other, 55 Inches. The same subtended Arch *a c.* but bigger, 61 Inches. *a.* The Root hollow within, the Cavity extending beyond the Place marked *b.* *b.* The Root rising above it's Socket, where it was thickest. *c.* The Place where the subtended Arch was greatest, 61 Inches. *d.* The Point of the Tusk somewhat bent outward and backward, although this Curvature could not be expressed by the Painter in a visible Manner in the lesser subtended Arch of 55 Inches. The Tusk answering to the foregoing on the Left Side, was entirely like that on the Right, except the contrary Direction of it's Curvature, and it's less Weight on Account of having lost it's Point; for it weighed but cxxviii lb. ʒviii. ʒij. Apothecaries Weight, or 150 Pound *Russian*: And this small Difference did not seem to deserve a separate Drawing.

Fig. 57.

*Fig. 57.* The Right Thigh-bone, exhibited to View on it's inner Side, which turns towards the Body. It weighed xxj lb. ʒvj. ʒv. ʒij. Apothecaries Weight, or 25 lb *Russian*. It's perpendicular Length is 38 Inches, 5 Lines. The greatest Breadth of it's upper Head (or *Apophysis*) 11 Inches. It's Circumference at the Middle of the Bone, about 13 Inches. *a.* The Head covered with a Cartilage, placed on it's Neck, and inserted in the Socket of the *Os Ischium*, and fastened by means of two Ligaments. *b.* The *Cervix* or Neck of the Bone. *c.* The upper external or greater *Trochanter*. *d.* The lower internal or lesser *Trochanter*. *e.* The Place in the middle of the Bone, where the Circumference measured 13 Inches. *f.* The *Sinus* facilitating the free Motion of the *Patella*. *g.* The other Process or inward Head, covered with a Cartilage, together with it's Fellow. *h.* Two vertical *Sinuses* in the *Tibia* answering to the external *Trochanter*.

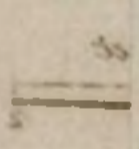
The Bones of this Skeleton, with the Ribs, *Vertebrae*, and others thereto belonging, were found in the sandy Side of a steep Hill, on the Eastern Bank of the River *Indigirska*, which falls into the Northern Ocean, not far from the Mouth of the Rivulet *Wolockowoi-ruçzei*. The River *Indigirska* to the East of the River *Jena*, where it runs into it's own Channel, has not been laid down by Mr *Wilsen*







1731



1732

2



in his Map of the N. E. Part of *Asia*: But it's Course is described by *Isbrand Ides* in the Map of his Travels. And some of these Bones are found now and then not only in these Parts, (which are so dangerous on Account of the excessive Cold, and continued Chains of inaccessible Mountains, that to us *Europeans*, who have the Happiness to live in a milder Climate, it would be present Death to travel through them) but likewise in the Sand-hills on the Rivers *Chatanga*, *Thomas*, *Tobol*, *Irtisch*, &c. which are all at a good Distance from the Sea; though neither *Elephants*, nor chimerical *Behemoths*, have been ever seen in those Countries, nor could they live therein by reason of the Inclemency of the Air. Wherefore the best Judges follow the Opinion of the learned Dr *Woodward*, the *Scheuchzers*, and others, (whose Arguments, which are well known, and of great Weight among the *Literati*, I think needless here to repeat) in taking them for the Bones of Antediluvian Animals, or of such as were convey'd thither in the universal Deluge. And lest the Truth of what I have said above be called in Question by such Persons as are prone to Envy, Calumny, and Falshood, and detract the contrary Virtues in others; I thought proper to give a Copy of the original Certificate of a Person who was an Eye-witness to the digging it up.

‘ **W**H E R E A S Mr *Messerschmidt* intreated me to let him know  
 ‘ **W** here the Head of the *Mammoth* with it's Teeth and other  
 ‘ Parts were found; as I was an Eye-witness to the digging it up,  
 ‘ I thought proper to give him this short Account thereof in Writing:  
 ‘ That Head was found by a certain *Russian* Soldier *Wesile Erlow*, on  
 ‘ the Eastern Bank of the River *Indigirska*, not far from the Mouth  
 ‘ of the Rivulet *Wolockowoi-ruczei*. After it was discovered, I, being  
 ‘ at Leisure, was present; and an Eye-witness to the digging up of this  
 ‘ Skeleton or Bones. And further likewise, on the other Bank of the  
 ‘ same River, which Bank is named *Sztanoijahr*, I saw a Piece of Skin  
 ‘ putrified, appearing out of the Side of a Sand-hill, which was pretty  
 ‘ large, very thick, and covered with long Hair, pretty thick set and  
 ‘ brown, somewhat resembling *Goats* Hair: Which Skin I could  
 ‘ not take for that of a *Goat*, but of the *Behemoth*; in as much as I  
 ‘ could not appropriate it to any Animal that I knew. This I certify  
 ‘ by this *Latin* Testimonial for the present, and can safely, and even  
 ‘ hold it my Duty to give a more circumstantial verbal Account thereof,  
 ‘ whenever her Imperial Majesty shall be graciously pleased to lay her  
 ‘ Royal Commands on me.’ Signed,

Dated at *Irkutskoe*;  
 Feb. 10. 1724.

*Michael Wolochowicz.*

XXIV. *Albert Durer's* Figure of this Creature has led several *Natural Hi-*  
*Natural* Historians, since his Time, into Errors; for such have always *story of the*  
 copied *Rhinoceros,*



by Dr Parsons.  
 No. 470.  
 P. 523.  
 Read June 9.  
 1743.

copied him; and indeed many have exceeded him in adorning their Figures with Scales, Scallops, and other fictitious Forms. Now, from the Badness of his Figure, I am induced to believe that great Man never saw the Animal; for he certainly could not have been so mistaken in the Performance. However, from the strictest Inquiry I was capable of making, it seems most probable, that a Sketch was sent to him from *Portugal*, by a Person who took it from a *Rhinoceros*, which was sent from the *East-Indies* to *Emanuel King of Portugal*, as a Present; and that *Albert* improved and embellished it into the original Drawing, which is in *Sir Hans Sloane's Museum*. The Inscription, in *German*, written under this Drawing, proves it very clearly, of which the following is a close Translation.

‘ In the Year 1513. upon the first Day of *May*, there was brought  
 ‘ to our King at *Lisbon*, such a living Beast from the *East-Indies*  
 ‘ that is called *Rhinocerate*: Therefore on Account of it's Wonder-  
 ‘ fulness I thought myself obliged to send you the Representation of it.  
 ‘ It hath the Colour of a Toad, and is close covered over with thick  
 ‘ Scales. It is in Size like an *Elephant*, but lower, and is the *Elephant's*  
 ‘ deadly Enemy; it hath on the fore Part of it's Nose a strong  
 ‘ sharp Horn; and, when this Beast comes near the *Elephant* to fight  
 ‘ with him, he always first whets his Horn upon the Stones; and runs  
 ‘ at the *Elephant*, with his Head between his fore Legs; then rips  
 ‘ up the *Elephant*, where he hath the thinnest Skin, and so gores him:  
 ‘ The *Elephant* is terribly afraid of the *Rhinocerate*; for he gores him  
 ‘ always, where-ever he meets an *Elephant*; for he is well armed, and  
 ‘ is very alert and nimble. This Beast is called *Rhinocero*, in *Greek*  
 ‘ and *Latin*; but, in *Indian*, *Gomda*.’

The first Print published by *Albert Durer* himself has a *German* Inscription over it, somewhat differing from the manuscript one, of which the following is likewise an exact Translation, with the Date and Mark, as in *Fig. 58*.

Fig. 58.

‘ In the Year 1513 from the Birth of Christ, upon the first Day of  
 ‘ *May*, there was brought to the most potent *Emanuel King of Portu-  
 ‘ gel* at *Lisbon*, from *India*, such a living Beast. They call it a *Rhi-  
 ‘ noceros*: It is here represented in all it's Shape. It has a Colour  
 ‘ like a speckled *Tortoise*, and is very closely covered over with thick  
 ‘ Scales; and is in Size as an *Elephant*, only of shorter Legs, and very  
 ‘ well armed. It has a sharp strong Horn forwards upon his Nose,  
 ‘ which it begins to whet when it is near a Rock; therefore it is a con-  
 ‘ quering Beast, and the *Elephant's* deadly Enemy: The *Elephant* is  
 ‘ greatly affraid of him; for, when he meets with him, the Beast runs  
 ‘ at him with it's Head between his fore Legs, and rips up the  
 ‘ *Elephant's* Belly, and kills him; for he cannot get rid of him: Besides,  
 ‘ the Beast is so armed, that the *Elephant* can do nothing to  
 ‘ him: They say likewise, that the *Rhinoceros* is swift, alert, and  
 ‘ cunning.’

Many



Many Years after this, one *Hendrik Hondius* published in *Holland* an exact Copy of *Durer's* Print counterfeiting the Date and Mark; but gives an Inscription in *Low Dutch*, nearly the same as that under the original Print.

*Bontius* \* says, he has often seen these Animals in the Woods and Stables abroad, and values himself for having exhibited a Figure without the Decorations that *Albert Durer* put upon his; and yet, instead of the Hoofs which are proper to the Animal, he has drawn a *Paw* not unlike that of a Dog, only something bulky.

The Figure given by *Chardin* in his *Voyages* has some Truth, as to the Folds or *Plicæ* in the Skin of the *Rhinoceros*; and likewise as to the Feet: But in other respects it is not like the Animal. There is also a little Truth in the Figures of *Camerarius*; see his Emblems taken from Animals; but far from a thorough Representation of the Creature: And, in short, the other Originals, as that taken from the *Rhinoceros* in 1685, that published by *Carwitham* in 1739; and, to look back to the *Roman* Times, those in the Pavement of *Præneste*, and *Domitian's Medals*, are very inaccurate, but have none of *Albert Durer's* Decorations.

When that *Rhinoceros* arrived here in 1739. *Dr Douglas*, who let slip no Opportunity of improving Natural Knowledge, intended reforming the History of him, and therefore went frequently to see him; and, on *June 24* of this Year, exhibited before the *Royal Society* a Drawing of the same *Rhinoceros*, with a Collection of Figures of that Creature, taken from several Authors, who had written of him before. He mentioned also his Dimensions; and, on the 28th of the same Month, he produced a Collection of Horns, with some Account of them, but proceeded no farther. Since therefore another Occasion may not offer in many Years. I offer the following Account of the Male *Rhinoceros* that was shewed in *Eagle-street* near *Red-Lyon-Square*, in 1739, and the Drawings annexed to it.

In this Account I have had no Regard to those of other Authors, but have barely described him, as I have often seen him on purpose, both in the above-mentioned Place, and a long time after, when he was shewn at a Booth near the *London-Spaw*.

*Humphry Cole*, Esq; being Chief of the Factory at *Patna* in *Bengal*, procured this *Rhinoceros*, when young, and sent it to *England* by Captain *Aiton* in the Ship *Lyel*, which arrived on the First of *June* 1739. The *Rhinoceros* was brought to *Eagle-street*, *Red-Lion-Square*, on the 15th of the same Month; and it was said by those who took care of him, that from his being first taken, to the time of his landing in *England*, his Expences amounted to One Thousand Pounds Sterling.

He was fed here with Rice, Sugar, and Hay: Of the first he eat 7 Pounds to about 3 Pounds of the Sugar; they were mixed together.

\* *Bontius* calls this Animal *Abada*, which probably may be the *Javan* Name.



and he eat this Quantity every Day, divided into 3 Meals, and about a Truss of Hay in a Week, besides *Greens* of different Kinds, which were often brought to him, and of which he seemed fonder than of his dry Victuals; and drank large Quantities of Water at a Time, being then, as I was informed by his Keeper, two Years old.

He appeared very peaceable in his Temper; for he bore to be handled in any Part of his Body; but is outrageous when struck or or hungry, and is pacified in either Case only by giving him Victuals. In his Outrage he jumps about, and springs to an incredible Height, driving his Head against the Walls of the Place with great Fury and Quickness, notwithstanding his lumpish Aspect: This I have seen several times, especially in a Morning, before his Rice and Sugar was given him; which induces me to believe he is quite indomitable and untractable, and must certainly run too fast for a Man on Foot to escape him.

As to his Size, he did not exceed a young Heifer in Height; but was very broad and thick. His Head, in Proportion, is very large, having the hinder Part, next his Ears, extremely high, in Proportion to the rest of his Face, which is flat, and sinks down suddenly forward towards the Middle, rising again to the Horn, but in a lesser Degree. The Horn, stands on the Nose of the Animal, as upon a Hill. I have seen the Bones of a Head of one of these, in Sir *Hans Sloane's Museum*; and the Part on which the Horn is fixed, rises into a blunt Cone, to answer to a Cavity in the Basis of the Horn, which is very hard and solid, having no manner of Hollow nor Core, like those of other Quadrupeds. That of this Animal, being young, does not rise from it's rough Basis above an Inch high, is black and smooth at the Top, like those of the Ox-kind, but rugged downwards; the Determination of it's Growth is backwards, instead of strait up; which is apparent, as well in the different Horns of old *Rhinoceros's*, which I have seen, as in this of our present Subject; for the Distance from the Basis to the Apex of this, backward, is not within a third Part so long as that before, and it has a curved Direction; and, considering the Proportion of this Animal's Size to it's Horn, we may justly imagine, that the Creature which bore any one of those great ones that I have seen, must have been a stupendous Animal in Size and Strength; and, indeed, it were no Wonder, if such were untractable at any rate.

The Sides of his under Jaw are wide asunder, flanting outward to the lower Edge; and backward to the Neck, the Edges turn outward: From this Structure his Head naturally looks large.

That Part that reaches from the fore Part of the Horn towards the upper Lip, may be called the Nose, being very bulky, and having a kind of circular Sweep downwards towards the Nostrils: On all this Part he has a great Number of *Rugæ* running cross the Front of it, and advancing on each Side towards his Eyes.



The Nostrils are situated very low, in the same Direction with the *Rictus Oris*, and not above an Inch from it. If we look at him in a fore View, the whole Nose, from the Top of the Horn to the Bottom of his lower Lip, seems shaped like a Bell, *viz.* small and narrow at Top, with a broad Basis.

His under Lip is like that of an Ox, but the upper more like that of a Horse; using it, as that Creature does, to gather the Hay from the Rack, or Grass from the Ground; with this Difference, that the *Rhinoceros* has a Power of stretching it out above 6 Inches, to a Point, and doubling it round a Stick, or one's Finger, holding it fast; so that, as to that Action, it is not unlike the *Proboscis* of an *Elephant*.

As to the Tongue of the *Rhinoceros*, although it is confidently reported by Authors, that it is so rough as to be capable of rubbing a Man's Flesh from his Bones; yet that of our present Animal is soft, and as smooth as that of a Calf; which I have often felt, having had my Hand sucked several times by him. Whether it may grow more rough, as the Beast grows older, we cannot say.

His Eyes are dull and sleepy, much like those of a Hog in Shape, and situated nearer the Nose than that of any Quadruped I have ever seen; which he very seldom opens entirely.

His Ears are broad and thin towards the Tops, much like those of a Hog; but have each a narrow round Root with some *Rugæ* about it; and rises, as it were, out of a Sinus surrounded with a *Plica*.

His Neck is very short, being that Part which lies between the back Edge of the Jaw and the *Plica* of the Shoulder; on this Part there are 2 distinct Folds, which go quite round it, only the fore one is broken underneath, and has a hollow Flap hanging from it, so deep that it would contain a Man's Fist shut, the concave Side being forward. From the Middle of the hinder one of these Folds or *Plica*, arises another, which, passing backwards along the Neck, is lost before it reaches that which surrounds the fore Part of the Body.

His Shoulders are very thick and heavy, and have each another Fold downward, that crosses the fore Leg; and, almost meeting that of the fore Part of the body, just mentioned, they both double under the Belly close behind the fore Leg.

His Body, in general, is very thick, and juts out at the Sides, like that of a Cow with Calf. He has a Hollow in his Back, which is mostly forward, but, backwards, the Line or Ridge rises much higher than that of the Withers; and, forming the *Plica* upon the Loins, falls down suddenly to the Tail, making an uneven Line. His Belly hangs low, being not far from the Ground, as it sinks much in the Middle.

From the foresaid highest Point in his Back, the *Plica* of the Loins runs down on each Side between the last Ribs and the Hip, and is lost before it comes to the Belly; but, above the Place of it's being lost, another arises, and runs backward round the hind Legs, a little



above the Joint: This I call the *crural Fold*, which turns up behind till it meets another transverse one, which runs from the Side of the Tail forward, and is lost before it reaches within Two Inches of that of the Loins.

The Legs of the *Rhinoceros* are thick and strong; those before, when he stands firm, bend back at the Knee, a great Way from a straight Line, being very round, and somewhat taper downwards. The hinder Legs are also very strong, bending backwards at the Joint to a blunt Angle, under which the Limb grows smaller, and then becomes gradually thicker, as it approaches the Foot; so also does that Part of the fore Leg. About the Joint of each of his Legs, there is a remarkable *Plica* when he bends them in lying down, which disappears when he stands.

In some Quadrupeds, the Fetlock bends or yields to the Weight of the Animal; but in this there is no Appearance of any such Bending, and he seems to stand on Stumps, especially if he is viewed behind. He has three Hoofs on each Foot forwards; but the back Part is a great Mass of Flesh, rough like the rest of his Skin, and bears upon the Sole or Bottom of his Foot.

This Part is plump and callous in the Surface, yielding to Pressure from the Softness of the subjacent Flesh. Its Shape is like that of a Heart, having a blunt Apex before, and running backward in a broad Basis. The Out-line of the Bottoms of the Hoofs are somewhat semicircular.

The Tail of this Animal is very inconsiderable, in proportion to his Bulk, not exceeding 17 or 18 Inches in Length, and not very thick: It has a great Roughness round it, and a kind of Twist or Stricture towards the Extremity, ending in a Flatness, which gave occasion to Authors to compare it to a *Spatula*. On the Sides of this flat Part, a few Hairs appeared, which were black and strong, but short: The Growth of these is seen in the Tail of the old *Rhinoceros*, described very well by Dr Grew, in his *Museum Regalis Societatis*, ' In this the  
' Dock is about half an Inch thick, and two Inches broad; of what  
' Length the whole, is uncertain, this being only Part of it, though  
' it looks as if cut off near the Buttock: It is about Nine Inches, black,  
' and very rough. On the two Edges, and there only, grow also very  
' black and shining Hairs, a Foot long, stubborn, and of the Thickness  
' of a smaller Shoe-maker's Thread: Yet not round, as other Hair,  
' but rather flattish, like so many little Pieces of Whalebone.' It is further to be observed, that the Hairs on the Left Side grow out a great way up towards the Root of the Tail, (being shorter, as they are higher) like the Fibres of a Quill; whereas, on the Right Side, they grow no higher than the flat Part. There is no other Hair on any Part of this young *Rhinoceros*, except a very small Quantity, on the posterior Edge of the upper Parts of the Ears. I have observed a very particular Quality in this Creature, of listening to any Noise or  
Rumour



Rumour in the Street; for though he were eating, sleeping, or under the greatest Engagements Nature imposes on him, he stops every thing suddenly, and lifts up his Head, with great Attention, till the Noise is over.

The *Penis* of the *Rhinoceros* is of an extraordinary Shape: There is first a *Theca* or *Præputium*, arising from the Inguinal Part of the Belly, nearly like that of a Horse, which conceals (as that does) the Body and Glans, when retracted. As soon as the Animal begins to extend it, the first thing that is extruded, the *Theca*, is a second Sheath of a light Flesh-colour, and pretty much in Form like the Flower of the *Digitalis floribus purpureis*; and then out of this another hollow Tube, which is analogous to the *Glans Penis* of other Creatures, very like the Flower of the *Aristolochia floribus purpureis*; but of a lighter or fainter Flesh-colour than the former. His Keeper, who was a Native of *Bengal*, would make him thus emit his *Penis* when he pleased, while he lay on the Ground, by rubbing his Back and Sides with Straw; and, in it's utmost State of Erection, it never was extended to more than about 8 or 9 Inches. It's Termination is backward in a curved Direction, so that he is a retromingent Animal, and consequently retro-generative. I have several Times seen him pissing; he turns his Tail to the Wall, and, extending his hind Legs asunder, crumps himself up, and pisses out in a full Stream as far as a Cow.

We need say no more of the Female *Rhinoceros*, that came over since, but that she is exactly like this in all respects, except the Sex; and, by the Horn, and Size, of the same Age; and the *Pudenda* like those of a Cow.

The Skin of the *Rhinoceros* is thick and impenetrable: In running one's Fingers under one of the Folds, and holding it with the Thumb at the Top, it feels like a Piece of Board half an Inch thick. Dr *Grew* describes a Piece of one of these Skins tanned, which, he says, 'is wonderful hard, and of that Thickness, exceeding that of any other Land Animal he has seen.' It is covered all over, more or less, with hard Incrustations like so many Scabs; which are but small on the Ridge of the Neck and Back, but grow larger by degrees downwards toward the Belly, and are largest on the Shoulders and Buttocks, and continue pretty large upon the Legs all along down; but between the Folds, the Skin is as smooth and soft as Silk, and easily penetrated; of a pale Flesh-colour, which does not appear to View in the Folds, except when the *Rhinoceros* extends them, but is always in View under the fore and hinder Parts of the Belly; but the Middle is incrustated over like the rest of the Skin. To call these scabbed Roughnesses Scales, as some have done, is to raise an Idea in us of something regular; which in many Authors is a great Inaccuracy, and leads the Reader into Errors; for there is nothing formal in any of them.

As to the Performance of this Animal's several Motions, let us consider the great Wisdom of the CREATOR, in the Contrivance that serves him for that Purpose. The Skin is entirely impenetrable and inflexible; if



therefore it was continued all over the Creature, as the Skins of other Animals, without any Folds; he could not bend any way, and consequently not perform any necessary Action; but that Suppleness in the Skins of all other Quadrupeds, which renders them flexible in all Parts, is very well compensated in this Animal by those Folds; for since it was necessary his Skin should be hard for his Defence, it was a noble Contrivance, that the Skin should be so soft and smooth underneath, that when he bends himself any way, one Part of this Board-like Skin should slip or shove over the other; and that these several Folds should be placed in such Places of his Body, as might facilitate the Performance of every voluntary Motion he might be disposed to.

I only beg leave to add one Paragraph more, wherein I shall attempt to settle a Point that concerns the double Horn mentioned by *Martial*,

*Namque gravem gemino cornu sic extulit ursum.\**

And which has given many Critics a great deal of Trouble to alter, as believing either *Martial*, or his Transcribers, were wrong in that Sentence.

There is no where a greater Instance of the Uncertainties that Mankind may be led into from conjectural Reasoning, than in this very Subject of the *Rhinoceros's* Horn. And although the several Critics who have handled this Matter, shew abundance of Ingenuity in changing *Martial's* Reading; yet if we can make it appear, that there was a *Rhinoceros* with Two Horns on his Nose in *Rome*, then that *Poet* was right; if not, *Bochart* has the better, who has altered it thus:

*Namque gravi geminum cornu sic extulit urum.†*

The first Knowledge we had in this Part of the World of that Animal, was of the one that was brought from *Asia* to the King of *Portugal*, mentioned before; and as those brought into *England* since that Time, viz. that in 1685, our present Subject in 1739, and the Female *Rhinoceros* in 1741, were single horned; and as likewise the great Number of Horns that are to be found in the *Museums* of the Curious, brought from time to time from the *East-Indies*, are also single; we may venture to assert, that all those of *Asia* have really but one Horn upon the Nose: And this is confirmed by many Gentlemen, who had seen those Creatures in *Persia*, and other Parts of the East. From thence it is easy to conclude, that this was the Reason the single Horn was imagined the Standard of Nature for that Animal, and that therefore *Martial* ought rather to say, that two *Bears*, or (according to *Bochart*) two wild *Bulls*, were tossed by the strong Horn of the *Rhinoceros*; than that a single *Bear* was thrown up by his double Horn.

On the other Hand, we are sure, that the *Romans* had always a very great Commerce with the *Africans*, and had many Cargoes of wild

\* *Martial*. Epigr. Libr. IV. Epig. 82.

† *Bochart*, Tom. I. Lib. 3. pag. 931.



Beasts from that Quarter of the World. Is it not therefore likely, that they might more conveniently have obtained the several *Rhinoceros's* that were shewed in that City, from *Africa* than *Asia*; since the Passage to *Italy* from the former is but a short one, cross the *Mediterranean Sea*; and that the Countries that produce those Animals in the latter, are so very remote from *Italy*? For we find the *Greeks* had no Knowledge of this Beast in the Time of *Aristotle*, nor since, that we know of; whereas the *Romans*, according to the Accounts given, have had Six; One shewed by *Pompey the Great*, One by *Augustus*, Two by *Domitian*, One by *Antoninus Pius*, and the last by *Heliogabalus*.

Now we do not want sufficient Proofs to shew that there is a *Species* of those Animals in *Africa* having Two Horns on the Nose. *Peter Kolbé*, a *Dutchman*, in his Voyage to the *Cape of Good Hope*, says, there is one on the Summit of the Nose, like the others, but having a smaller close behind it. There are also Two Horns in *Sir Hans Sloane's Museum*, sticking to the same individual Integuments, not much more than an Inch from each other; which is an undeniable Proof of the Existence of this *Species*: And, in fine, the Brass Medal of *Domitian*, which *Mr Folkes* was so kind to shew me, has, on one Side, the Figure of a *Rhinoceros* with Two Horns \* upon the Nose very plain. From all which I cannot but be inclined to believe, that this Medal was struck from one of those of *Africa*; and that *Martial* had no more Notion of a *Rhinoceros* with One Horn, than *Bochart* had of one with Two.

There is one thing remarkable of *Albert Durer*: It is certain, from his Print of this Animal, that he, or somebody else, concerned in his Figure, thought that *Martial* was right; for it is plain, they were willing to add a Second Horn to the Figure, and being puzzled where to place the other, at last put it upon the Neck; by which it further seems probable that *Albert* never saw the Beast †, but was led by the Poet's *Epigram* to make that Addition to the Drawing sent to him from *Portugal*.

*Augustini* also, in his *Dialogue of Medals*, has a Figure of the *Rhinoceros*, with Two Horns on the Nose. So hath likewise the Figure in the *Prænestan Pavement*, made by Order of *Sylla* the Dictator, on which he certainly designed to represent several Animals, and other remarkable Things proper to *Africa*.

\* *Pausanias's* Testimony is of great Force here, having seen them himself in *Rome*, brought thither from *Ethiopia*, with a double Horn on the Nose. His Words are:

Εἶδον ὃ καὶ ταύρος τὴν τε Αἰθιοπικὴν, ὅς ἐστι τὸ συμβεβηκότεν ἑνομάζεσθαι ῥινοκέρας, ὅτι σφίσιν ἐπ' ἀκρὰ τῆ ῥινὸς ἐν ἐκάστῳ κέρα, καὶ ἄλλο ὑπὲρ αὐτῶν μέγα, ἐπὶ ὃ τ κεφαλῆς ἐδὲ ἀρχὴν κ' ἐσθλάεσι.

Vidi etiam Tauros Æthiopicos, quos ex re ipsa Rhinocerotas nominant, quod illi e nare extrema corum prominet; & paulo superius alterum, non sane magnum, in capite nullum prorsus habent. *Pausan.* Lib. IX. C. 21.

† *Petrus Maffijus* makes this certain: He says, that the *Rhinoceros* that arrived in *Portugal* in 1513, was sent by the King to the *Pope*, and that the Ship which had him on board was cast away, and the Animal drowned on the Coast of *Genoa*.



Explanation of  
the Figures.

- Fig. 59. *A side View of the Rhinoceros.*  
 Fig. 60. *A fore View of the Rhinoceros fore-shortened.*  
 Fig. 61. *A back View of the same, fore-shortened.*  
 Fig. 62. *Two Views of one of the Feet. a, the upper Part of the Foot. b, the Sole of the Foot.*  
 Fig. 63. *The Tail of an old Rhinoceros, in the Museum of the ROYAL SOCIETY.*  
 Fig. 64. *The Penis in an erected State. a, The first Theca or Præputium, of a dark Colour. b, The second Theca, being Flesh-coloured. c, The Tubular Glans Penis.*  
 Fig. 65. *A Horn of a Rhinoceros, said to be Six Years old, being about 10 Inches long.*  
 Fig. 66. *The Bottom or concave Basis of the same, to shew the Cavity is very superficial.*  
 Fig. 67. *A beautiful Horn in Dr Mead's Museum, being about 37 Inches long.*  
 Fig. 68. *The Horn of a Rhinoceros, in the Museum of Sir Hans Sloane, which (as those of Oxen are sometimes liable to Distortions in their Growth) differs from the common Form; it is 32 Inches long.*  
 Fig. 69. *The double Horn mentioned above, belonging to Sir Hans Sloane: Whether they crossed each other on the Animal, is uncertain: It is most likely they did not, but that by drying they were crossed by the Corrugation of the Skin that joins them together: However I have drawn them as they appeared to me. The strait Horn is 25 Inches long, the curved one somewhat shorter, and the Two Diameters of the Bases 13 Inches.*  
 Fig. 70. *The concave Bottoms of the above double Horns, as they adhere to the same Piece of Skin.*

*An Account of  
the Bones of  
Animals being  
changed to a  
Red Colour by  
Aliment only.  
By John Bel-  
chier, Surgeon,  
F. R. S. N<sup>o</sup>  
442. p. 287.  
July &c. 1736.*

XXV. I. That the Circulation of the Blood is carried on through the Bones, is evident from many Phænomena observable in Surgery; but that the Circulation is universally and intimately distributed through the most solid and compact Substance of the Bones (tho' hitherto by some made a Matter of Doubt) will appear undeniably from the Instances here produced; which are the Bones of several Hogs, of a different Breed, changed to a deep red Colour meerly by Aliment. And what makes this still more surprizing is, that neither the fleshy nor cartilaginous Parts suffer the least Alteration in Colour or in Taste.

The Diet with which these Hogs are fed is Bran, after it has been boiled in a Copper with printed Callicoes, in order to clean them from a dirty red Colour occasioned by an Infusion of *Madder Root*, which is made use of to fix the Colours printed on the Cloth; some of which Colours are made with Preparations from Iron, others with a Mixture of Alum and Sugar of Lead. The Parts printed with the Preparation of

Iron



Iron produce Black and Purple ; those printed with the Mixture of Alum, Red of different Degrees, according to the Strength of the Mixture. The Bran having absorbed the red Colour discharged from the Cloth, is mixed with the common Food of the Hogs, and produces this Effect on their Bones.

Upon examining these Bones, I observe in general the solid Parts to be most tinged, and the Teeth particularly, except the enamelled Part which is of a different Substance ; and upon sawing them through, I find the internal Parts equally tinged, except at the Ends of the Bones, where the Substance is more spongy. And in order to discharge the Colour, I have macerated them in Water for many Weeks together ; have boiled them often, and steeped them in Spirits, but all hath proved ineffectual ; nor is the least Tincture given to any of the Liquids, in which I have made Experiments.

2. The first Experiment I made was upon a Cock, by mixing some of the *Madder* Root with *Fig-Dust*, on which they feed. The Cock dying within 16 Days after his first feeding on the *Madder*, I dissected him, and examined the Bones, not in the least Expectation of finding them tinged in so small a Time ; but, to my great Surprize, found them universally of a Red Colour : So that, from this Experiment, it appears, that the *Madder* alone causes this Alteration.

*A further Account by the same. N<sup>o</sup>. 443. p. 299. Oct. 1736.*

3. It is proper to observe, that *Mizaldus*, in a Work published in 1566, with this Title *Memorabilium, utilium ac jucundorum Centuriæ novem*, (Cent. 7. N<sup>o</sup>. ) has these Words : ‘ Erythrodanum, vulgo Rubia tinctorum dictum, ossa pecudum rubenti & sandycino colore imbuunt, si dies aliquot illud depastæ sint oves, etiam intacta radice, quæ rutila existit, &c.’

*Of the same, by M. Du Hamel du Monceau, F. R. S. &c. Translated from the French by T. S. M. D. F. R. S. N<sup>o</sup>. 457 p. 390. July, &c. 1740.*

I took 4 strong Pullets, which I shut up in Coops. I fed them with a Paste made of Wheat-meal and Powder of *Madder* Root ; and gave them an Infusion of the same Root to drink, which I was in hopes they would have no Dislike to. The first Days they eat their Paste pretty well ; but I found, that the Addition of the *Madder* rendered it much less agreeable to them than that made of the Meal alone, on which they fell with much greater Eagerness than on the other, when to try their Relish, I now and then gave them some of it. As to the Infusion of the *Rubia Tinctorum*, they never would drink it, and I was obliged to give them pure Water, which they drank plentifully ; for this Root made them thirsty. In short, at the End of some Days they could not relish the Mixture, of which they eat but very little, and wasted away visibly.

On the 10th Day, one of them died ; and another 2 Days after : and both of them had their Bones tinged of a Rose-colour. In order to prolong the Lives of the other Two, I diminished the Dose of the *Madder*, and from time to time I gave them the Paste without it. The Root had already produced it's Effect ; for notwithstanding the new Regimen, they continued to waste ; which obliged me to kill the Third 5 Days after the Death of the first 2. The Colour of it's Bones was not different from that



that of the 2, which died 5 Days before. As to the Fourth Pullet, which seemed not quite so sick, I marked it on the Leg with a Bit of Cloth tied round, and set it at Liberty. It recovered by degrees, by chasing Food to it's Taste in the Yard. But at the same time the Tincture it's Bones had received, went off gradually, and almost entirely disappear'd in a Month's time. For I took care to observe the Change every second or third Day, by looking at the Bones on the Under-side of the Wing, which have no other Covering than a thin Skin.

From this Experiment, as from that of Mr *Belchier's* Cock, it appears, that the *Madder-root* is alone sufficient to tinge the Bones of Animals red, which eat it. The Bones of my Pullets had taken no more than a Rose-colour; because these Creatures, being disgusted with their Food, never eat of it, but when urged by extreme Hunger: And I had never been able to tinge them of a fine red Colour, had I not repeated the Experiment on such Animals as I could feed with the PASTE, and had it in my Power to make them swallow *Madder* in large Quantities.

For that Purpose I chose young Pigeons, the strongest of a whole Pigeon-house. Two of these had no other Food given them but Wheat-meal, others were fed with the Meal and *Madder* mixed and made into Pellets of a convenient Size, given them 3 times a Day till their Crops were full. I endeavoured to make the young Pigeons drink of the Infusion of *Madder*, which were fed with the Root and Meal; but I could never succeed, and was obliged to give them Water alone, as to the Pullets of the first Experiment. The Two young Pigeons fed with the Meal alone were lively and fat, digested their Food, and throve as well as if fed by the old ones. But, on the contrary, those that were fed with the PASTE of Meal and *Madder*, took this Food only by Force, digested ill, were dull and very thirsty. And though Care was taken to keep their Crop constantly full, as well as the others, yet they grew leaner daily. They were always shivering, and endeavouring to get into the Sun, or near the Fire, to warm themselves: And the strongest of them was very sick by the 10th Day. I got the Two killed, that had fed on the Meal alone, as well as the others that had the *Madder* given them; and I preserved but Two, which appeared to me to have better borne the Effect of it than the rest, and had the Bones of the Wings already tinged red.

One of the two was intended to be recovered by a simple Diet, in order to see, if, by prolonging it's Life, the Colour, which was already very visible in the Wing-bones, would wear off: But in 3 Days time it was killed accidentally. However I thought I perceived the Colour weaker than before the Change of Diet: And the same Experiment, repeated some time after, confirmed me (in the Notion) that the Change of Food makes the Colour disappear by degrees. I continued to feed the other remaining young Pigeon with *Madder*, but in small Quantities for fear of killing it too soon. It lived 8 Days longer without any Appearance of the Bones being deeper coloured than the first that were killed.

All



All these Creatures, that had been fed with the Mixture, were dissected; and I made the following Observations on them.

Neither the Feathers, the Horn of the Bill, nor Claws, had changed their Colour, even where they are inserted into the Skin. The Skin of the whole Body had preserved it's natural Colour. The Brain, Nerves, Muscles, Tendons, Cartilages, *Epiphyses*, and Membranes, afforded nothing to the Sight contrary to the usual State of these Parts. But the long bony Tendons, that run along the great Bone, which is improperly called the Leg of Fowls, were red about the Middle of their Length, which is their hardest Part. All the true Bones, even to the very thinnest of them, were as red as Carmine; and in some Places this Red was so deep, that they appeared almost black.

In these young Birds, all the Bones do not take the red Tinge alike. The hardest are generally more coloured than those that are tenderer. A Difference of this kind is perceivable even in the same Bone; for the Middle, which has more Solidity than the Ends, is almost always the reddest. Not but there are sometimes found little pale Spots in the Part where the Red is deepest; and sometimes Spots of a very deep Red in those Parts which have taken but a Carnation Tinge.

I have always found, that the great Bone of the Foot, which is commonly called the Bone of the Leg, was visibly less red than the others. I have found the little Bones of the *Larynx* and of the *Apophyses* tinged of a fine Red, though these are as small as a Thread in young Pigeons. The Rings of the *Trachea*, which are entirely cartilaginous, had not taken the least Tinge; but the Ring nearest the Division of the *Trachea* was red in these Pigeons; and even the first Ring of each Branch of the Bifurcation had in several taken the Tincture, in the Middle at least of it's Outside.

The other Parts of the Thorax, *viz.* The Heart, Lungs, *Mediastinum*, *Pleura*, and Diaphragm, remained of their natural Colour. There was nothing remarkable in the Liver, Spleen, Kidnies, nor on the Outside of the Gizzard; but the inner Membrane of the Crop and Intestines, especially the large ones, appeared red. Having washed Pieces of these Crops and Intestines, I found that their outer Membrane continued white, and that the inner, or *Tunica Villosa*, only was tinged by the *Madder*. At first Sight it appeared to me as if injected; but upon examining it with a Glass, I saw distinctly, that it was not a coloured Liquor that was contained in Vessels, as in Parts injected; but that it was only a sort of *Facula* detained in the villose Part of these Membranes. It is doubtless the Adhesion of these tinging Particles of the Root to the small *Villi* of the inner Membranes of the Organs of Digestion, that is the Source of all the Distempers with which these Creatures appeared to be seized, while I fed them with the *Madder*. Their Crop especially was relaxed and flabby, as if it had been macerated several Months in Water; it was easily torn, and it's inner or villose Membrane adhered so little to the others, that it was detached from



them in Pieces. It is very probable, that the coloured *Fæcula* detached from the *Madder*, that is, the Part of the Root which gives the Tincture, had obstructed the small Vessels and Glands of the Stomach, which might possibly occasion a *Sphacelus* therein. However that be, a certain Quantity of this *Fæcula*, being accumulated there, retarded Digestion, and those Animals died hectic, though with a full Stomach.

The Eyes of these Animals, while alive, seemed as red as those of some Parrots. I thought, after having dissected them, that no other Part was coloured but the *Capsula* of the Crystalline: But Monsieur *Morand*, to whom I had sent a Turkey fed with the *Madder*, observed that the vitreous *Capsula* was of a crimson Red, though neither the vitreous Humour nor the Crystalline were dyed: The Eye of this Turkey being larger than those of the Pigeons, the Hand that dissected it much more dexterous than mine, and the Anatomist more knowing, I willingly come into his Opinion. This then is the only soft Part, that is really tinged in these Animals; for I do not look on those Parts as such, which appear so only by their immediate Contact with those Parts that are charged with the Colour: Monsieur *Morand* having in the Notes he sent me of his Observations, confirmed all that I had before observed, there ought to remain no Doubt of what I have here related.

I come to the Examination of the Skeletons, and of all the coloured osseous Parts of my Pigeons; in order to compare them with the Skeletons of the two Pigeons fed with Wheat-meal alone without the *Madder*. The Bones of the first were, as I have said above, of a very lively Carmine-red, in some Places of a Crimson; and I have some of them of the Colour of yellow Oker; but whence this Difference arose, I could not discover. These tinged Bones being broken, while fresh, or before drying in the Air, seemed to me somewhat bigger and fuller of Marrow; but also more spongy, or of a looser Texture, and easier to break, than the white Bones of the Pigeons fed with Meal only. The Parts of these Bones that had the least Degree of Hardness, broke between the Fingers, which remained coloured from them: And this Tincture does not come from the Marrow, which continues in its natural State, like all the other soft Parts. The same Parts in the white Bones were not to be broken in this manner.

If we recollect, that the Pigeons fed with the Mixture of Meal and *Madder* are always in a languishing Condition, in a continual Decay; it will be easy to judge, that this is the only Reason why the red Bones must be not so well formed, nor so hard, as the white Bones of the Pigeons fed with good Aliments. But why are they bigger, and, as it were, puffed up? It is hard to suppose any other Cause of this, but the Interposition of the colouring *Fæcula* of the *Madder* between the *Lamellæ* of the Bones. These heterogeneous Particles hinder the immediate Contact of these *Lamellæ*; and thence proceeds the preternatural Increase of their Size, and their little Solidity. Upon viewing these Bones with a good Glass, their smoothest Surface appears bored



with a vast Number of small Holes, in which the colouring *Facula* is perceived. And with a Microscope that magnifies still more, there appears a sort of Net-work of Fibres, which divide, and re-unite, to form this Net. Under the first Order of this Net-work, which appears white, another is seen somewhat red, and under this a third and a fourth, still deeper coloured: In fine, the Ground under all these reticular *Strata* is of a very deep Red; and the whole may be justly enough compared to a Piece of Wood stripped of it's Bark. It is probable, that this sort of Injection, made by the way of Digestion, might lead an able Anatomist to some very useful Discoveries on the Nature and Formation of the Bones. Nay I think I have already found out something new on this Head; but, as I have still some Scruple remaining on my Observations, I will not venture to communicate the Consequences drawn from them.

In order that the *Madder* should produce the above related Effect on the Bones, it's Tincture must have such a Degree of Fixity, (according to the Dyers Term) as not to be changed by the dissolving Action of the *Saliva*, of the Juice of the Stomach, of the pancreatic Juice, of the Bile, &c. nor by the peristaltic Motion of the Stomach and Intestines; and yet these Juices act so powerfully on common Aliments, that after Digestion they are not to be known either by their Smell, Taste, or Colour. This is not all: These colouring Particles must be small enough to pass with the Chyle into the Bood, and circulate with it through a great Number of Strainers or Vessels, without being separated, and without being deposited either in the Liver, Spleen, or Pancreas.

I strongly suspect that Portion of the Lymph of the Blood, which is fit for nourishing the Bones, might be the true Dissolvent of the Tincture of the *Madder*, and might convey it to the Place whither it carries Nourishment to the solid Parts of the Body of these Animals. In consequence of this Conjecture, which I shall resume in the Sequel, I thought that the Skeletons of young Animals ought to take a stronger and quicker Tincture, than those of full-grown Animals; because the Bones of young Animals are in a State of Growth, which requires a greater Quantity of osseous Juice. It is likewise true, as above said, that it is the hardest Bones of young Animals, that imbibe most of the Colour. All these Considerations gave Rise to a Difficulty, which was to be cleared up.

Wherefore, in the Beginning of last *October*, I chose Two Turkeys of the Year, the strongest I could find, and young Pigeons in their first Hair or Down. I could wish to have made the Experiment on Animals of the same Species; but it was impossible to find young Turkeys in their first Down at that Time of the Year: And besides, these Animals being extremely tender during the first Months, their Stomach would never have been able to bear the Effect of the *Madder*. As to old Pigeons, I had no tame ones: The wild are difficult to be



fed with the Paste; and if they were suffered to feed at Discretion, they would not have been sufficiently *maddered*, if I may be allowed this Expression. However, the Bones of my two Turkeys were very hard, in comparison of those of the young Pigeons: And thus I had in these Animals, though of different Kinds, all that was of Importance for my Experiment.

My young Pigeons, fed with the Paste mixed with *Madder*, died the third Day; yet all that had the Consistence of Bone in their Skeletons, was become as red as Scarlet. Mr *Belchier* was surprized to see the Bones of his Cock tinged red in 16 Days, and here are Bones so coloured in 3 Days. But all that should in Course of Time have turned to Bone in one of my young Pigeons, and as yet was but Cartilage, as the *Epiphyses*, the great *Apophysis* of the *Sternum*, &c. had not taken the least Colour. In the other there were some Spots of a very weak red on the Cartilage of the *Sternum*, which probably began to ossify. Other Experiments, since tried, have taught me with greater Certainty, that the Cartilages in general are not tinged red by the *Madder*, but when they begin to acquire the Consistence of Bone.

It, as I suspect, it is the lymphatic Part of the Blood that is the *Menstruum* of the colouring Particles of the *Madder*; if this Lymph contains the nutritious Juice of the Cartilages and Bones; why does it not, in carrying with it the colouring Particles it has extracted from the Root, why does it not, I say, tinge the Cartilages as well as the Bones? In my Opinion this Difficulty cannot be solved but by the Difference of the Pores. In the Cartilages they are too large, the colouring Matter passes through them too easily, and finding no osseous *Laminae* yet formed, for want of a Surface sufficiently extended to retain it, it passes with the superabundant Lymph through the Pores of the Cartilages. When these Cartilages begin to take a proper Consistence, where there are *Strata* of osseous *Laminae* already formed, the Obstacle exists, the colouring *Facula* is detained and deposited there. When the ossifying Juice is no longer necessary for repairing a daily Loss of Substance, as in Animals arrived at their full Growth; besides that probably this Juice is then much less abundant, and consequently, in proportion, less charged with the colouring Parts of the Root; it must necessarily result thence, that the Bones of an adult Animal will be much weaker coloured. And this is what happened to my two Turkeys, which, though fed for 15 Days with the Paste of Meal and *Madder*, had their Bones tinged but of a Rose Colour, which appeared to me somewhat deeper towards the Ends than the Middle, which, having too much Consistence, could not admit or retain the same Quantity of the colouring *Facula* as the tender Bones of the young Pigeons. Therefore the Bones of Animals that are still growing, are dyed better and quicker than those of full-grown Animals; and, in my Opinion, for the Reasons already given. My two Turkeys had the same Aliments with the Pullets of the first Experiment, they fell into  
a Decay



a Decay like those, and I was obliged to have them killed in 15 Days Time.

Here we see young Pigeons, whose Bones were dyed of a fine Carmine red in three Days; which is nearly the Time they must have for acquiring this Degree of Tincture. By other Experiments on young Pigeons of the same Age, I have found, that in 36 Hours their Bones were of a lively Rose Colour, and in 24 Hours they were at least of a Flesh-colour.

These last Experiments prove with what Expedition the Distribution of the nutritious Juice is performed in Animals of this Kind, which acquire all their Growth in a few Months; and how rapid the Distribution is, even in those Parts where the Blood's Circulation meets with the greatest Obstacle, as in the Substance of the Bones.

As one ought likewise to infer from these Experiments, that there are vegetable Medicines whose chief Tendency is to the Bones, and which consequently might remedy many of their Distempers, I looked on my self obliged to employ the *Madder* with this View; but not having it in my Power to raise Diseases of different kinds in the Bones of my Animals, I confined myself to the Examination of what Effect it would have in a Fracture.

I chose 4 very vigorous young Pigeons: A Thigh-bone of each of them was broken; the Reduction was immediately performed, and secured by a proper Bandage. Two of these Pigeons were fed with the Meal and *Madder*, and the other two with the Meal alone. These last, notwithstanding the Pain the Fracture must have given them, had always a good Appetite, and in 8 Days they began to walk with their Dressing, which was a little loosened. The others fell into the Accidents already mentioned, and died, one on the 10th, the other on the 14th Day. The two Pigeons that had recovered were killed, in order to compare the *Callus*.

That of the Pigeons which had not taken any *Madder*, was little, close, and very even: That of those fed with this Root, was large, spongy, and uneven: There shot out of it a sort of Vegetation: It broke between the Fingers, and crumbled into small Grains. It is true, that the State of Suffering of these Animals, occasioned by the Hurt, and increased by a Food improper for them, might retard the perfect Re-union of their Bones; yet I think it certainly results from this Experiment, and others which I suppress, because they prove nothing more, that the *Rubia Tinctorum*, taken inwardly, is rather prejudicial than beneficial in the Case of Fractures; and it is not without it's Use to know what is to be avoided.

The *Rubia*, probably, is not the only vegetable Substance that can change the Colour of the Bones; and yet I have tried the Log-wood, the *Anchusa* and *Curcuma*, without Success. In all Likelihood it must be a Substance less susceptible of Alteration; and it is well known,



that the *Rubia* is of that Sort, seeing the Cloths dyed with this Root bear very well the Action of the Air, and that of boiling.

I have put the coloured Bones of my Animals to several Proofs: First, as Mr *Belchier*, to that of boiling Water, and of Spirit of Wine, without the least Change of Colour. It also resisted Soap-suds. A strong Lixivium of Salt of Tartar discharged a little of the Colour, and made it look brighter. Vinegar made it take a yellowish Brown and obscure Tinge. In fine, Alum-water discharged the Colour pretty considerably, and the Water remained somewhat vinous. Thus these Bones perfectly well resist the same Boilings as the Cloths dyed with the same Root; but the Air acts upon them much sooner than on these Cloths: For the Bones of the Pullets in the first Experiment, those of the Turkeys in the third, and those of the young Pigeons, that had eat of the *Madder* but 3 Days, became entirely white in less than a Year; and the reddest Bones lost much of their Colour. And I am of Opinion, that the Dew, to which I have exposed some of them for a few Days, will finish the whitening of them.

As there is a Sort of Analogy between the Nutrition of Animals, and that of Vegetables, I have not neglected trying, if the Tincture of the *Rubia* would introduce itself into the Vessels of some Plants; which would, perhaps, contribute much to lay open their Organization.

For the first Experiment, in which indeed I had no Hopes of Success, I planted two Bulbs of Tuberoses in Earth, with which I had mixed a good Quantity of *Madder*: But I found nothing, either in the Leaves, Stalk, or Flowers, but what was in the common and natural State. And this must have been so: For since it is only the Bones that take the Tincture in Animals, the Tuberoses, having all it's Parts soft, is in the State of an Animal without Bones: Such as a Leach, an Earth-worm, a Lamprey, which would probably continue in their natural State, whatever Quantity of *Madder* were given them, supposing it could possibly be done.

Wherefore I resolved to try the Experiment on a Tree. I planted a Paradise Apple-tree in a Box, which I had filled with Earth mixed with a great deal of *Madder*; and I covered the upper Surface of the Earth with a Layer of *Madder* two Inches thick. This Layer was renewed several times for near two Years that my Tree is under the Experiment; but I have not as yet been able to examine if it's Wood is coloured by this Root. In case the Experiment does not succeed, as it is very likely it will not, it will serve at least to expose the Vanity and Uselessness of all those Receipts and Proceses of Vegetation, that are to be found printed in *Mizaldus*, *Porta*, and other more modern foreign Compilers.

Concerning a  
Zoophyton,  
somewhat re-  
sembling the  
Flower of the

XXVI. 1. At the North-End of the Island of *Barbadoes*, in *St Lucy's* Parish, is a Cave about 14 Feet long, and 11 wide: It's Bottom is a Bason always full of transparent Salt-water, it's greatest Depth about 3 Feet: In this Bason there is a Stone of about 4 Feet long, and 3 in  
breadth



Breadth, always covered with Water. From small Holes in the Sides of this Stone, at different Depths under Water, appear in full Bloom, at all Times of the Year, several seemingly fine radiated yellow Flowers, with thick-set distinct *Petala*: These Flowers\*, upon the Approach of my Fingers, or when disturbed by any thing else that came within 2 or 3 Inches of them, would in an Instant close all their Leaves together, and the Flower, Stalk and all, would shrink back into the Cavity of the Stone; yet, if undisturbed for the Space of a few Minutes, they would again come in Sight, and by Degrees expand their Leaves, and appear in their former Beauty. From such an Appearance at first, I could give it no other Name but that of a sensitive Flower; especially when I once saw several *Stamina*, but without *Apices*, rise up from the Socket of the Flower. Yet no sooner had these appeared to give me the Idea of a perfect Flower, but that replete with Animal Life, if Motion, and a Capacity of Self-Preservation may be called such; these Claws, or Arms, which I must no longer call *Stamina*, darted from one Side of the Flower to another, and about it's Verge, with a quick Motion, as if in Search of Prey. What further confirmed me in this Opinion, was, that I observed these Claws, when in Motion, to be jointed, and that they would often close together, as so many *Forcipes*; though their Appearance was but for a short time, soon retreating and disappearing again in the Socket of the Flower. As this seems to me, if it is allowed to be an Animal, to be it's manner of taking it's Prey, I leave it to the Judgment of others to consider whether, as these radiated Leaves can in an Instant close, with a strong elastic Force, to avoid Danger, they may not also when the Prey is brought within their Circle, be of Use to confine and secure it in their Embrace, till it is conveyed to the Mouth; which I suppose to be in the Socket, of what I have at first called a Flower. The Top of the Stone, out of which these seeming Flowers do grow, is covered over with Clusters of Water-bottles, that resemble unripe Grapes. Among these I found also several small blue Flowers, resembling the yellow ones in their Form and other Qualities.

2. At first Sight this Species of Animals greatly resembles the Flower of the *Marigold*, but is of a paler Yellow. I take it to be a Sort of *Urtica marina*, of which *Gesner* has given Descriptions and Figures in his Book *de Aqualibus*; but a Figure very nearly resembling this above described, is to be seen in *Johnston*, *Hist. Nat. de Exanguibus aquaticis*, Tab. XVIII.

XXVII. 1. In the 1st Chapter he discourses of Shells in general, and premises a Method of placing them in different Classes, which he reduces to 8, viz. *Tubulus*, *Cochlidium*, *Polythalamium*, *Lepas*, *Concha*, *Conchoides*, *Balanus*, and *Echinus*.

The 2d treats of *Polythalamiums*, which he defines a Tubulous Shell divided into several Cavities, conical, straight, or regularly spiral, with a Pipe, or Canal, passing through each Cavity. This again he subdivides

*Marigold*, by  
the Rev. Mr  
Griffith  
Hughes, Mi-  
nister of St  
Lucy's Parish  
in Barbadoes,  
No. 471. p.  
590. Read  
Nov. 10,  
1743.  
\* Fig. 71.

*A Remark by*  
C. Mortimer,  
M. D. R. S.  
Sec. Ibid. p.  
591.

*An Account of*  
*a Book intituled,*  
Jo. Phil.  
Breyonii, M. D.  
&c *Dissertatio*  
*Physica de*  
*Polythalamis,*  
*nova Testaceo-*  
*rum classe,*  
videt &c. Gedani,



1732, 4<sup>to</sup>. Or vides into four, viz. 1. *Orthoceras*, 2. *Lituus*, 3. *Ammonia*, and 4. a Physical *Nautilus*.

Dissertation of a new Class of Shells, which he styles *Polythalamiums*. &c. with 14 Copper Plates. By Richard-Middleton Massey, M.D. F. R. S. and Hon. F. C. Med. Lond. No. 430. p. 191. Nov. &c. 1733.

The 3d treats of the *Nautilus* and *Nautilites*, which last he takes to be a Stone formed under Ground in the Cavities of the *Nautilus*.

The 4th is of the *Ammonia* and *Ammonites*.

The 5th is of the *Lituus* (which he names from some Resemblance it has to the *Lituus*, or *Crozier*, which the ancient *Roman Augurs* used in their Ceremonies) and the *Lituites* or Stone formed in it's Cavities under-ground. The Shell is yet unknown, but of the Stone he has given a curious Draught, as it appears in a Marble which was brought from *Oelandt*, an Island of *Sweden*.

The 6th is of the *Orthoceras* and *Orthoceratites*, or stony Concretion in it's Cavity. Of these last Stones he produces 9 different Species, which he distinguishes chiefly by the Pipe or Canal, which runs thro' them.

In his Note concerning the *Belemnites Prussici*, of which he describes two Species, he takes notice that the stony Cone or Nucleus of it, is never found articulate, as in those that come from *Sweden*, and some other Countries.

At the later end of his Book he proposes a methodical Distribution of the *Echini* and *Echinites*, or Stones that are generated under Ground in the Cavities of the *Echini*.

The whole Method he proposes for ranging Shells in general, may be seen in the following Table.

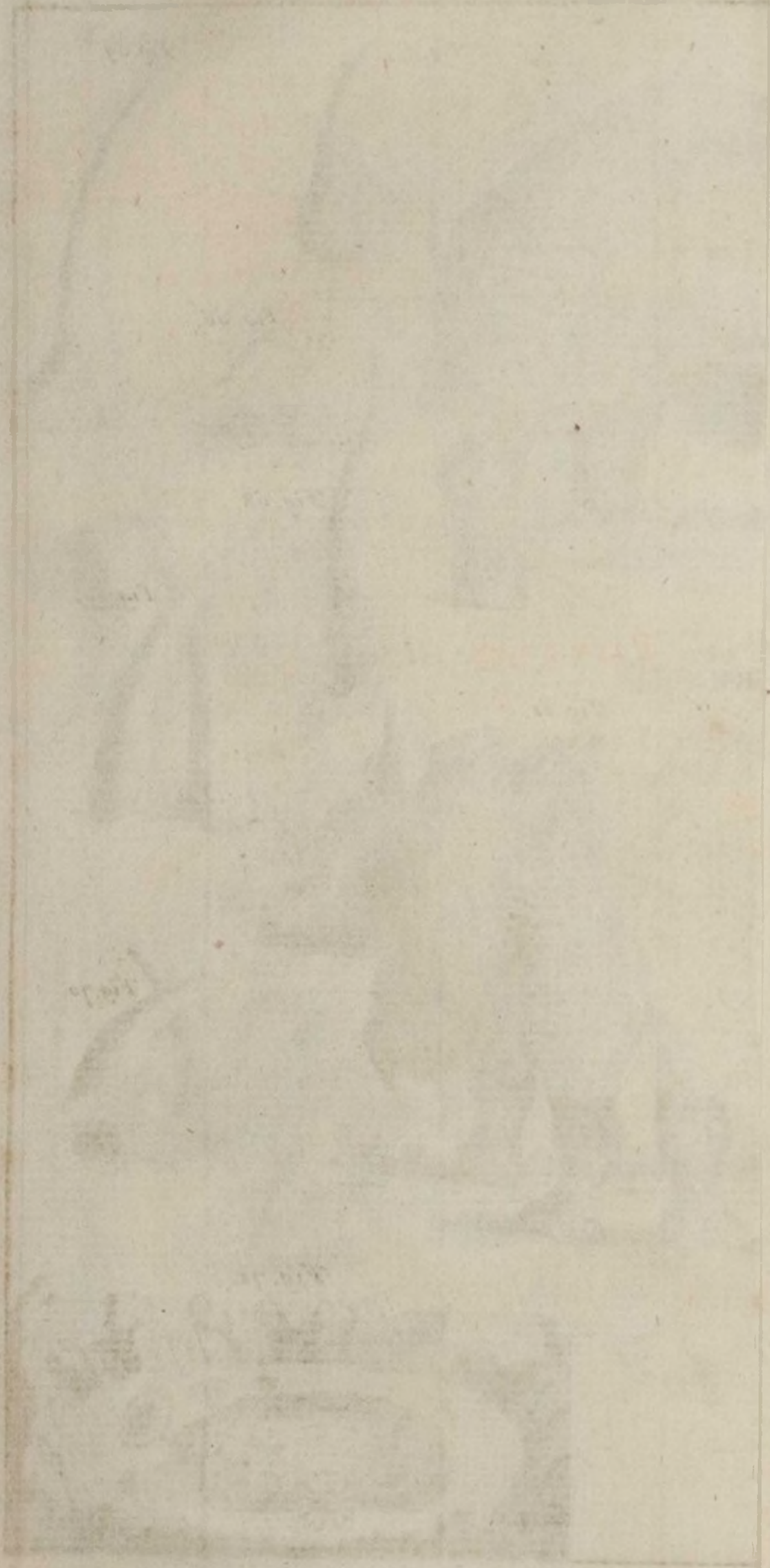
Tabula





1515  
RHINOCERUS  
Fig. 59.  
D











An Account by  
Mr John  
Eames, F.R.S.  
of a Book in-  
titled, Jacobi  
Theodori  
Klein Histo-  
riæ Piscium  
Naturalis pro-  
movendæ  
Missus primus  
Gedani, 1740.  
4<sup>to</sup>. Or, The  
first Number of  
An Essay to-  
wards pro-  
moting the  
Natural Hi-  
story of Fishes,  
by Mr Klein,  
Secretary of  
Dantzick, and  
F. R. S. No.  
462. p. 27.  
Read Feb 4,  
1741.

2. Although the Natural History of Animals has been vastly improv-  
ed, since several Members of the Royal Society, both at Home and  
Abroad, have taken it under their Consideration; yet there still remain  
some things to be known, in order to render it full and complete.  
As particularly, concerning the Hearing of Fishes, it is remarked, that  
in no Fishes beside the Cetaceous Kind, have hitherto been found any  
auditory Passages, or Ear-holes; and whether all Fish hear or no, is  
a Question not yet fully determined, notwithstanding the Experiments  
alleged to prove the Affirmative.

'Tis with this View, and in order to set this Matter in a clearer  
Light, the ingenious Author has obliged the World with the Book be-  
fore us.

It consists of a Dedication addressed to this honourable Society, a  
Preface, an Essay, and a double Appendix.

The Preface begins with acquainting us, what he means by Fishes,  
and defines them so, as to exclude several Tribes, that have been com-  
monly taken for such by the Ancients. *Pisces dicimus Animalia* (says  
he) *apoda pinnis natantia*; and adds in his Annotation upon it, *Ab  
hac definitione seclusa sunt Serpentium Genus, pinnis carens, Cancræ, Astaci,  
Testacea; Cochleæ, Conchæve; imo Amphibia, sive Bipeda, (ut Manati  
Clusii) sive Quadrupedia, ut Phocæ, &c.*

Mr Klein then (waving the Consideration of the Cetaceous Kind,  
which are allowed by most Authors to have both auditory Passages, and  
the Sense of Hearing) proceeds to the main Question, *viz.* Whether  
the Cartilaginous and Spinose Kinds of Fishes are endowed with the  
Sense of Hearing; or have any Organs or auditory Passages for that  
Purpose.

He gives us the Sentiments of the Ancients and Moderns, by pro-  
ducing a Variety of Quotations, both *pro* and *con* out of their Works;  
from whence (says he) it appears, that though some of them were du-  
bious, yet many of them agree, that Fishes do hear; nevertheless,  
none of them were fully satisfied, by what Part, or Ways, they had this  
Sensation produced. And though *Julius Casserius Placentinus* found out  
some little Bones in the Head of the Pike, which he looked upon to  
be the Organs of Hearing, yet he could not discover any manifest ex-  
ternal auditory Passages.

In fine, from a diligent Inquiry into, and Consideration of all, that  
hath been said from Reason and Experience on both Sides the Question,  
our Author determines us in Favour of the Affirmative; and says,  
That Fishes not only have Organs of Hearing, but also Passages,  
(though they are difficult in many Species of them to be demonstrated)  
by means of which a tremulous Motion is communicated to these Or-  
gans. Nor does he think the Water in which they live, any Impedi-  
ment, but rather the Medium, (or, as he calls it, the *Intermedium*) by  
which Sound is communicated to them: As a Man shut up in one  
Room,



Room, will hear and understand what is said in another, notwithstanding the Interposition of a Party-Wall.

He then proceeds to his Essay, wherein he considers what Parts in the Head of Fish serve for the Organ of Hearing, and by what Passages a tremulous Motion producing this Sensation may arrive at them. This Part of his Treatise he styles, *De Lapillis, eorumque Numero in Craniis Piscium*. These little Stones, sometimes called *Officula*, or little Bones, Mr Klein looks upon, and accordingly considers, as constituent or essential Parts in the Heads of Fish, and generated with the Brain itself. They differ (he says) in Magnitude, according to the different Size or Bulk of the Fish to which they respectively belong, and are easiest to be discovered in Heads of the Spinose Kind.

There are in all kinds of Fish 3 Pair of them; the first are the 2 largest Bones, and are easily enough found; but the greatest Difficulty lies in discovering the other two Pair, which are small, and lie enveloped in distinct little Bags, or a fine sort of Membrane. These he takes to be the auditory Organs, and answer to the *Incus*, *Malleus*, and *Stapes*, in other Animals: And he thinks by a diligent and careful Inspection, we might determine the Age of Fishes, by the Number and Thickness of the *Laminae* and *Fibres* of these Bones, as we can the Age or Growth of a Tree, by the Number of Circles in the woody Part of it's Trunk.

The Passages by which a tremulous Motion producing the Sense of Hearing, may arrive at these auditory Organs, are what our Author next enquires after; and he produces first a Specimen in the spinose Kind, *viz.* in a *Pike*; and upon Inspection into the Head of this Fish, he observes several Holes, which, by means of Hogs Bristles, he finds lead directly to these auditory Bones before described.

In dissecting the Head of a *Sturgeon*, (as a Specimen of the cartilaginous Kind) he traced the auditory Duct as far as the Membranous Body in which the three Pair of little Bones are placed.

But as our Author has obliged us with an exact Delineation of these auditory Ducts or Passages, as well as the Figures of a Variety of those *Lapilli* or *Officula*, from different Sorts of Fish, on several Copper Plates, to these I must refer, for a more satisfactory Idea than can possibly be given in Words.

We therefore proceed to the first Appendix, which entertains us with the Anatomy of a *Porpeff*. This Fish our Author in the Title Page styles *Terfio*, the usual Name for it in *Pliny*; but he calls it *Phocæna* in the Appendix, the Name used for it by *Aristotle*.

'Tis ranked amongst the cetaceous Kind, and is the smallest Fish in that Tribe, seldom exceeding 5 Feet in Length; in which it differs from *Dolphins* (amongst which Species it has by some been improperly reckoned) for they often exceed 10 Feet in Length. The Snout also of the *Dolphin* is much larger than in the *Porpeff*, which is another thing sufficient to distinguish them. It would be needless here to give



a Detail of the Anatomy of this Animal, which is so largely done by Dr *Tyson* in his *Phocæna*. I shall therefore only take Notice of some Remarks made by our Author upon the Dissection of a *Porpeffs*, by the accurate Hand of Dr *De la Motte*, at Mr *Klein's* Request.

In the first Place, the *Meatus Auditorius* was found by both to be 2 Inches distant from the exterior *Canthus* of the Eye, forming a very small Hole (lest the Water getting in might prove an Inconvenience to it). He then gives us an Account of the *Os Petrosum*, and other auditory Organs, with curious Figures of them; in order to correct Mr *Ray*, who says \*, *We observed not in this Fish any Ear-holes or Meatus Auditorii at all, wherein also Aristotle agreeth with us.*

A second Remark is, that though the *Porpeffs* has no *Vesicula fellea* or Gall-bag, (and from thence most Authors have been induced to believe no Gall) yet Dr *De la Motte*, upon a more exact Scrutiny, finds a Duct that arises with a great Number of Branches in the Liver, and tending downwards, joins itself to the Pancreatic Duct; and these two so united together, form a Canal or common Duct, about 4 or 5 Lines long, before they discharge their Contents into the *Duodenum*. From whence it appears, (says Dr *De la Motte*) that the *Porpeffs* has always a Discharge of Bile into the *Duodenum*, though 'tis but thin and diluted, and such as in other Animals is usually called Hepatic Bile.

In dissecting the *Os Petrosum*, several Worms were found: Some of these Mr *Klein* has presented us with a Figure of, as also of the Parts of Generation proper to the Male *Porpeffs*, and lastly the Thoracic Duct in it's natural Dimensions.

Our Author concludes with some Observations made on the Heads of two *Raiæ* of an uncommon Species, and which he says are no where described. He gives us the Figures of the auditory Organs, with the Jaw of one of these Fish very accurately depicted in his vi<sup>th</sup> Table.

And having considered the auditory Organs, with the Seat of them both, in the Cetaceous, Cartilaginous, and Spinose Kinds of Fishes, it appears, says our Author, that these *Lapilli* or *Officula* differ from one another both in Structure and Substance; for in cetaceous Fishes, whose Skeletons are truly bony, and which, in certain respects, may be compared to truly Lignous Trees, both the *Os Petrosum*, and auditory Organs, are in these, as in other Animals, perfectly *osseous* or bony: Whereas the cartilaginous Fish, whose Skeletons are elastic and cartilaginous, they may be compared to the *Keratophyta*, Species of Sea-Plants; and these Fish, instead of an *Os Petrosum*, have something analogous, but cartilaginous; and the auditory Bones are of a tartareous Kind of friable and easily macerabile Substance.

\* See Vol. II. Chap. vi. §. 36.



[ The following Paper belongs to Section VIII. ]

10. After I had, without Success, made several repeated Searches for the *Polypus*, in several Fish-Ponds, and a small Stream in my Parish, I applied myself to collect the different Insects of various Sorts I had there met with, and which were of more than than 30 Kinds, all which I put together; but some of them voraciously seized upon others, and devoured them, so that in a Day's time I had hardly any left, but a few of one Sort, which rolled themselves up like *Millepedes*, or *Hog-lice*, but were, upon the whole, more of the *Leech* Kind, and could extend themselves about an Inch in Length. These I cut asunder, but the Pieces died in about 30 Hours after the Operation. I then recollected, that, in the Account published by Dr *Mortimer*, Mention is made of a *French* Gentleman, that had discovered *Water-Worms*, that would live after cutting: I searched for all I could find fastened either upon rotten Wood, Leaves, Straws, or Stones, that I took out from the Bottom of the Water, and cut of every Sort asunder; but none lived above 48 Hours, except these I here send you. In one Glass are 4 Pieces that now seem to be compleat Worms, and the same as the two in the other Phial: These 4 Pieces, 12 Days since, were 2 Worms: I cut them asunder with my Penknife, and found that each Part, from the first, continued vigorous and strong; and I could, by my naked Eye only, see that in three Days the Ends where the Wounds were given, were grown sharper, and that they moved along like the entire Worms.

The 2 entire Worms here mentioned to have been contained in one of the Phials sent up by Mr *Lord*, were each cut presently after into two Pieces, which soon after compleated themselves, grew longer, and were several Weeks after in a vigorous and thriving Condition.

Concerning  
some Worms  
whose Parts  
live after they  
have been cut  
asunder, by  
the Rev. Mr  
Thomas Lord,  
No. 470. p.  
522. Read  
June 9, 1743.

See above.

## C H A P. II.

### *The Structure, External Parts, and common Teguments of the Body.*

A Girl now 8 Years old, had Swellings in her Joints, and all over her Body some Years ago. Various Remedies were applied by her Parents, chiefly such as were domestick or empirical. A remarkable Tumour then arose in her Back between the Shoulders, which they endeavoured to discuss by topical Applications. In this they succeeded; but from that Time there gradually appeared a dry hard Crust, chiefly on the Palms of her Hands and Soles of her Feet, and came out also from the Ends of her Fingers and Toes, obstructing the Use of them, and rendering her incapable of either standing or walking. This Crust fell off at Times, especially after the Use of various Ointments by her Parents, but she was so much the worse

A remarkable  
cutaneous Dis-  
order, by  
Abr. Vater,  
Prof. Anat.  
& Bot. Wit-  
temberg,  
F. R. S. N<sup>o</sup>  
440. p. 199.  
Jan. &c.  
1736.



worse, grew bloated, and felt inward Disorders and Gripings, which did not cease till the Crust grew again. When that returned, she had no other Complaint than the Loss of the Use of her Hands and Feet. She was then put under the Care of a Surgeon, who gave her mercurial Purges, and Decoctions to purify her Blood, to which the Disease yielded again, and the Clearness of her Skin returned, so that she is now in a perfect State of Health; but whether it will continue, Time must shew. I received from Mr *Harnisch*, who sent me this Account, a Piece of the Crust, and a Bit of it, that fell from the End of one of the Fingers. It was of such a Length and Thickness, that it appeared like the last Joint of the Finger, and the more so, as a Piece of the Nail stuck to one Side of it. This Crust being viewed by the Microscope, plainly appears to be composed of little Scales, so that it is certainly the very Cuticle expanded and hardened by a viscid and tartarous Nourishment. The same Gentleman also mentions a young Woman, who for a long Time has shed such a Crust twice every Year, from her Hands, Feet, and Elbows. She has not yet received the least Benefit from any Medicine. She has indeed an Obstruction of the *Menses*, which may be looked upon as the Original of her Disorder.

## C H A P. III.

*The HEAD.*

*A remarkable Cure performed by John Cagua, Surgeon, at Plymouth-Dock, of a Wound of the Head complicated with a large Fracture and Depression of the Skull, the Dura Mater and Brain wounded and lacerated. N<sup>o</sup> 458, p. 495, Sept. &c. 1740.*

I. JUNE 11, 1729, I was sent for to Mr *John Darton* of *Stonehouse* near *Plymouth*, to see his Son, aged 10 Years, who fell down from the Top of an old Wall, as he was taking out a *Sparrow's Nest*, upwards of 20 Feet high, in an ancient Building belonging to the Honourable *Richard Edgewcombe*, Esq; When I came, I found him speechless, comatose, bloated Eyes, a wan Face, bleeding at the Nose and Ears, and a great *Hæmorrhage* and Vomiting: On Examination, a large, long, deep, and contused Wound appeared, from the Eye-brow all over the Left Side of his Head; and after having shaved him, was surpris'd to feel, with my Fingers, so many rugged Splinters of the *Cranium* confusedly depressed through the *Dura* and *Pia Mater* into the Substance of the Brain; the Extremities whereof appearing above the *Dura Mater*, I extracted to the Number of 5, besides several other Bits and small Pieces. In taking out the last Splinter, being Part of the superior and interior Part of the Orbit, containing some of the Basis and inferior Part of the *Os Frontis*, joining by the *Sutura Transversalis* to the superior Part of the *Os Mala*, with Part of the said *Suture*, and the upper Extremity of the *Sphenoides*, almost to the lower End of the *Sutura Coronalis*, and *Squamosa*: This Splinter was the major Part of it depressed under the superior Part of the



the great Depression of the *Os Frontis*; on extracting of which, 2 Parts or Pieces of the Substance of the Brain, with clotted Blood, came out with it, one as big as a large Kidney Bean, and the other as a large Pea; at which Time the Patient fainting and vomiting, brought up most of what was contained in his Stomach, mixed with bilious and bloody Matter. The *Dura Mater* was very much contused, lacerated, and bare, upwards of  $3 \frac{1}{4}$  Inches, in Length, and at one End  $1 \frac{1}{2}$  Inch over, the Remainder about 1 Inch, and the Edges rugged: From the upper Part of the Fracture, there was a Depression of the *Os Frontis*, which reached up to the *Sutura Sagittalis*, nigh the *Coronal Suture*: One Part of the *Cranium* lapt over the other, which I sawed off on the Third or Fourth Day, it being an Inch long, and occasioned me a great deal of Trouble, before I could raise it up with my Elevator, the inferior Part of the Fracture being so thin and weak: The depressed Part terminated in a long Fissure about an Inch behind the *Coronal Suture* in the *Bregma*: The *Scalp* was so much contused and lacerated, that the next Day it began to mortify, which obliged me to lay all that Side of the *Coronal*, and the greatest Part of the *Bregma*, home to the *Lamoid Suture*, bare, from the upper Part of his Head down to his Ear: The *Dura* and *Pia Mater* were very livid, and insensible to the Touch, except those Parts where the Brain was wounded, in the dressing of which the Motion or Pulsation of the Brain was very strong, and sometimes to that Degree, that it would rise considerably above the Surface of the *Cranium*; which obliged me to keep it down sometimes more than 2 or 3 Minutes with my Fingers, and a large and thick Sindon dipt in a warm detergent Lotion, before it would cease, introducing it between the *Dura Mater* and the Edges of the Fracture. The upper Eye-lid in a Week's time impostumated, and formed a large Tumour as big as a Hen's Egg, which I opened, and kept it so a considerable Time, because I had therefrom a plentiful Discharge of Matter, which was at first very fetid, but afterwards became laudable, giving likewise a good Discharge from the wounded Brain through the Fracture of the upper Part of the Orbit. In about a Fortnight's time I had a very laudable Suppuration from all the Wound, and the Symptoms ceasing, the *Dura Mater* began to regenerate, looking very red and fresh; the livid and lacerated Parts sluff off, and the Extremities of the Fracture began to throw out their Ossifications from the *Diploe* and both Tables of the *Cranium*, like small Excrescences, or proud Flesh, which in a Month's time spread over the whole Fracture; and I made my Observation, that it grew harder sooner at the Extremities of the Fracture than in the Centre. The Motions or Pulsations of the Brain still continued, and were very visible for a long Time after, and were felt for some time after the Wound was cured; especially in the inferior Part of the *Coronal* and *Bregma*, over the inferior Part of the *Coronal Suture*, nigh the *Squamosa*. Except the 3 or 4 first Days the Boy continued very sensible; but during the first 6 Weeks would very often complain of a violent Pain in his Head, attended with a *Coma* and Fever; but would soon go off again,

by



*A remarkable Cure performed by Mr Cagua, Surgeon.*

by giving him an emollient and laxative Clyster, or a gentle laxative Draught. The 6th of Oct. following, before his Wound was quite well, he was taken very ill with the Small-Pox, of the Flux-kind, and though he had them very severe, and was delirious in their coming out, yet he recovered. Nov. 11. following, the Wound was perfectly cured; but in the latter End several Exfoliations were taken out of the upper Part of the *Coronal*. He is now, and hath been ever since, very well, strong and healthy; has his Sight in both Eyes, is a very sensible and forward Lad, for his Age, and has been upwards of 4 Years at Sea, in his MAJESTY'S and the Merchants Services.

Fig. 72.

Fig. 72. Represents the Boy's Head, with the Wound, as it appeared to View, and Part of the Cranium laid bare.

Fig. 73.

Fig. 73. Represents the Skull, with the Fractures made in it, and the several Splinters that were taken out.

A . . . . . Is the external Part of the Splinter, adjacent to the superior Part of the *Os Malæ*, and the upper Part of the Orbit, in it's proper Bigness and Figure. 1. Is the thick Protuberance of the Basis and inferior Part of the *Os Frontis*, broken off and separated from the superior Extremity of the *Os Malæ* in the transverse Suture. 2. Is the lower Part of it broke off from the upper Part of the *Os Sphenoides*. 3. Is Part of the *Sutura Transversalis*. 4. Is the Diploe, and it's Thickness, being very rugged and irregular

B . . . . . Is the internal and concave Parts, with the Thickness of the same Splinter 1. Is Part of the Concavity of the upper Part of the Orbit. 2. The superior Part, with it's Thickness and Diploe. 6. and 7. The external and internal Tables. 3. The inferior and internal Part separated from the *Os Sphenoides*: The Middle of it is a deep Concavity. 4. 4. A rugged Ridge arising from it's Cavity, and likewise from the great and middle one. 5. The internal and concave Part. 8. 8. Part of the *Sutura Transversalis*.

C . . . . . Is Part of the inferior and Basis of the *Os Frontis* and Bregma, with some of the lower Part of the *Sutura Coronalis*; being very thin in the Middle where the Suture is, it shews it's proper Bigness and Figure. 1. The Diploe.

D. D. D. Three other Splinters in their proper Bignesses and Figures. 1. 1. 1. The Diploe and both Tables.

E . . . . . The Splinter that lap! over the Depression, which was sawed off.

*The Case of a Wound in the Cornea of the Eye being successfully cured*

II. A young Woman about the Age of 15 Years, Nov. 6. 1733, received a Wound just in the Pupil of her right Eye, by the Spear of a common Fork. An Inflammation followed, with great Pain. The whole Eye appeared dark and turbid; and the Humours seemed confused,





Fig. 72.

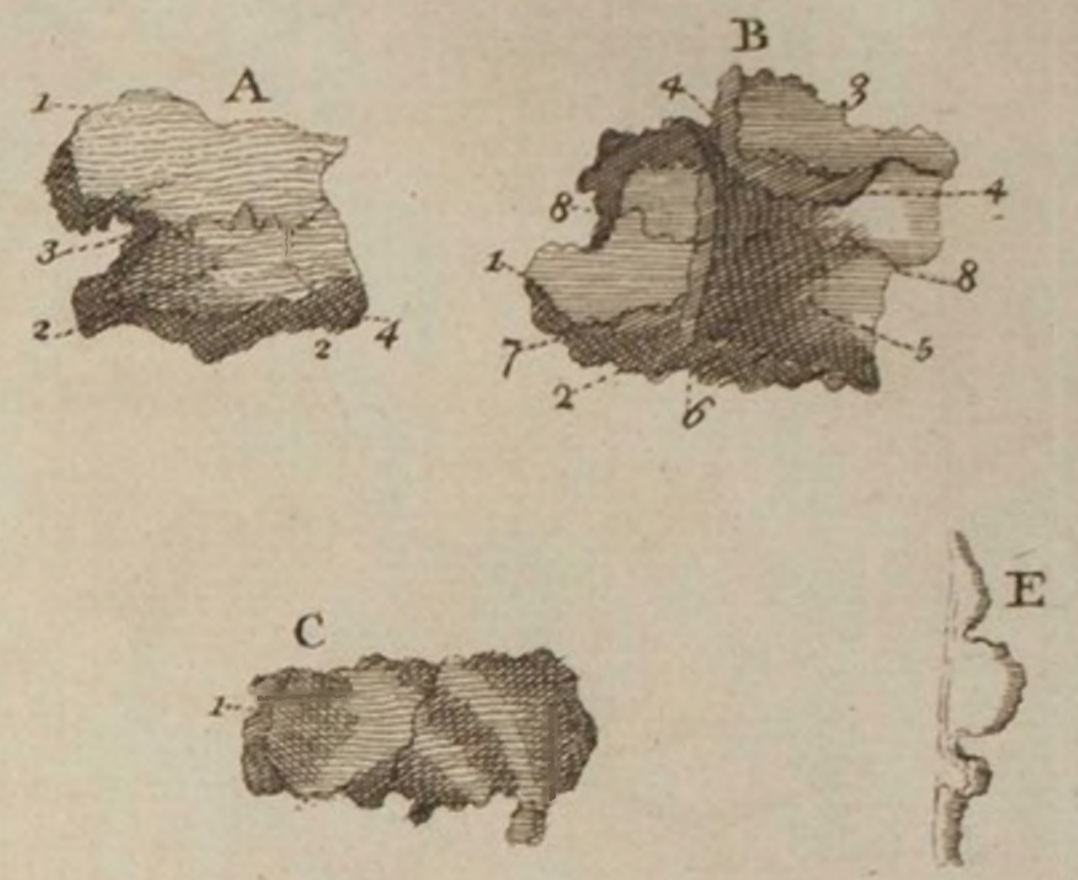
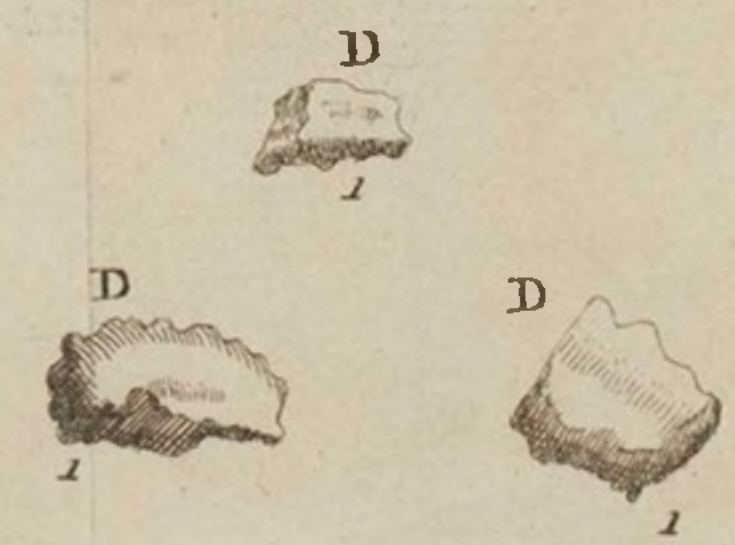
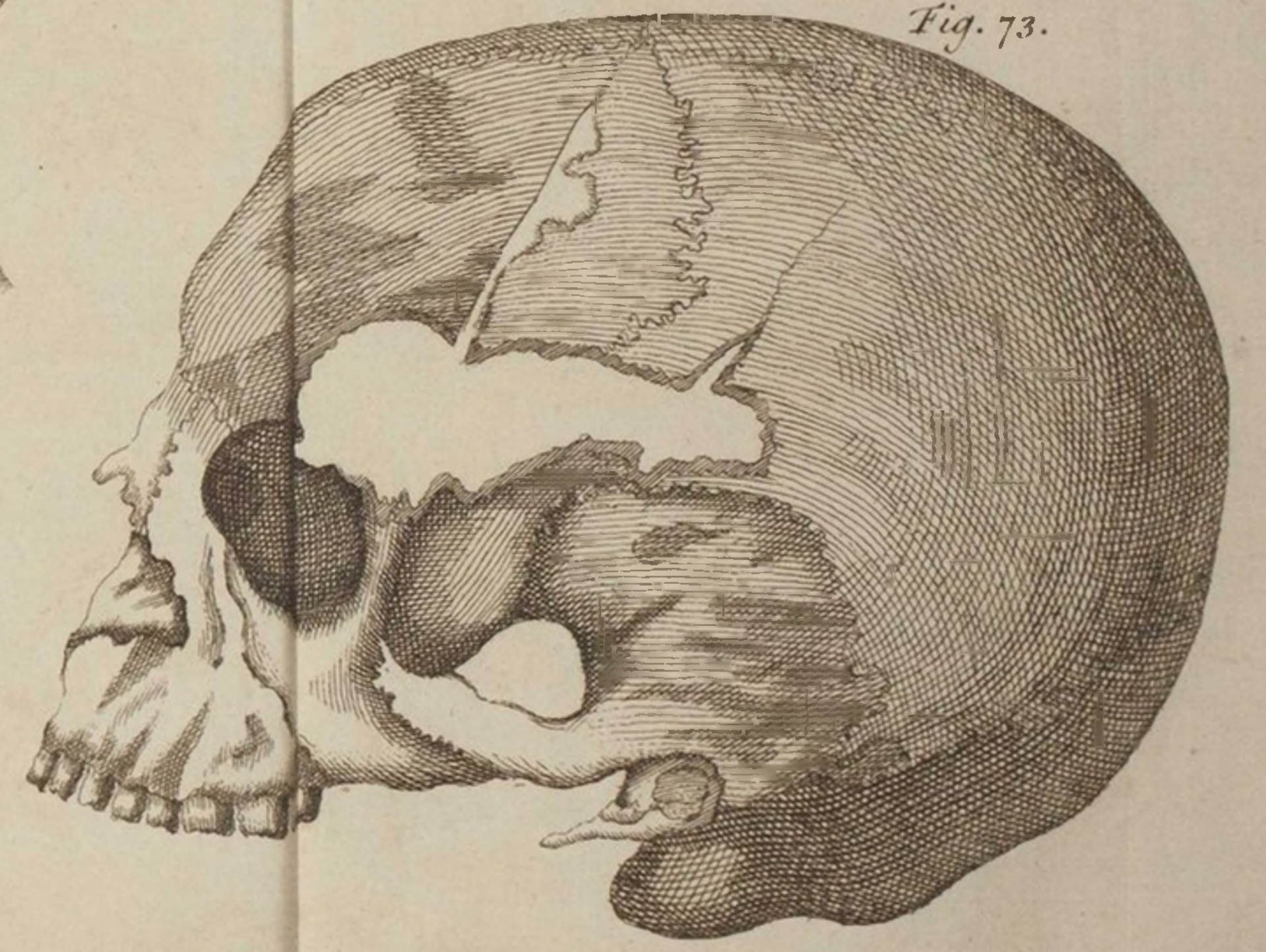
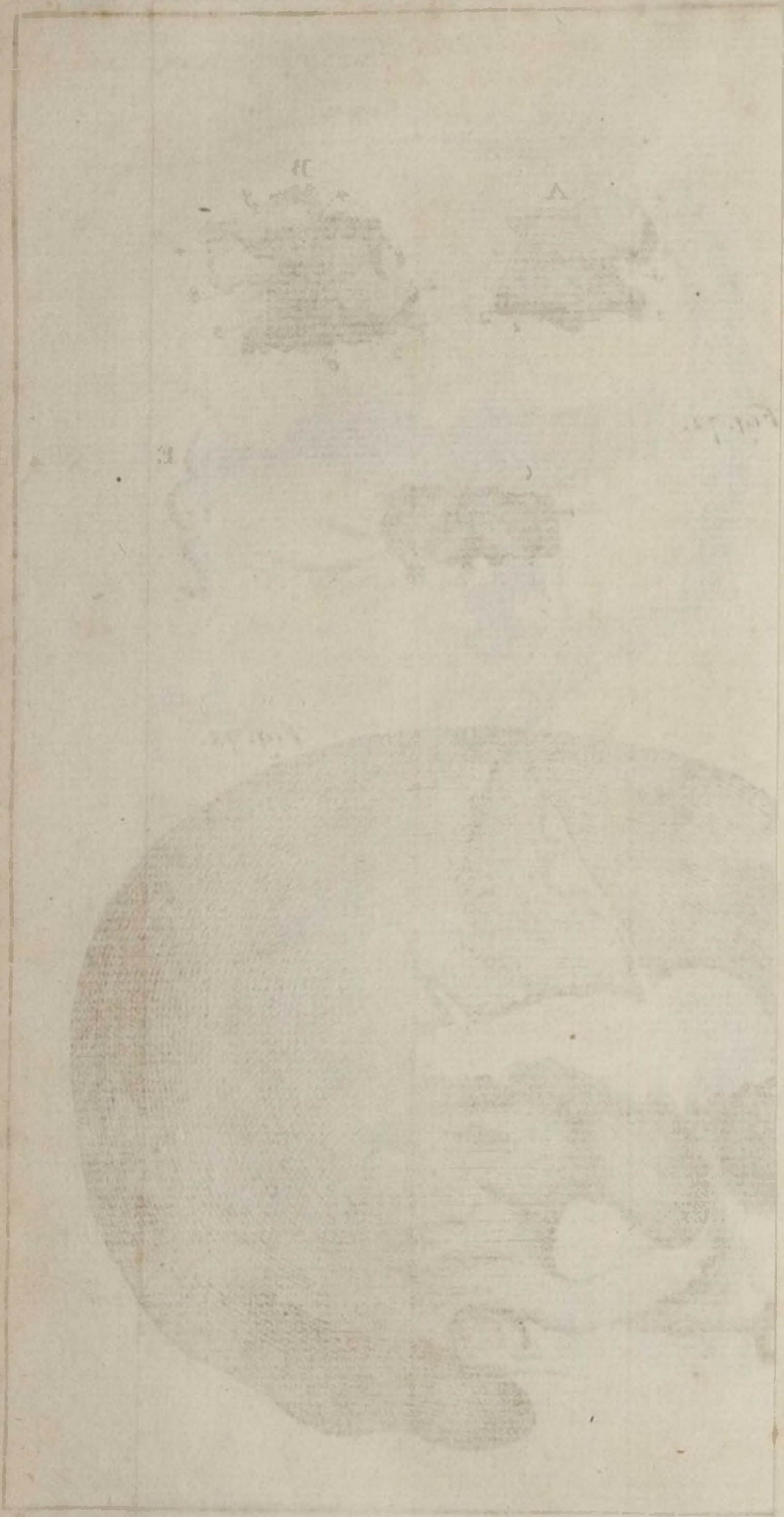


Fig. 73.









and blended together. I opened a Vein in the Arm, and drew away 10 Ounces of Blood: I then washed the Eye with a Collyrium of *Trochisci Albi Rhabis*, and common Water, made Blood-warm; and dressed it with a Cataplasm of white Bread and Milk, with a little Saffron in it. The next Day there appeared on the wounded Part of the *Cornea*, a large thick Slough: I dressed her in the same Manner, and so continued till the 18th Day of the same Month, when the Slough cast off. I purged her during this Time with *Decoct. Sennæ* ℥ij, *Mann. Solut.* ℥ss, *Aq. Pæon. comp.* ℥ij; *m. f. Pot.* at the Distance of about 3 Days, just as I found her Strength would permit. The Inflammation and Pain abated daily. During the whole Time, the Eye was quite blind, till the Slough cast off, when she complained she saw double. In a very little time her Sight returned, but not so perfect as before; her Eye having somewhat of a Cloud before it.

by Mr Tho. Baker, Surgeon to St Thomas's Hospital, N<sup>o</sup> 453, p. 135, April 1739.

I made her 6 Visits, at the Distance of 2 or 3 Days after the 18th: When I left her, she saw perfectly well, that Cloud which she before complained of, being removed, her Eye appeared fair and clear; and, as she told me, was equally strong and useful to her as her other. A little Speck (which was the Cicatrix of the Wound) remaining on the *Cornea*, I made her a Fontanel in the Arm, and ordered her to keep it open, and not to touch the Speck on her Eye. It is now more than 2 Years since, the Speck has gradually decreased, and is now so small, that it is scarce visible; and her Sight is as perfect and strong as before this Accident.

III. June 7, 1732. M. Guilliminet, Counsellor of the Court of Aids, went hence to *Balleruc*, (whither I had been called to attend a Patient) with a Nun his Daughter, about 30 Years of Age. This Lady was troubled with as singular a Disease as I have heard of. 'Twas an intermitting periodical Palsy of the Eye-lids, which began every Evening about 6, with a Defluxion from the great *Canthus*, of a whitish Matter of some Consistence; so that she remained blind till next Morning, and then recovered the Use of her Eye-lids as before. This Disorder held her since *February* last, from which Time all Remedies ordered her by her Physician proving ineffectual, she was sent to *Balleruc* for the Benefit of the Waters. As we lodged in the same House, I had a fair Opportunity of observing the Effects the Waters had on her. She was pumped on the back Part of her Head and Neck 7 times, without receiving any sensible Benefit: The ninth time her Disorder seized her an Hour later than usual, and the Defluxion was less and thinner. The next Evening it retarded two Hours, and the following Night she had as much Command of her Eye-lids as ever. She took the *Douche* (for so we call that way of pumping) the next Morning and Evening and was entirely cured. I sat with her an Hour that Evening, carefully observed her Eye-lids by Candle light, and asked her several Questions on her Disorder. She opened her Eyes as well as I did mine, and set out the next Day for *Montpelier*.

An uncommon Palsy of the Eye-lids, by Dr. Andrew Cantwell, of Montpelier. N<sup>o</sup> 449, p. 311, August, &c. 1738.

IV. The Intention in destroying the *Os unguis*, and *Saccus lacrymalis*, through which the Tears naturally distil into the Nose, is to procure

Some Thoughts on the Operation of the Fi-



*stula lacry-*  
*malis* by Fran-  
cis-Joseph Hu-  
nauld, M.D.  
F. R. S. Reg.  
Prof. Anat. &  
Surg. and  
Member of the  
Roy. Acad. of  
Sciences at Pa-  
ris. N<sup>o</sup> 437.  
p. 54. April,  
&c. 1735.

them a new Passage thither, by the Hole thus artificially made. Wherefore, in order to keep the Sides of this Hole asunder, to prevent it's filling up, and render the Flesh, which forms it's Circumference, hard and as it were callous, a Tent made of prepared Sponge, &c. is put into this new Passage, and is continued therein a Month or two. However, this Precaution, notwithstanding it happens but too often, that the Tears, instead of keeping the Road prepared for them with such Care, flow over the lower Eye lid, as before the Operation, and occasion a Weeping, which is now become past Remedy.

'Tis easy to prove, that those very Means, which are used after the Operation to make the Tears distil into the Nose, are generally the Cause of the subsequent Weeping: For by filling the Wound with small Pledgets, and putting a Tent into the Hole that was made, the Orifice of the little common Canal, that serves to convey the Tears into the *Ductus lacrymalis*, suffers a Compressure, and is rendered hard, thick, and callous, whereby, as it's Diameter is very small, it is easily stopped up. The Contusion made on this little Orifice, and round about it, brings on a Suppuration; after which the Parts coalesce, and the Orifice of this small Canal closes up. The Pus, or Sanies, that in the Course of the Distemper flowed back both through the common Canal, and the small Canals, which are a Continuation of the *Puncta lacrymalia*, has sometimes occasioned Excoriations; in consequence of which happens a Regeneration of Flesh during the Dressings, a small matter whereof is sufficient to stop up such slender Ducts. In fine, those small Canals, through which nothing passes for a Month or two, that the Dressings last, either close by their proper Springiness, or their Diameters are lessened by their small Vessels becoming varicous. 'Tis certain, that Injections are sometimes made through the *Puncta lacrymalia*; but the propelling Force of these Injections overcomes those Resistances, which the Cause that naturally drives the Tears into the *Puncta lacrymalia*, is not in a Condition to get the better of.

Thus it appears from the Detail of the Accidents I have enumerated, and which generally happen, more or less, that while the Artist is endeavouring to preserve a clear Passage for the Tears into the Nose, he labours, without designing it to stop the Entry of the upper Part of their Canal. I hope now to make appear, that the best way to avoid part of these Accidents, and keep open the new Canal from the Eye to the Nose, is precisely to do nothing. This is what Experience has confirmed me in, and what likewise Theory, well understood, will give us a clear Conception of.

'Tis a Thing not very easy to determine, how the Tears, and the Liquid that is continually found on the Surface of the Eye, in order to preserve the Cleanness and Transparency of the *Cornea*, can pass through the *Puncta lacrymalia*. 'Tis moreover observed, that when one lies in Bed, this Liquid enters into those *Puncta lacrymalia*, which in that Position are higher than the Eye, as well as into the *Puncta lacrymalia* of the opposite



posite Eye. The Ascent of Liquors in capillary Tubes above the Level, might be proposed to explain this last Fact. One might also in certain Circumstances imagine the Road which the Tears keep, to pass from the Eye into the Nose, to be a *Syphon*, the short Leg of which is divided into two. 'Tis strange that these two Ideas, which strike by their Simplicity, have not been offered by any one hitherto. It must be allowed, however, that they are not entirely sufficient to account for the *Phænomènon* under Consideration. The following *Rationale* seems to me quite as simple, and more accurate.

The Air present at the Orifices of all the Ducts, which have any communication with the *Trachæa*, is by it's proper Weight determined to enter them, when the Resistance happens to be diminished. Thus as, during Inspiration, it passes through the Mouth and Nostrils, so it likewise enters the *Puncta lacrymalia*; and must necessarily carry with it, towards the *Puncta lacrymalia*, and their small Canals, the Moisture that lubricates the Surface of the Ball of the Eye, as it mixes with it. Therefore it is easy to perceive already, that in order to preserve to the Tears their new and artificial Road into the Nose, one need only commit the whole Care to the continual Passage of the Air and Tears. 'Tis well known in good Surgery, that 'tis very difficult, not to say impossible, to effect a re-union in a Part, that serves as an *Emunctory* to a Liquor constantly flowing to it.

Now let us examine, if Nature alone can stop the Hole made by the Operation. It will not be imagined, that from the Remains of a bony *Lamina*, so thin as the *Os Unguis*, a sufficient Quantity of ossifying Juice can work out to stop it up. The *Periosteum* and *Saccus lacrymalis* are too much lacerated, to think it possible for them to repair of themselves what they had lost. Nor will it be believed, that the *Membrana pituitaria* can easily fill up the Hole made in it. Those are the Parts concerned in the Operation: But even if they are granted to be more disposed to a Re-production than they really are, still the Air and Tears will always be able to preserve themselves a Passage into the Nose.

Wherefore after having destroyed the *Saccus lacrymalis* and *Os Unguis*, instead of introducing an extraneous Body capable of making the Orifice of the small common Canal into the *Ductus lacrymalis* become callous, and of drawing on a Suppuration, the Communication between the Nose and Eye must be left entirely disengaged, and Liberty by this Means be given to Respiration, to make both the Air alone, and the Air mixed with the Tears to pass continually through it.

In fine, the Action of these Fluids may be assisted by the Application of *Collyriums*, and by making frequent Injections into the *Puncta lacrymalia*; which, besides the common Effects that may be naturally expected from them, will contribute to prevent the Juice, that re unites the Wound made in the Skin, from over streightening the Canal.



*A Description  
of Needles made  
for Operations  
on the Eyes, by  
Archibald Cle-  
land, Surgeon,  
N<sup>o</sup> 461, p.  
847, Aug. &c.  
1741.  
\* Fig. 74.  
† Fig. 75.*

V. The first \* differs from a common Couching-needle in this, that it is made of two Pieces of Steel foldered together, and fixed in a Handle †: At a little Distance from the Handle they separate, and have, in each *Lamina*, a Button fixed, which passes through a Hole in the other; from this Part to the Points, they are so nicely applied, and polished together, that they cut, and have the Shape of a common Needle: Upon pressing the Buttons, the Points are separated, and in the Inside of the broad Part of the Points are several small Indents, to prevent any thing from slipping, after it has once got hold.

The Use of this Needle is, either to depress a Cataract; or, if it should be found of such a Nature as to bear to be taken hold of, then, by opening the Points, to engage it, and carefully bring it out of the Eye.

If it should happen, that in depressing the Cataract, or in bringing it out of the Eye, some of the small Vessels are wounded, and some Drops of Blood diffuse themselves in the aqueous Humour; this second Needle is made with Design to remedy this Inconveniency.

It is a long, small, round Stilet, gradually decreasing from the Handle to the Point; and is fitted to a long Silver Tube of the same Shape, into which the Needle is put, and the Point comes out at the End  $\frac{1}{4}$  of an Inch. This is to be introduced into the Eye at the Orifice the other Needle had made: When it is so far introduced, as the End of the Tube is within the posterior Chamber of the aqueous Humour, the Needle is to be withdrawn, leaving the Tube in the Eye; and then, with the Mouth, may be sucked into the Tube, all the Blood, and watery Humour, that is contained there, or any other floating Particles: Then the Tube is to be withdrawn, and the Eye left to replenish itself with the aqueous Humour again; which will take Twelve or Eighteen Hours at most.

*Instruments  
proposed to re-  
medy some kinds  
of Deafness  
proceeding from  
Obstructions in  
the external  
and internal  
auditory Pas-  
sages; by the  
same. ibid. p.  
848.  
\* Fig. 79.*

VI. In order to discover, with more Exactness, whether the Disorder lies in the outward Ear, I make use of a convex Glass, 3 Inches in Diameter, fixed in a Handle,\* into which is lodged some Wax Candle, which comes out at a Hole near the Glass, and reaches to the Centre; which, when lighted, will dart the collected Rays of Light into the Bottom of the Ear, or to the Bottom of any Cavity that can be brought into a strait Line. Therefore, when it is discovered by the Help of this Glass, and lighted Candle, that the Ear is full of hard Wax, which will not bear to be taken out with the *Forceps*, the Method is to have a small Boiler, wherein are put some proper Herbs; and, by different Tubes of various Sizes, the Steam is conveyed to the Bottom of the Ear. In a short Time the Wax will dissolve, and the Person find great Ease. In one of these Tubes, are placed 2 Valves, to regulate the Heat to the Person's Inclination. If this has not the desired Effect, and the Person still remains deaf, the following Instruments are made to open the *Eustachian Tube*: If upon Trial, it should be found to be obstructed, the Passage is to be lubricated by throwing a little warm Water into it by a Syringe joined to a flexible silver Tube, which is introduced through the Nose into the oval  
Opening



Opening of the Duct at the posterior Opening of the *Nares*, towards the Arch of the Palate. The Pipes of the Syringe are made small, of Silver, to admit of bending them, as Occasion offers; and, for the most part, resemble small Catheters: They are mounted with a Sheep's Ureter; the other End of which is fixed to an Ivory Pipe; which is fitted to a Syringe, whereby warm Water may be injected: or they will admit to blow into the *Eustachian* Tube, and so force the Air into the Barrel of the Ear, and dilate the Tube sufficiently for the Discharge of the excrementitious Matter that may be lodged there. The Probes, which are of the same Shape with the Pipes, have small Notches near the Points, which take in some of the hardened and glutinous Matter, that is contained in those Tubes, which is distinguished by the fetid Smell, when the Probes are withdrawn.

Fig. 80.

Fig. 81.

There is another Kind of Deafness, which proceeds from a violent Clap of Thunder, Noise of a Cannon, or the like. In this Case, it is probable, that the Position of the *Membrana Tympani* is altered, being forced inwards upon the small Bones, and so becomes concave outwardly. In this Case no Vibration of Sounds will be communicated to the Drum, until the Membrane has recovered it's natural Position. The Means, proposed to remedy this Disorder, are, first, (if the Person heard very well before; and it be not too long after the Accident has happened) to oblige the Patient to stop his Mouth and Nose, and force the Air through the *Eustachian* Tube into the Barrel of the Ear, by several strong Impulses; which will probably, push the Membrane back to it's natural State.

But if by any Accident, the Excrement is hardened in the Tube, or the Orifice of it, which opens into the Barrel of the Ear, should be stopped up, so as that no Air can be forced that Way, the second Method proposed, is to introduce into the *Meatus auditorius externus*, an Ivory Tube as near to the Drum as can be done, and so exactly fitted, that no Air can go in or out, betwixt the Skin of the external *Meatus* and the Tube. When it is thus fixed, I take the further small End in my Mouth, and, by degrees, draw out what Air is there contained; and I believe, it will act like a Sucker upon the Membrane, and draw it back to it's natural State; and then the Person will hear as before. If this should fail, I should be apt to believe the violent Shock this Membrane has suffered, may have dislocated some of the small Bones; in which Case there is scarcely any Remedy. And for the Diseases that are called *Nervous*, I must leave them to the learned Gentlemen of the Faculty.

Fig. 82.

In this Ivory Tube may be fixed a Brass Cock, which, being turned, will hinder the rushing in of the Air, while the Person who sucks, takes Breath, and can renew his Suction.

Fig. 83.

The flexible silver Tube, for injecting the *Eustachian* Tube, may be used without the Sheep's Ureter, by being screwed on to a small silver Syringe, as at

Fig. 84.



An Account of  
Margaret Cutting, a young  
Woman, now  
living at  
Wickham  
Market, in  
Suffolk, who  
speaks readily  
and intelligibly  
though she has  
lost her Tongue.  
N<sup>o</sup> 464. P.  
143. Read  
July 1, 1742.

VII. A brief Account of this young Woman's Case, in a Letter from Mr *Benj. Boddington*, of *Ipswich*, *Turkey Merchant*, to Mr *Henry Baker*, *F. R. S.* was communicated to the *Royal-Society* in *Feb.* last, and appeared so extraordinary, that Mr *Baker* was desired to make all possible Inquiries into the Reality of the Fact, and lay before the Society what Information he should receive in relation thereto.

In pursuance of this, he wrote to Mr *Boddington*, and begged the Favour of him to make the strictest and most critical Inquiry he was able into this Affair, not only by viewing the young Woman's Mouth, and examining her himself, but also by calling to his Assistance some skilful Gentleman in the Physical Way, and any other learned and judicious Person whom he might judge most likely to contribute towards discovering the real Truth, and detecting any Error, Fallacy, or Imposition. He likewise desired they would heedfully observe her Manner of speaking and articulating the Sounds of those Letters and Syllables, in the Formation whereof the *Apex* of the Tongue seems more particularly needful: And, in order to render their Examination more easy, as well as more satisfactory, he sent a List of Letters and Sounds, together with several such Sentences as he imagined would be most difficult to be pronounced without the Help of the Tongue.

Mr *Boddington*, as soon after this as their Affairs would give them Leave, prevailed upon Mr *Nottcutt*, a Minister, a learned and curious Gentleman, and Mr *Hammond*, who perfectly understands Anatomy, to accompany him to *Wickham Market*, about 12 Miles from *Ipswich*, where the young Woman lives; whose Case (after they had inspected her Mouth, and examined her in the strictest Manner) is set forth in the following Certificate signed by them all.

*Ipswich*, April 9, 1742.

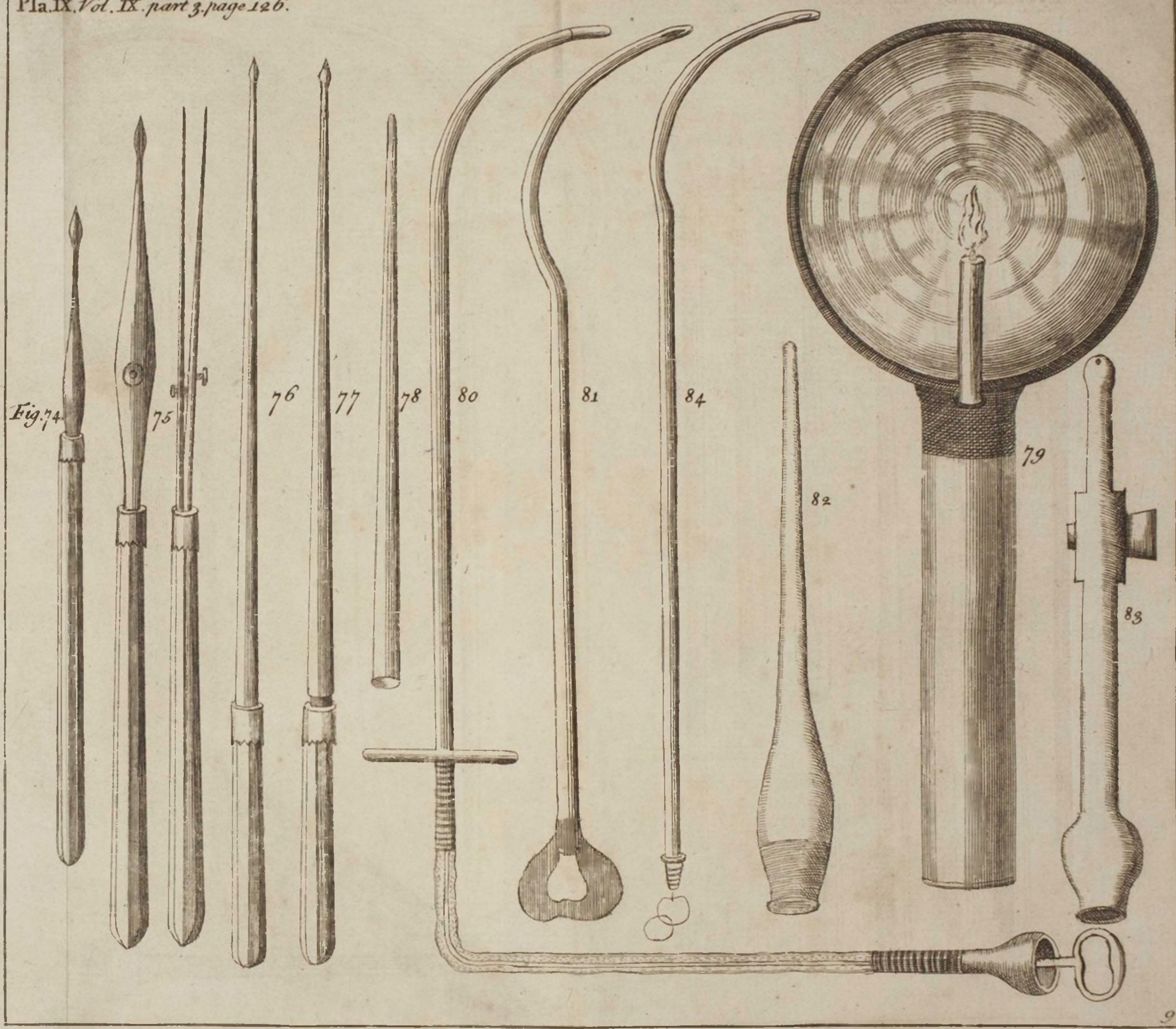
WE have this Day been at *Wickham Market*, to satisfy our Curiosity, concerning *Margeret Cutting*, a young Woman, who, we were informed, could talk and discourse without a Tongue.

She informed us, that she was now more than 20 Years of Age, born, at *Turnstal*, a Village within 4 Miles of *Wickham Market* in *Suffolk*, where she lost her Tongue by a Cancer (being then about 4 Years old). It first appeared like a small black Speck on the upper Superficies of the Tongue, and soon eat it's Way quite to the Root of it. She was under the Care of Mr *Scotchmore*, a Surgeon of *Saxmundham*, who soon pronounced the Case incurable. However he continued using the best Means he could for her Relief. One Day when he was syringing of it, the Tongue dropped out, and they received it into a Plate, the Girl, to their Amazement, saying to her Mother, 'Don't be frightened, Mamma; it will grow again.' It was near a Quarter of a Year after, before it was quite cured.

We proceeded to examine her Mouth with the greatest Exactness we could, but found not the least Appearance of any remaining Part of a Tongue, nor was there any *Uvula*. We observed a fleshy Excrecence

on











on the under Left Jaw, extending itself almost to the Place where the *Uvula* should be, about a Finger broad: This Excrescence, she said, did not begin to grow till some Years after the Cure: It is by no means moveable, but quite fixed to the Parts adjacent. The Passage down the Throat, at the Place where the *Uvula* should be, or a little to the Right of it, is a circular open Hole, large enough to admit a small Nutmeg.

Notwithstanding the Want of so necessary an Organ as the Tongue was generally supposed to be, to form a great Part of our Speech, and likewise to be assisting in Deglutition, to our great Admiration, she performed the Office of Deglutition, both in swallowing Solids and Fluids, as well as we could, and in the same Manner: And as to Speech she discoursed as fluently and well as other Persons do; though we observed a small Sound, like what is usually called speaking through the Nose; but, she said, she had then a great Cold, and she believed that occasioned it. She pronounced Letters and Syllables very articulately; the Vowels she pronounced perfectly, as also those Consonants, Syllables, and Words that seemed necessary to require the Help of the Tongue, as *\*d, l, t, n, r, at, al, ath, ash, cha, la, ta, ja.* *The little Dog did not eat Bread.—Touch the Tooth.—Try to light the Candle—Thrice Thirty-three.—Let the large Cat scratch the little Dog.—The Church.—do:b.—Lilly.—* All these she pronounced perfectly. She read to us in a Book very distinctly and plain; only, we observed, that sometimes she pronounced Words end- in *ath* as *et*—end as *emb*—ad as *eib*—; but it required a nice and strict Attention to observe even this Difference of Sound: She sings very prettily and pronounced her Words in singing as is common. What is still very wonderful, notwithstanding the Loss of this useful Organ the Tongue, which is generally allowed by Anatomists, and Natural Philosophers, to be the chief, if not the sole Organ of Taste, she distinguishes all Tastes very nicely, and can tell the least perceivable Difference in either Smell or Taste.

We the underwritten do attest the above to be a true Account.

*Benjamin Boddington.*

*William Notcutt, Minister.*

*William Hammond, Apothecary.*

Mr *Baker* received along with the foregoing Certificate, by Letter from Mr *Boddington*, some farther Particulars, which he supposed less material. He says, in her Person she is a little thin Body, genteel enough, a pretty good Face, fair Complexion, with light brown Hair, of a weakly Constitution, lame on one Side, through Weakness after a Fever and the Small-Pox, which she had last Summer. She seems a well behaved Girl, and has nothing of a Country Mien. She discourses agreeably, very fluently and pertinently, has every thing clean and neat about her, gets her Livelihood by making Mantuas, and has an Aunt in *London*, named *Mary Cutting*, who is House-keeper to the Dowager *Lady Rockford* in *Bond-street*.

\* These were the Letters, Sounds, and Sentences mentioned by Mr *Baker*.

He





*Of a young Woman who speaks intelligibly without a Tongue.*

He says, if she were among 20 People in a Room, he thinks it would be impossible for a Stranger by any means to guess her being the Person without a Tongue, for she has no odd Motion of her Mouth or Lips in speaking: She sings with an easy Air, and modulates her Voice prettily. He asked her, if she did not miss her Tongue, or find any Inconvenience from the Want of it? She answered, No: Not in the least; nor could she imagine what Advantage he had in the Use of his. He inquired, how she did to guide her Food in her Mouth to eat: She replied, very easily, she could eat before, on one Side, or the other, as she pleased, but could not explain the Manner how. He was very observing to see her eat, but could discern no Difference from others in the moving of her Jaws, or other Motions of her Face, nor in her swallowing Food, or in drinking; she did both very neatly, and had exactly the same Motion in her Throat as we have in it's passing down.

He was apprehensive the Excrecence mentioned in the Certificate, might, in some measure, supply the Use of a Tongue; but she assured him, it never moved in the least, and that she spoke as well before it began to grow (which was several Years after the Cure); and Mr *Hammond* convinced him, by trying with their Fingers and a Spoon, that it was quite fixed and immoveable. He observes further, that she is no ways assisted by a good Set of Teeth; for she has but few, those bad, and scarce so high as her Gums. He asked her, in what Part of her Mouth her most sensible Taste lay? She said, it was all over alike; and, smiling, added, she was afraid she was too nice in that; for, if her Butter was not curious, she eat dry Bread.

Mr *Boddington*, in another Letter to Mr *James Theobald*, F. R. S. dated *April 14, 1742*, after giving an Account of this young Woman in the Manner as before, adds, he can recollect nothing more, except her telling him, that though she was able to speak from the very first losing of her Tongue, she was not so happy as to her Deglutition; for she was unable to swallow any thing solid for many Months after, without it's being minced very fine, and then thrust into her Throat by a Finger: But by Degrees, she knows not how, she became able to manage without that Help, and could eat any thing in the same Manner as other Persons can. He adds, that, in his own Mind, he thinks the fleshy Excrecence is of great Service to her, though she cannot make out in what manner: That for his own Part, he had formerly supposed it as impossible to speak without a Tongue, as to see without Eyes; and therefore expects many who shall hear this Account, will continue Unbelievers, and think he and his Friends are all mistaken, that they do not know what they see, and that their Ignorance is the only Ground of their Admiration.

While Mr *Baker* was making his Inquiries, he was informed, that Mr *John Dennis*, Tobacconist, in *Aldersgate-street*, could give him a full and satisfactory Account of this Affair: He therefore applied to  
 Mr *Dennis*,



Mr *Dennis*, who assured him in a very civil, candid, and intelligent Manner, that he was well acquainted with *Margaret Cutting*, having many Years ago been carried by a Gentleman to see her as a Prodigy, for being able to speak without a Tongue: That he had seen her several times since, commonly calling on her when he travels that Way, and carrying some Friend or other with him; and at all these times he had inspected her Mouth, and was sure she had no Tongue: And that last Summer, in particular, he and another went to see her: That he would declare this under his Hand, and should always be ready to attest the Truth of it to any Body, or in any Manner. He likewise gave an Account how she lost her Tongue, as he had it from her Mother, who died some Years ago, and it was exactly as above related; and said he had been told the same by an Apothecary also, who had her in Hand along with Dr *Scotchmore*.

The Testimony of Mr *Dennis*, and the Person who saw her with him last Summer, is as follows:

March 20, 1741.

WE the under-written saw *Margaret Cutting*, at *Wickham Market* in *Suffolk*, in or about *June* last; and, examining her Mouth, found she had no Tongue, and yet she speaks very intelligibly.

*John Dennis.*

*Gabriel Daniells.*

MYself saw her in about 2 or 3 Years after her Tongue was lost, had a full Account of it from her Mother, heard her then speak, and have seen and heard her divers times since, and heard her talk better and better.

She was under the Care of Dr *Scotchmore* at *Saxmundham, Suffolk*.

*John Dennis.*

Mr *Dennis* (upon Mr *Baker's* Inquiry) wrote to the young Woman herself, acquainting her, that many People would not believe it possible for her to speak without a Tongue, and desiring she would not be ashamed to give an Account of herself under her own Hand; in Answer to which he received the following Letter:

To Mr *John Dennis*, in *Aldersgate-Street*.

Sir,

THIS being the first Opportunity that I had to answer your Letter, I assure you, that I have no more Tongue in my Mouth than I had when you saw me last, which is none; but Thanks be to my God, I have had the Happiness to speak ever since it came out, which was when I was about 4 Years old. As for my Age now, I cannot rightly tell, but I think I am about 24 Years old. I would have none suspect the Truth of it; for I have no Tongue, and can



An Account of a Wound received by a Bullet.

Speak very well, and this is from my own Hand. I was not ashamed to write about myself, but of my bad Writing. So no more, but I am

Your humble Servant,

Margaret Cutting.

The Case of this young Woman is indeed extraordinary \*; but there are several Examples of like Nature to be met with in medical Writers, and those of the greatest Authority; one of which, as it has the Attestation of a whole University, cannot be improper to mention here. Monsieur *Drelincourt*, a very noted Physician, tells us, in his Treatise on the Small-Pox, of a Child 8 Years of Age, who had lost his Tongue by that Distemper, and was yet able to speak, to the Astonishment of the University of *Saumur* in *France*; and that the University (who doubtless had first carefully examined into the Truth) had attested it, by drawing up a particular Account of the Fact, that Posterity might have no Room to doubt concerning the Validity of it. The Account is to be met with at large, in the third Volume of the *Ephemerides Germanicæ*, under the Title of *Aglossostomographia*.

*Tulpius* too makes mention of a Man who had the Misfortune to have his Tongue cut out by the *Turks*, and yet, after 3 Years, could speak very distinctly. He says, he went himself to *Wesop*, a Town in *Holland*, to be satisfied of the Truth of it, and found it to be as it was reported. Nay, he does not so much as mention any Defect in his Speech, but assures us, that he could pronounce those Letters which depend upon the *Apex* of the Tongue, even the Consonants, very articulately. And this Case is still the more worthy Attention, because the Patient could not swallow even the least Quantity of Food, unless he thrust it into the *Oesophagus* by means of his Finger.

If we go back to earlier Times, the Emperor *Justin*. in *Cod. Tit. de Off. Præf. Præt. Af.* says, he had seen venerable Men, *qui abscissis radicitus Linguis, pænas miserabiliter loquebantur, whose Tongues having been cut out by the Roots, they miserably spoke, or complained, of the Punishments they had suffered.* And again, *Nonnullos alios, quibus Honorichius Vandalorum Rex Linguas radicitus præciderat, loquebam tamen habuisse integram, that some others, whose Tongues Honorichius, King of the Vandals, had cut out by the Roots, yet perfectly retained their Speech.*

An Account of the Wound, which the late Lord Carpenter received at Brihuega; whereby a Bullet remained near his Gullet for a

VIII. Lord Carpenter was wounded at the Defence of the Breach of *Brihuega* in *Spain*, in the Mouth by a small *Spanish* Musket-ball, which having taken away Part of his upper Lip, beat out all his Teeth (except two) on one Side, broke and splintered part of his upper Jaw-bone, went through his Tongue, and lodged itself near his Gullet, where it remained 51 Weeks and 3 Days before it was extracted, the Surgeons thinking it had been spit out with some of his Teeth soon after his

\* *N. B.* All the original Papers are in the Repository of the Royal Society.



being wounded. The Ledge which was made upon the Bullet by the two Fore Teeth, lying almost by the Gullet, and continually grating upon it, occasioned an intolerable Pain \*, and preventing him from swallowing any thing but Liquids, it brought him so low, that his Life being despaired of, to make a final Trial, his Tongue was drawn out as far as it could be, and one of the Surgeons feeling the Ball with his Probe, which he then took to be a Piece of a Tooth, (several Pieces of Teeth having been beat into his Tongue by the Bullet) and endeavouring to extract it, he took hold of the Ledge with his Forceps, and pulled the Ball out, after which he recovered in a few Weeks.

The Marks of the Fore Teeth are to be seen on the Bullet, and where it flatted upon the Jaw-bone.

\* See Vol. V. Chap. iii. §. 5.

#### CHAP. IV.

##### The NECK and THORAX.

I. **I** Have drawn this rough Sketch by Memory, not having any of the Doctor's Papers by me, except some Drawings which are engraven with some Improvements, in *Fig. 85, 86, 87, 88.*

I shall not here undertake to give a Description of all the Parts belonging to the Heart, supposing them already sufficiently known from the anatomical Writers; but shall only explain the surprizing Simplicity of the *Muscular Structure* of the Heart, as Dr *Stuart* hath demonstrated it from various Preparations of boiled Hearts, *viz.* that *the Heart is nothing else than a single Muscle of nearly a semicircular Form, whose Fibres are all parallel*: For, suppose a rectangular Parallelogram, *ABC D\**, consisting of 2 Squares *ABEF*, and *EFCD*; in each of which draw first the Diagonals *EB* and *CF*; then fill the whole Parallelogram, or both Squares, with Lines at equal Distances, and parallel to the Diagonals: This done, at the Center *F*, with the Radius *FB*, draw the Semicircle *BED*, and do the same on the Backside of the Paper; so that every Line on the Backside may lie exactly under each corresponding Line on the Foreside, and that each Side may be as exactly alike, as if the Paper were transparent, and that the Lines might be seen equally plain on either Side: Cut this Semicircle out of the Parallelogram, and cut out likewise a small semicircular Piece at the Center *F*; then roll up this semicircular Piece of Paper in a conical Manner, so that the Backside of *D* (or to *I*, in *Fig. 86.*) be folded to the Back of *E* (or to *H* in *Fig. 86.*) and this Fold turned round, till *E* comes to the Backside of *B*, as in *Fig. 87.* and the Seam formed by the Edges *BF* and *EF* may be pasted together, only the inner Fold on the Right Side must be pushed back from the outer circular one, so as to form a Partition, as at *G*, in *Fig. 88.* and 87. by which

*A short Account of Dr. Alexander Stuart's Paper concerning the Muscular Structure of the Heart: Read at several Meetings of the Royal Soc. in May and June 1735. by C. Mortimer, M. D. R. S. Sec. No. 460. p. 675. \* Fig. 85.*

Fig. 86.

Fig. 87.



Fig. 88.

means two Cavities will be formed, that on the Right Side the Partition in this Form  $\smile$ , the other, on the Left Side, almost circular, thus,  $\bigcirc$ , as in *Fig. 88.* the Outside of the first consisting but of one single Fold, the Outside of the latter consisting of a double Fold, and the Partition being but of one Fold: Thus the first Cavity represents the Right Ventricle of the Heart, the other the Left Ventricle, and the Partition *G* the *Septum*, as in *Fig. 88.* All these Particulars are distinctly expressed in *Fig. 86.* which is to be cut off from *Fig. 85, 87, and 88,* and is to be folded upon the Line *BD*, so that the Letters *EE* and *HH* come exactly Back to Back, and that the Line *EF* and *HF* tally precisely; paste this Paper thus folded together Back to Back, then cut off the white Paper to the Rim of the Circle, and cut out a Piece at the Center to *F*, and you will by this means have a semicircular Piece of Paper, with all the Lines represented on both Sides tallying to each other, as above described at *Fig. 85.* But as it was very difficult to print on each Side of the same Paper, so as to make the Lines tally, I thought it better to have this Figure printed in a whole Circle, that so such as would be at the Pains, might cut it off, paste it, and fold it, and thus, as it were, form a Model of an Heart. In this Figure likewise I ordered the Engraver to distinguish the several Surfaces of the muscular Coats, by Lines and Dots, in such manner as Colours are represented in Heraldry graving: Thus the Outside of the Right Ventricle is shaded with Lines running from Top to Bottom pretty close, which denote that you should paint that of a dark Red; the Outside of the Left Ventricle, with Lines in the same Direction, but farther asunder, to denote a lighter Red; the Inside of the Right Ventricle is shaded with Lines from Right to Left, to denote it should be coloured (for Distinction Sake) blue; then, where the double Course of Fibres form the outward Side, or Left Side of the Left Ventricle, and which are not to be separated but by Art, there the Paper is left white or blank; but the Inside of the Cavity of the Left Ventricle is dotted, to represent yellow, that it may be coloured so: The colouring the Figure in this Manner, makes all the Parts much more distinct, when rolled up into a Cone.

This Model, if I may so call it, compared with the Heart of Man or Quadruped, will be found to answer in the following Manner: The Edge *BF*, in *Fig. 85.* or *EF* in *Fig. 86.* answers to the tendinous Seam or *Sulcus*, which runs along the superior Side of the Heart; and the Direction of the parallel Lines in *Fig. 85* and *86.* answers to the Course of the Fibres in each Part of the Heart; the circular Edge of the Paper *BED* answering to the tendinous Circle round the Base of the Heart, from which, and the Seam *BF*, all the muscular Fibres take their Original: The exterior Fibres of the Right Ventricle, next the *Apex* or Point of the Heart at *F*, decussate \* each other, run in-

\* This may be imitated by gumming on Threads, in the same Directions as the parallel Lines in *Fig. 85.* turning them back cross the Hole left at *F.*

wards,



wards, and then, rising up again towards the Base, form that Side of the *Septum* which constitutes Part of the Inside of the Right Ventricle; and likewise form the *Columnæ carneæ* of the Right Ventricle: The Fibres of the interior Course of the Left Ventricle decussate and form in the same manner the internal Fibres and *Columnæ carneæ* of the same Ventricle: The external Course of Fibres of the Left Ventricle are only a Continuation of those of the Right Ventricle, which together embrace the Heart circularly, while the internal Course of Fibres of the Left Ventricle run chiefly from the *Apex* towards the Base, so that on the Left Side of the Ventricle they cross the external Course nearly at Right Angles; but on the Side of that Ventricle which forms the *Septum*, they run from the *Apex* towards the Base, in the same Direction as on that Side of the *Septum* which is next to the Right Ventricle.

The several Courses of the Fibres may be easily traced in a boiled Heart; and if they are not found to answer to the Directions of the Lines on the Paper-Cone with the strictest mathematical Exactness, when rolled up as at *Fig. 87.* you must consider, that the Form of the Heart is not exactly conic, though nearest reducible to that Figure; and moreover that the Base is not a Plane as in the Paper-Cone, but of a convex round Form; and the tendinous Circle round it is of a smaller Diameter than the Middle Part of the Heart.

By this Structure and Circumvolution of the Fibres, the Muscle which constitutes the Heart, doth, by a simple Contraction of it's Length, by those external Fibres, which encompass both Ventricles, contract the Diameter of the Heart, while by the internal Fibres, that form the *Septum* and Inside of the Left Ventricle, it shortens the Length of the Heart, or draws the *Apex* up nearer to the Base: This is done without any Contrariety in the Action of these Fibres, or destroying the Force of each other; but, on the contrary, they being all parallel to each other; and a Continuation of the same Fibres, do assist each other in their Action.

The Doctor supposes this Contraction is not caused so much by the Influx of the nervous Spirits, as by the Influx of the arterial Blood, through the Coronary Arteries into the Substance of the Heart; and that the Contraction of the Auricles comes from the same Cause; which will be alternate with that of the Heart, because the lateral Branches, which arise out of the Trunk of the Coronary Artery, that encompasses the Base of the Heart and both Auricles, are on one Side distributed into the Substance of the Heart, and on the other Side into the Coat of the Auricles; and will be alternately compressed, and alternately free, as the Auricles and Ventricles are alternately full or empty of Blood.

II. 1. Mr — dying at the Age of Twenty-two, of an Illness that had perplexed his Physicians, was opened, to discover an Imposthume, which was apprehended in the Belly. As nothing was observed there

*An Extraordinary Case of the Foramen Ovale of the*

worth



Heart, being found open in an Adult; communicated by Claudius Amyand, Esq; Serjeant-Surgeon to his Majesty, and F. R. S. No. 439. p. 172. Oe. &c. 1735.

Concerning the Foramen Ovale being found open in the Hearts of Adults, by M. le Cat, M. D. F. R. S. Surgeon to the Hôtel Dieu at Rouen. Translated from the French by T. S. M. D. F. R. S. No. 460. p. 681. Apr. &c. 1741.

EXPLANATION of the Figures.  
Fig. 89, 90.

Fig. 91.

Fig. 92.

Fig. 93.

worth Notice, saving a very great Relaxation of the *Viscera*, the Cause of his Death was looked for in the *Thorax*; there the Lungs were strongly attached to the *Pleura* on each Side, and a large Collection of Water in each Cavity, especially on the Left, where the posterior Lobe was inflamed, and tending to Suppuration; the Quantity of Water in the *Pericardium* was greater than usual, and the Heart much larger than could be expected in so great an Atrophy as the Patient was reduced to; in it the *Foramen Ovale* was found open, so as to give Passage to a large Finger, when a fungous Substance, which grew from the Circumference of the *Foramen*, and did stop up the same, was removed. The Valve was hardly perceptible, it being callous and furled up. The *Ductus Arteriosus* was found close as usual. This Patient had enjoyed great Health till lately, and had given no Sign of this Opening of the *Foramen Ovale*, which is præternatural in Adults.

2. This last Winter I opened a great Number of dead Bodies of Men grown, and did not find the *Foramen Ovale* open in any of them. The oldest of the Male Subjects, in which I found it open, was a Lad of 15 Years of Age. Of 20 Bodies of Women, which I examined, in seven I found the *Foramen Ovale* open.

Among the Number of Openings that remain of this *Foramen*, there is a great Variety in their Shape, and in that of the *Cicatrices* or Adherences of the *Valve*: However, they may conveniently be reduced to 3 Sorts, expressed in the Figures.

Fig. 89. The *Foramen Ovale* viewed on the Side of the Right Auricle. A. A Valve that throws itself on the Side of the Left Auricle, and appears closed up chiefly by a Continuation of the Membrane that lines this Auricle. B. The Place where this Valve leaves a Hole, which opens into the Left Auricle. C. The Part contiguous to the Right Ventricle.

Fig. 90. The same *Foramen Ovale* viewed on the Side of the Left Auricle. A. The Valve drawn a little back, that the Hole may be seen. B. The Point to which the Valve ascended, when left at Liberty. C. The Part which leads to the Left Ventricle.

Fig 91. The second Sort of *Foramen Ovale* open in the Adult, and seen on the Side of the Right Auricle. It differs from the first Sort, in being more sunk in, or more approaching the Shape of a Funnel.

Fig. 92. The same *Foramen Ovale* of the second Sort, seen on the Side of the Left Auricle. It differs from the same Side of that of the first Sort, by the Valve beginning to make the Goosefoot by it's different Attaches, which much resemble the Columnns of the mitral Valves of the Heart. In the Figure I have added a Probe passed into the *Foramen Ovale* from the Right Auricle to the Left.

Fig. 93. The *Foramen Ovale* of the third Sort open in the Adult, viewed on the Side of the Right Auricle. This Sort differs from the preceding two, by the *Foramen Ovale* nearly forming a Funnel.

Fig. 94.



Fig. 94. The same Foramen Ovale viewed on the Side of the Left Auricle, and two Probes passed into it's Aperture. This Sort differs from the preceding ones, by the Goose-foot formed by the Valve being much more compounded. The Circle of Points A. marks the Place which answers the oval Cavity that is in the Right Auricle, and is the Cicatrix of the Foramen Ovale at the Birth. The Women in whom I have found the Foramen Ovale of the second and third Sort, were about 60 Years of Age.

III. I have observed, in a new-born Female Infant, the Heart without a Pericardium, and turned upside down, so that it's Basis, with all the Vessels, had fallen down as low as the Navel; and it's Apex, still on the Left Side, lay hid between the 2 Lungs. How could the Circulation be carried on, the Heart being thus inverted? and yet the Child lived several Days after Birth. I observed the Heart from it's Basis, whence the *Aorta* and pulmonary Artery spring, and where the *Cava* and pulmonary Vein enter it, to it's Cone, surrounded loosely with several Windings of these Vessels, through which the Blood's Circulation must necessarily be performed.

IV. During the exceeding dry, cold Weather, in Feb. and March last, several of the Men brought Home in the *Deptford* and *Dunkirk* Men of War, from the *West-Indies*, were seized with short, importunate, asthmatic Coughs, without any Expectoration. Violent and almost continual Palpitation of the Heart, with a perpetual intermitting, trembling, fluttering Pulse, and a constant Anxiety, Pain, and Sinking of the Heart, as they expressed it. They breathed with excessive Difficulty, and could scarce lie down in Bed without Suffocation. Their Heads, as it were, sunk between their Shoulders, and they had very dead, heavy, Countenances. Some had Pains of the Side, though very little apparent Fever.

Upwards of 20 Persons were in a very short Time carried off towards the End of *March* in this Manner, notwithstanding the most proper and diligent Care, by Bleeding, Vomiting, Blistering, Attenuants, Di-  
luents, &c.

Upon this, Mr *Wyatt*, First Surgeon of the Hospital, ordered 2 of the Dead to be opened forthwith; they were about 40 Years old. He found monstrous *Polypi* in both their Hearts, and directly had the Hearts carried to his own House, and soon acquainted me with the whole Matter: We very carefully examined them. The *Polypi* were very nearly of the Colour of the Buff formed on the Surface of highly pleuritic or rheumatic Blood, when quite cold, or rather whiter. They were vastly tough, and seemed to be formed of various *Laminae* very closely connected, though here and there a bloody Vein, as it were, was interspersed. They were not only firmly attached to the fleshy *Columnae* of the Heart, but were also sunk and inserted strongly into the *Intercolumnia*, or *Sulci*, and that even to the very Bottom of the *Ventricules*. These Roots, if we may so call them, were of a whiter Colour than the Body of the *Polypus*.

One

Fig. 94.  
Of the Heart  
of a Child turn-  
ed upside down;  
by Jos. Ignat.  
de Torres, M.  
D. No. 461,  
p. 776. dated  
Gandia in Va-  
lencia, Mar.  
19, 1738,  
N. S.

Concerning Po-  
lypi taken out  
of the Hearts  
of several Sai-  
lors just arriv-  
ed at Ply-  
mouth from  
the West-Ind-  
ies, by John  
Huxham, M.  
D. No. 464,  
p. 123. read  
May 20. 1742.



Of Polypi taken out of the Hearts of several Sailors.

One of these *Polypi* (taken out of the Heart of *Jeremy Mannings*) weighed a full Ounce, not including it's Ramifications in the *Arteria Pulmonaris* and the *Cava*, but as it was taken out of the Right Auricle and Ventricle; for it was one continued Mass, and strongly adhered to both.

The *Polypus* taken out of the Left Ventricle of the same Heart, was also very considerable, and rather more firm and compact than that of the Right, but of the very same Colour, and firmly implanted into the Sides of the Ventricle quite down to the *Mucro Cordis*. It's Branches were shot a great Way into the Subclavian and Carotid Arteries. But very little down the *Aorta*. I observed one of the semilunar Valves of the *Aorta* beginning to grow bony.

There were likewise found very great *Polypi* in the Right and Left Cavities of the other Heart, of the same Colour, Firmness, and Tenacity, but not altogether so large; and they respectively branched their *Appendices* a great Way into the Pulmonary Artery, *Aorta*, &c.

More of the Sailors dying in the very same way soon after, the *Thorax* of another was opened, that of a young Man about 20. In the Right Auricle and Ventricle of his Heart was found a large tough subrubicund *Polypus*, not quite so white as those mentioned before. But there was no such Concretion in the Left.

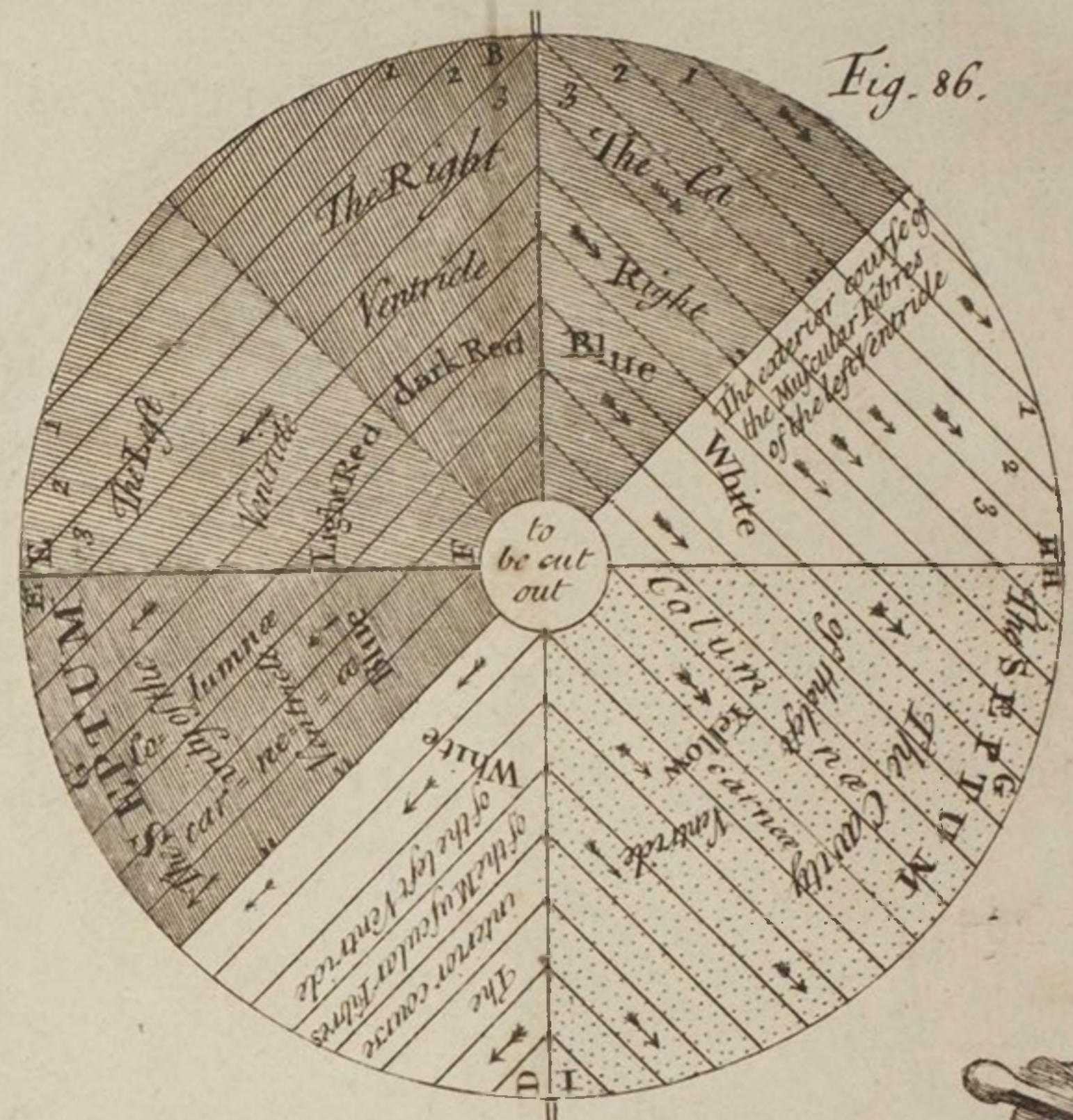
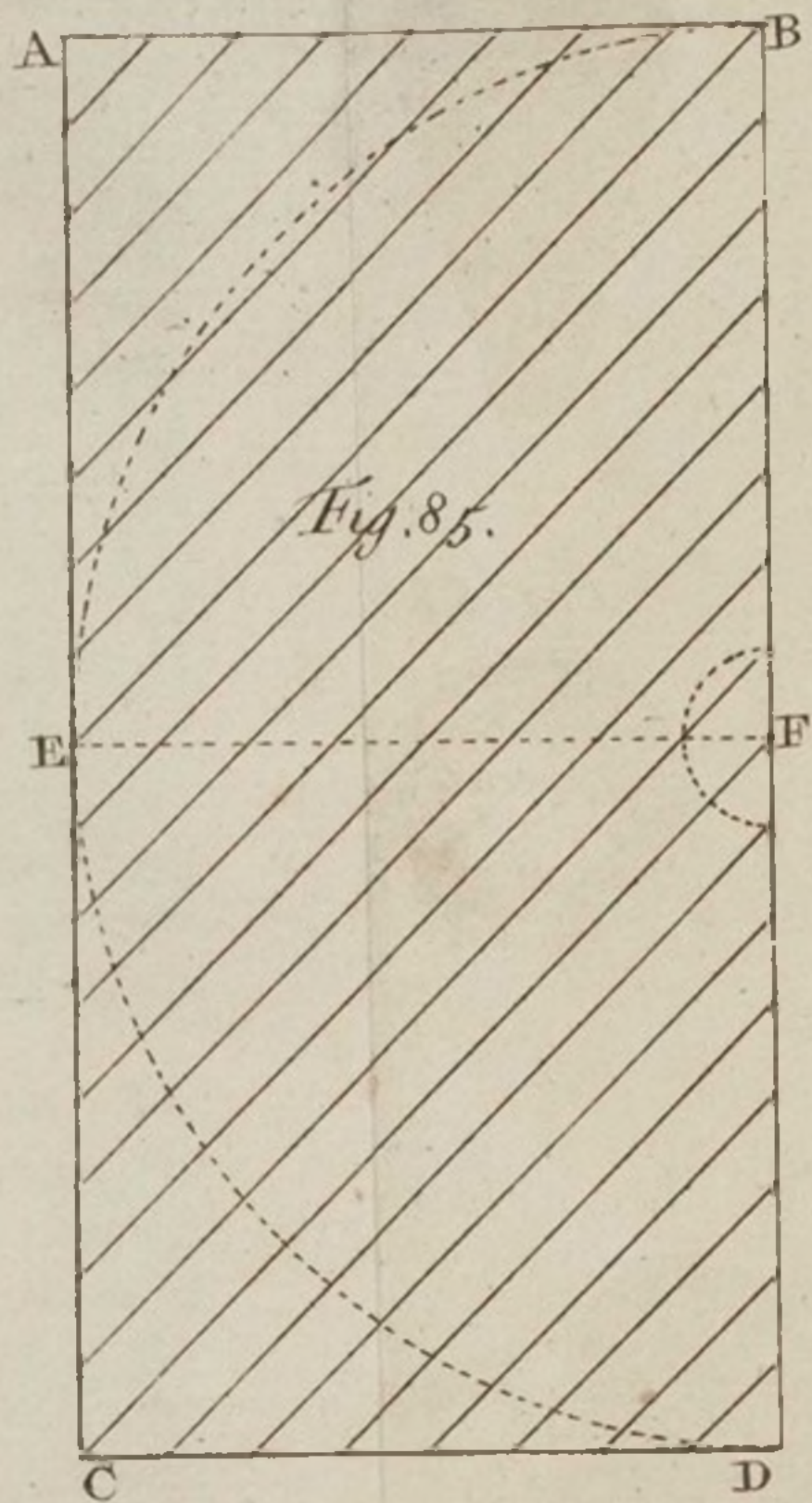
Now though *Kerkringius* and others have endeavoured to explode the Notion of the Formation of true *Polypi* in the Heart and Blood-Vessels; yet *Malpighius*, *Bartholine*, *Tulpius*, *Pechlin*, and others, have given us incontestable Instances of the Existence of true *Polypi* in the Heart in the strictest Sense; and you have here 3 unquestionable Evidences of the like Nature: Such, indeed, especially the 2 former, as I have never before met with amidst the very numerous Dissections I have been first and last present at.

Before I conclude this it may not be amiss to mention, that I had the first Lieutenant and Purser of the *Dunkirk* under my Care in very severe *Pleuroperipneumonies*, whose Blood was as viscid as I ever saw; and they were with very great Difficulty saved, nor could they be brought to expectorate till the Seventh Day of the Fever.

It may be observed also, that the above Ships came Home from a very hot Climate into a very cold one, in the midst of Winter, and that a long continued Course of North-easterly Winds kept on, and even increased the Cold to a great Degree. That Pleurifies, *Peripneumonies*, &c. are commonly the Effects of such a Constitution of Air. That the Blood of such as labour under these Disorders is always extremely sily; and that the Heat of the Weather in the *West-Indies*, and large and long continued Use of spirituous Liquors, had greatly condensed the Blood of these poor Fellows, and that in the Blood-Vessels of the *Thorax* of such as die of these Distempers, *polypose* Concretions are not uncommonly found.

V. Thomas











V. *Thomas Halsey*, aged about 70, of a short make, and pretty fat, being in a tolerably good State of Health, (unless, as for some Years past, troubled with frequent coughing upon Motion) was seized Sept. 23, 1740. with a violent Fit of Coughing, in which he fell down, as the By-standers thought, dead, and discharged near a Quart of Blood at his Mouth, in a very large Stream, mixed with many Portions of a seemingly grumous Matter. His coughing Fit continued near 3 Minutes. He revived upon bleeding at the Arm, and, being put to-bed, recovered his Senses, and (as he said) was perfectly easy, and free from Pain, except upon Coughing, which as often as he did, he spit Blood visibly arterial from it's florid Colour. About Four Hours after the First Fit, he was taken with a Second, attended with the same Symptoms as the First; and expired in it. Upon examining the Blood, which he brought up at his Death, I found, in Pieces of different Sizes, near Three Ounces of the Substance of the Lungs, not ulcerated, or any ways distempered; and I have Reason to believe there was near the same Quantity of the Lungs thrown up during the first Fit of Coughing. The Pieces were easily distinguishable from grumous Blood, by their connecting Membrane, the *Acini* in the internal Part, and their specific Gravity.

Upon examining the Contents of the *Thorax* after Death, the Right Lobes of the Lungs were found, of a good Colour, and no ways injured: In the Left Cavity of the *Thorax*, there was a large Quantity of extravasated Blood; the inferior Left Lobe adhered strongly both to the *Pleura* and *Mediastinum*, and was somewhat decayed; but of the superior Left Lobe, the upper Part next the *Trachea* adhered to the *Pleura* for about 2 Inches; and the Remainder, where there had been no Adhesion, (as I could perceive from the smooth Surface of the *Pleura*) was torn away by Pieces, and discharged in Coughing. As the greatest Part of the Left Side of the Lungs was tied down to the circumjacent *Membranes*, the Person being old, and the whole Force of the *Parietes* of the *Abdomen*, *Diaphragm*, &c. in the Action of coughing, was unequally exerted upon that Part that did not adhere, and which, by the Violence of the Pressure, was torn off from the rest, and discharged as I just now mentioned; it is worthy Observation, how small the Degree of Sensibility is in the Lungs; that a Person should lose so much of their Substance, as in this Instance, upon the First Fit; and yet, upon Recovery of his Senses, to complain of little or no Pain from such Dilaceration, when even the Bite of an Insect upon the Surface of the Body is attended with so much.

The Adhesion of this Man's Lungs explained likewise the Cause of his frequent Coughing for some Years before his Death.

*A Case wherein Part of the Lungs were coughed up, by Will. Watson, F. R. S. No. 459, p. 623. Jan. &c. 1741.*



Experiments  
on the Perfora-  
tion of the Tho-  
rax, and it's  
Effects in Re-  
spiration, made  
at Leyden, in  
1728, and  
1729, by the  
late W. Houf-  
toun, M. D.  
F. R. S. No.  
441. p. 230,  
Apr. &c.  
1736.  
Exp. I.

VI. In *April* 1728, I made a Puncture into the Thorax of a little Dog, on each Side, with a small Penknife. After this Operation, the Dog barked and howled as strongly as he had done before; and shewed no Sign of an injured Respiration. Hence some of the Standers-by suspected that I had not penetrated quite into the cavity, wherefore, to remove all Doubt, I made another Pair of Wounds, but with the same Success, for the Dog remained unhurt, either in Life or Voice, from 9 in the Morning till 6 in the Afternoon, when I killed him, to see what was done.

Upon opening the Thorax the 4 Punctures appeared very evidently to have penetrated into the Cavity: And upon blowing up the Lungs, there was not found any Defect in them, tho' the Knife had entered almost a Finger's Breadth into their Cavities, nor did the Air get out any more than it uses to do from the soundest Lungs.

Exp. II.

In *August* following, I tried the same Experiment upon 2 Puppies, about 4 Days old, opening one Side of the Thorax with Punctures only, the other with broad Wounds, so as to discover the Lungs on each Side, which did not however subside, but rather seem to thrust themselves outwards. They continued crying, 'till, in about a quarter of an hour, I took pity on them, and put an end to their Life and Misery.

Exp. III.

About the Beginning of *November* I made a large Wound on each Side of the Thorax of a middle sized Dog. I thrust my Finger through the Apertures into each Cavity of the Thorax, and perceived the Lungs to be so far collapsed, that there was about a Thumb's Breadth between them and the Membrane which lines the Ribs; two other Students of Physick thrust in their Fingers also, and felt the same. But as soon as the Dog was loosened, he got up very briskly, ran about the Room, and howled upon being hurt. No Application was made to the Wound till the next Day, when I applied some Pledgets dipped in Turpentine. The Dog being kept for 3 Days was so far from losing his Voice, that he was very troublesome with his Noise, and at last being let loose, ran quite away.

Exp. IV.

*Jan.* 14, 1729. Having procured a young Dog, I had a mind to open his Thorax and let in the Air, without any great Wound of the Skin and Muscles; that I might neither cause a troublesome Hæmorrhagy, nor give the Animal unnecessary Pain. Therefore making a Hole with a Trochart, I introduced a Goose-quill into the Cavity, upon which I put a Cap of Leather, covered with Pitch, to stick to the shorn Skin, and so keep in the Quill: But the moveable Skin soon drew the Quill out of the Cavity of the Thorax, and I found it sticking upon the Ribs. But being in hopes, that I might be able to keep it in, I made a new Puncture, and thrust it in a second Time, and tried it as often on the other Side, but without Success. This Hope being frustrated, I separated the Skin on both Sides with a long Incision, and then divided the intercostal Muscles, and penetrated into each  
Cavity



Cavity of the Thorax, which was manifest by the violent Eruption of the Air. The next Day, I put Tents of Cork into the Wounds, which, being thicker at each End than in the middle, wanted neither Bandages nor Plaisters to keep them in. The Dog, with all these Operations, neither died, nor lost his voice; but eat, drank, and seemed well enough, only he could hardly lie on his side, because of the Wounds and especially the Tents. The Air was now and then let in by taking out the Tents; nay, it was blown through a Pipe into one Side. After he had lived, in this Manner, two Days, without any sensible Injury to his Voice: On the third Day, as I was handling him, both Tents burst out, on a sudden, with some Force, and the Air passing in and out through the Wounds, made such a hissing, that being affrighted partly by the Noise, and partly by the Apprehension of my hurting him again, he ran away, and hid himself under the Bed. I thrust the Tents again into his Wounds, but they soon flew out again. In this Condition he lived from 10 in the Morning till about 5 in the Evening, and was seen, not without Wonder, by several Students. At last I mentioned it to Dr *Van Swieten*, who being as much surprized as the rest, persuaded me to kill the Dog, and open him. But being willing to observe the further Consequence of his Wounds, I deferred killing him 'till the next Day. Thus he lived 4 whole Days after the Opening of his Breast, and at last was hanged, and shewed no Sign of an injured Respiration before the end of the third Day, when he began to wheeze a little.

The Thorax, when opened after Death, contained a good deal of sanious Matter on each Side. The Lungs were contracted into a small Space; one Side, as far as we could perceive, being sound, the other wounded.

Dr *Van Swieten*, being willing to enquire further into the Affair, made some Experiments himself. I had not leisure to attend the First, but the Second, which I saw, was as follows.

Jan. 25, 1729. A middle sized Dog was tied to a Board, and his Thorax was opened, on both Sides, with a large Wound. His Voice did not fail; and the Lungs were so far from collapsing, that a Lobule of them, thrust itself through each of the Apertures. These Lobules being on the outside did not cease to be contracted and dilated; and what was most wonderful, they were dilated when the Thorax was contracted, and on the contrary. Air being blown into the Cavities of the Breast, did no Injury to the Respiration of the Animal. After it had lived in this Manner, for  $\frac{1}{2}$  an Hour, without any sensible Injury of the Voice, or of Respiration, the Wound on one Side of the Thorax was enlarged, by cutting through the Rib: Now appeared a great Paradox, the Lungs were contracted, whilst the Breast was dilated; and dilated whilst it was contracted. The Dog survived this Operation also, and after every Body had been satisfied, was hanged.

Exp. V.



The unexpected Phænomena of these Experiments, were the Cause of my making the following, with some Fellow-Students, in order to examine whether the Lungs were always applied to the Membrane of the Pleura, when the Thorax was entire.

Exp. VI.

We bound a little Dog firmly to a Plank, with his Limbs extended. We raised Part of the Skin, and cut it off with a Pair of Scissars, in that Part of the Thorax, where the Ribs are not covered by the incumbent Muscles. When we had wiped away the Blood, and staunched it with Spirit of Wine, we cut off all that covered the Ribs, and intercostal Muscles; and at last carefully separated the intercostal Muscles. The *Pleura* being thus laid bare, afforded the following *Phænomena*, whilst the Breast was dilated, there appeared, something white, on the inside, applied to the *Pleura*, and whilst the Breast was contracted, and the Animal expired, that white Body gave place to something red, that came up in it's room; when the Breast was dilated again, the red Body went down, and the white came up, and so on alternately. We then took off the Muscles from the upper Interstice of the Ribs; but there nothing but white appeared. The *Pleura*, in both Parts, became concave, when the Breast was dilated; and a little (but scarce sensibly) convex, when it was contracted.

When we had satisfied ourselves with this, we opened the Breast by cutting two of the Ribs, with a Wound large enough to shew all the Contents of that Side; when this was done, the Animal ceased howling, tho' his Thorax was untouched on the other Side. That Side of the Lungs was immediately collapsed, but did not quite lose the alternate Motion of Dilatation and Contraction; and all that were present agreed, that it's Dilatation, and the Contraction of the Thorax were synchronical, and on the contrary. At last the Ventricle of the Heart was opened, to feel the muscular Force, and so an end was put to both his Respiration and Life.

I was before of Opinion, that a Man, or other more perfect Animal, (for as to Frogs, and such like, it is quite otherwise) could not live, if the Air was admitted into both Cavities of the Thorax. But these Experiments show how erroneous this Opinion is. They seem at the same Time to contradict the justly received Doctrine of Respiration; that the Lungs are dilated by the Weight of the Air entering thro' the Larynx, when the Pressure of it on their external Surface is removed by the Dilatation of the Thorax. But I think this seeming Contradiction may be thus removed, or at least diminished.

Let us suppose both Wounds to be double the Aperture of the Glottis; but the Lungs to be entire, and destitute of all contractile Force, and let the Thorax be now dilated, and filled by the Lungs distended with Air. Then,

1. At the first Contraction of the Thorax, the Air will go out through the Glottis only.

2. When



2. When the Thorax is dilated again, the Air will enter in Proportion as it's Capacity is increased; but it will not all enter through the Glottis, nor all through the Wounds, but through each of their Apertures, according to their Proportion; and the Quantity which shall enter through the Glottis, will be to the Quantity which shall enter through the Wounds, as the Aperture of the Glottis to the greatest Aperture of the Wounds; or, in the present Case, as 1 to 4. Therefore the Air, by which the Lungs are now inflated, will be  $\frac{1}{4}$  of the Quantity by which they would have been inflated, if the Thorax had remained entire.

3. When the Thorax is contracted a second Time, the Air must go out by the same Passages, through which it entered in the preceding Dilatation; and if the Apertures remain unaltered, the Air, which entered by the Wounds, must go out of them exactly in the same Time, as the Air entering by the Glottis goes out through the same. Hence no Air will remain between the Lungs and the Pleura, but every thing will be in the same State as at the end of the first Contraction; and if  $\frac{1}{4}$  of the usual Inflation of the Lungs is sufficient for the Life and Voice of the Animal, or if it can dilate the Thorax 5 times more than usual, then Nothing hinders but that it may live and form it's voice, notwithstanding this Opening of the Thorax.

I supposed one thing, which is evidently false, that the Lungs are destitute of all contractile Force; which would overthrow every thing, if no Compensation was made; but it is manifest that the Aperture of the Glottis can be contracted or dilated at the Pleasure of the Animal; and, indeed, dilated whilst the Air is inspired, and contracted whilst it is expired, at least whilst the Voice is formed. Hence the Entrance of the Air may be as much assisted by the Dilatation of the Glottis, as it is hindered by the contractile Force of the Lungs, and it's Egress hindered as much by the Contraction of the Glottis, as helped by the Contraction of the Lungs. The Balance, also, may be preserved, or either Cause prevail, according as the Animal has this Power of changing the Glottis, or shall make use of it. This, also agrees very well with the Phænomena; for when the Dog howled his Lungs burst out at the Wounds, but when he was silent, they went in again.

As to that Phænomenon of the Lungs being seen to dilate when the Thorax was contracted, I believe it happened, only, because the Muscles of the Abdomen being contracted by a great, and almost, convulsive Force, thrust every thing upwards, and much diminished the Capacity of the Thorax; wherefore the Air being driven from the lower Parts of the Lungs tended upwards; and the Lungs, tho', with Regard to the whole, contracted, yet were dilated towards the Wound.

In *Exp. VI.* It is self-evident, that the white Body was the Lungs, and the red the Diaphragm; also, that the Lungs fill the whole Thorax, and are applied by their Surface to it's Membrane, as is commonly believed.

There



There are some other Difficulties still remaining, which may be removed by more accurate Experiments, and better Understandings\*.

\* See the Appendix to Dr Hoadley's Lectures on the Organs of Respiration, 4to. 1740.

#### CHAP. IV.

#### The ABDOMEN.

Of an Obstruction of the Biliary Ducts, and an Impetumation of the Gall-Bladder, discharging upwards of 18 Quarts of bilious Matter in 25 Days, without any apparent Defect in the animal Functions, by Claudius Amyand, Esq; Serjeant-Surgeon to his Majesty, and F. R. S. No. 449, p. 317, Aug. &c. 1731.

I. I. **M**R La Grange, aged about 50, of a fallow bilious Complexion, died of an Abscess in the *Vesica Fellis*, May 29, 1733. Dr Vatas, his Physician in Ordinary, reports, that about 14 Years before, this Gentleman was afflicted with a Tertian Ague, which was cured by the Bark, and from that Time had complained of a Sense of Weight, and some Uneasiness and Hardness in the Region of the Liver and *Borborygmi*, which were relieved by frequent Purgations; notwithstanding which, he had enjoyed all the Appearances of Health, till about 4 Months before his Death, when some Symptoms of the Jaundice first began to appear on him, which had greatly increased 5 or 6 Weeks before he died, when he began to complain of shooting Pains on the Right Hypochonder, which was soon followed with a hard inflammatory Tumour there, tending to Suppuration. May 4, I met Dr Vatas, and Mr Fiquel, his Surgeon, in order to open a large Abscess pointing below the Cartilages of the second and third spurious Ribs on the Right Side. 'Twas determined to open it immediately with a Lancet, whereupon a Pint of a purulent fetid Matter was discharged. The Aperture being large, and the Dressings easy, by the next Day we found, that a very large Quantity of *Sanies*, and some *Pus* left in the Bag, had found a Vent; and this was so great, that 'twas though proper to renew the Dressings twice a Day. This had the desired Effect so far, that from this Time the Matter daily decreased till May 12, when we were informed, that during the Night the Wound had discharged near 2 Quarts of Matter of a saffron Colour, intermixed with large Flakes and thick Lumps of a coagulated Lymph or Gelly, tinged of a deep Yellow; and what surprized us no less, was, that upon Dressing we made way for the Discharge of about a Quart more of the same, as we enlarged the Orifice of the bursten Bag, to favour the coming out of the large Flakes and Lumps of Gelly obturating at times this Orifice. During this Day the Discharge was exceeding great, and at Night was emptied about a Pint more of the same Matter. From this Time a short and thick *Canula* was left in the Opening of the bursten Bag, this causing a more easy and constant Discharge, and a vulnerary Injection, strongly saturated with Spirit of Wine, had the good Effect to diminish it very considerably; but yet it continued so very great, that we had just Reason to apprehend



our Patient would soon sink under so great a Flux of this bilious Matter, and the rather that his Stomach and his Rest failed him ; but the Discharge daily lessening, and his Appetite and Rest returning in Proportion, he recovered Strength enough to be able to walk. All this while the Appearances of the Jaundice were wearing off, the Urine was returned to it's natural Colour, and the Patient had regularly a natural Stool every Day, till about 8 Days before his Death, when his Body becoming costive, the Physician found it necessary to discharge the *Fæces*, by Clysters and lenient Purges. Whilst I attended him, his Belly was always free from Fulness or Tension, being soft and lank, and he less troubled with Wind, than he had been for many Years before. Two Days before he died, he went to air himself in another Room, and caught cold : This is presumed to have occasioned a Fever followed with a Lethargy, in which he continued till May 29, when he died.

Dr *Stuart* and Dr *Vatas*, Mr *Fiquel*, myself, and several more, attended the Dissection, when it was observed, that our Patient was not nearly so extenuated as might have been expected, after so great a Discharge of Bile and Lymph during 25 Days ; for much Fat was yet observed under the Skin and elsewhere, and his Flesh not much sunk from the natural State, but the Blood-Vessels were found extremely empty. The *Abdomen* being opened, the Caul or *Omentum* was shrivelled up, and adhered to a great Bag or *Cystis*, affixed to the Inside of the great Lobe of the Liver, and stretching from thence along the Right Flank, over one half of the Kidney on that Side. The Left Lobe of the Liver was removed from the Left Side to the Right, not reaching farther than the Right Edge of the *Cartilago Ensiformis*, and the *Pylorus* : The *Ligamentum latum suspensorium hepatis*, was drawn backwards into the Right Hypochonder. The Liver was of a natural Colour, but very small, and more decayed and wasted in Proportion than the other *Viscera*, but as free as they from any preternatural Adhesion, Obstruction, or Induration, and the Bag or *Cystis* arising from it, strongly adhering by it's Outside only, to the *Peritoneum*, down to the Right Kidney.

Upon passing my Finger through the Wound in the Integuments, it entered first into a Cavity made between the *Peritoneum* and the Outside of the *Cystis*, in which the Matter of the Abscess had been lodged, and then through a Hole in the *Cystis*, or grand Bag, through which the great Collection of Bile in this *Saccus* had afterwards made it's way ; and it was observed, that the strong Coalition of this Bag to the *Peritoneum* round that Part where the Pus had been collected, had shut up all Communication with the Cavity of the Belly, and thereby prevented any Extravasation into the *Abdomen*.

Now the Bag or *Cystis* being separated from the *Peritoneum*, and this and the Liver spread on a Board, it was observed that the Matter had been collected in the Gall-Bladder, without affecting the Liver itself.



self. The *Vesica Fellea* was become a very large Bladder, and extended so as then to appear capable of containing 3 Pints, or more; it was nearly as broad as long: It arose very broad from the inner Surface of the Right Lobe of the Liver, which it occupied about 10 Inches in Circumference, or more: It's Bulk had removed the Stomach and *Pylorus* from their natural Situations, and pressed them far under the Left Hypochonder, and that Part of the *Colon* placed naturally on the Right Kidney, forwards upon the Spine: It's Surfaces were rugged and unequal, as that of a *Potatoe*, and it's Coats thick and horny, forming several Tumours, Elongations, or Expansions, of different Sizes and Figures; one of which, as large as a Hen's Egg, was full of a cretaceous Matter, intermixed with hard white Stones. This cretaceous Bag was made in the Duplicature of the *Vesica Fellea*, but had no Communication with nor Opening into it, which several other Tumours appearing of the same Kind, had; whence 'twas presumed that some very small Pieces of *Creta*, found in the great Bag, might have dropt from them into it, but 'tis more likely we had dropt them there, because nothing like them had been discharged through the Wound. The outward Opening in this Bag answered in the Cavity of the Abscess, wherein Incision had been made, as this latter was formed between it and the *Peritoneum*. In the Bag were found about two Ounces of the same bilious Matter which had all along been discharged; which being computed, must be equal to, if not exceed, the Quantity of 18 or 20 Quarts, during the 25 Days the Patient lived, from and after the opening of the Tumour.

It has been observed, that the Liver was in a natural State, and that the Matter collected in the *Vesica Fellea* had not in the least wounded or affected the Liver itself; so that the great Quantity of Bile and Lymph daily discharged through the Incision, must have proceeded from the internal Surface of the distended Gall-bladder. This put us upon enquiring for the *Radices Cysticae* and *Hepati-cystic* Duets; I mean for those very Duets which *Giovanni Caldesi* has so carefully traced in several Animals, and delineated in his *Observatione Anatomice al illustrissimo Sig. Francisco Redi* 1687. and which *Verheyen* has discovered in the *Bullock* Kind, but could not trace in Man; these Duets, I say, whereby so great a Quantity of Gall had been deposited in the *Vesica Fellea*, for as much that the *Cystic* Duet was obturated, whereby some Anatomists have supposed the Gall to flow back from the *Hepatic* Duets; and upon Dissection, we traced a Trunk like unto that, which *Bidloo* and *Winslow* observed in Man; and resembling that formed by several Branches in the Liver, and discharging itself into the *Vesica*. We would gladly have traced this further, but the Time allowed for Dissection did not permit us to pursue this Inquiry.

The *Duetus Communis Choledochus* was found empty, and opening, as usual, into the Cavity of the *Duodenum*; but the *Cystic* Duet was so compressed by the Bag, that nothing could pass through it. The  
Spleen



Spleen, *Pancreas*, and all the other *Viscera*, were in a natural State, saving (as hath been already observed) that some of them had changed and altered their natural Situations.

Upon the whole it appears, 1<sup>st</sup>, That the animal Functions have been in no-wise vitiated by some of the *Viscera* having been displaced; and notwithstanding that for 25 Days, the Discharge of the Bile thro' the Wound had been so great, that little was left to pass into the *Duodenum*, nevertheless he digested his Food well. The Stools continued regular, till within a few Days before Death, and even to the last the Fæces all along retained their natural Colour. 2<sup>dly</sup>, It may be observed, that the Jaundice in our Patient was not occasioned by the Obstruction of the Cystick Duct, though that is apprehended as a common Cause of this Malady; for this Obstruction must have been of many Years standing, and our Patient's Jaundice was of a very late Date. Nor was his Jaundice owing to any Retention of the Bile in the *Porus Biliaris*, from the Tumour continually pressing that Duct, and thereby obstructing the free Discharge of the Bile from the Glands of the Liver into the *Duodenum* and Gall-Bladder; nor even to the strong Compression and total Obstruction of some, yea almost all the Biliary Duets, viz. The *Pori Biliarii*, the *Ductus Hepaticus*, the *Hepati-cystici*, and the *Ductus-cysticus*, and *Communis Choledochus*, the principal of which are seated in the Concavity of the great Lobe of the Liver, under the Pressure of this great and hard Tumour, and under it's Increase for near 14 Years together, Obstructions and Compressions generally accounted as primary and idiopathick Causes of the Jaundice, because no Distemper like the Jaundice had appeared in our Patient till within a few Months before his Death, and no true Jaundice till within a few Weeks, and only then as the Abscess formed in the Neighbourhood of the Liver, had brought an Inflammation there; but as all the Symptoms of his Jaundice began to wear off, soon after the *Pus* had got a Vent, viz. as the Inflammation of the Liver brought on occasionally by a Suppuration in the Neighbourhood wore off, and some Days before the bursting of the *Vesica Fellis*, it does not appear unlikely, this Inflammation of the Liver was the Pathognomick Cause of the Jaundice here; which Inflammation of the Liver, as it was accidental, so the Jaundice occasioned thereby was actually removed soon after a Vent was made for the purulent Matter which had occasioned this Inflammation.

The Draughts were done by Memory, we not being permitted to take the Liver out of the Body. Fig. 95, 96.

A. The external Surface of the Right Lobe of the Liver. B.B. Parts of the same. C. C. The Ligament which suspends the Liver to the *Diaphragm*. D. D. The Ligament which suspends it to the *Cartilago Ensiformis*. E. Part of the *Vesica fellis* below the Liver in it's Fore Part, emptied of it's Contents, arising from the Concavity of the Right Lobe, 10 to 12 Inches in Circumference. F. F. F. F. It's Ad-

Explanation  
of the Fi-  
gures.

Fig. 95.



hesions to the *Peritoneum*. G. An Opening into the External Bag or *Abscess*, or Incision into it. H. H. H. H. H. H. Elongations and Inequalities in it. O. O. O. O. The Angles of the *Cystis* opened, shewing in it's back Parts an Elongation opening into it at P.

Fig. 96.

A. A. A. The concave Side of the Liver. B. The *Vena umbilicalis*. C. The *Vesica biliaria* emptied, which when full covered almost all the Inside of the Right Lobe on it's back Part. D. D. D. D. D. D. Several Elongations or Expansions of the *Vesica* opening into the Gall-Bladder. E. The cretaceous Bag in it's Duplication full of Chalk; intermixed with hard white irregular Stones.

Some Observations on the Case of Mr Le Grange, by Alexander Stuart, M. D. F. R. S. &c. *Ibid.* p. 325.

2. The Symptoms during Life, recited by Mr *Amyand* in the foregoing Paper, and the Appearances in the Body opened, which I was Witness to, therein likewise fully narrated, I hope it may not be unacceptable to point out what appears to me to be the mechanical and necessary Connexion between these apparent Causes and their Effects, in this uncommon Case.

As to the original or prime Cause of all the Symptoms, to wit, the Distention of the Gall-Bladder, now become a morbid *Cystis* of an enormous Extent.

If we consider the Size and Figure of the Liver, and Situation of the Gall-Bladder, with the Course or Direction of the Biliary Vessels, from various Places of the Liver towards that narrow Space where the *Pori biliarii* open into the *Cystis*, it will appear, that in almost every Position of the Body, at least in an erect, supine, and lateral Position, some of these biliary Ducts terminating in the Gall-Bladder, are perpendicular or nearly perpendicular to the Horizon and to the *Cystis*: Therefore, as far as Gravity takes Place in the Animal Oeconomy, the Bile descending by these Ducts, will press upon the Contents of the full *Cystis* and it's Sides, as a Cylinder of that Fluid, of the Length of the Secretary Ducts or Pipes, and of the Diameter of the *Cystis*.

Besides this, the Extremity of every one of these small Ducts, conveys it's Fluid into the full *Cystis*, as a Wedge acted upon by the repeated Strokes, Impulses, or Pressure of the circulating Blood of the *Vena Porta*, where it supplies the Gland at the Origin of each secretary Duct.

Therefore, by the known Laws of Hydrostaticks and Mechanicks, it is apparent, that the Force of this Secretion of the Bile into the Gall-Bladder is very great, and the Quantity copious; sufficient at least to distend the *Cystis* to an enormous Pitch, where the Discharge by the *Ductus cysticus* is not equal to the Secretion by the *Pori biliarii* and the *Ductus hepatico-cysticus*.

These Powers mentioned do sufficiently account for the Distention of the *Abdomen* in an *Ascites*, of the Womb in Gestation, of the Bladder in a morbid or voluntary Retention of Urine; also, of morbid Impostems or Tumours, and of the Gall-Bladder in the Case before us.

But this Distention could never have happened, without a total or partial Obstruction of the excretory Duct, the *Ductus cysticus*.

Had



Had this Obstruction been at once total, as when a Calculus is thrown suddenly out of the *Cystis* into the Duct, and stops it totally, he must have had the Jaundice immediately, or very soon after: For, notwithstanding the strong Powers above-mentioned, it would have been impossible for the Sides of the *Cystis* to have yielded to such a sudden Dilatation, no more than the Womb in the first Week of Gestation, can be dilated to the Pitch it is brought to in the Ninth Month, without a Rupture: So that the Dilatation here must have been very slow and gradual, and therefore the Obstruction must have been at first, and probably for many Years, only partial; and the Gall-Bladder thus slowly distended, gradually yielded and gave way only for the Reception of the Excess of the Secretion beyond the Excretion, and so prevented the Jaundice, or Regurgitation of the Bile into the Blood.

This partial Obstruction of the cystic Duct may probably have been occasioned by one of those small soft incysted Tumours, lodged between the Membranes of the *Cystis fellea*, near the Origin of it's excretory Duct, containing a soft white pultaceous Matter, with *Calculus's* or chalky Concretions in it's Centre. If this was the Case, it is conceivable that while the Contents of this small incysted Tumour was fluid or soft, it might not be capable to obstruct totally the Current of the Bile through the excretory Duct: But as the Matter of it grew thicker, and it's Bulk increased by pressing gradually more and more upon the Duct, the Obstruction must increase; and the Formation of the *Calculus's*, by their Pressure, must at last make the Obstruction total. But as the cystic Duct was at opening of the Body entirely coalesced and obliterated, it's Vicinity and Situation, with respect to these small incysted pultaceous and cretaceous Tumours, cannot be precisely determined; and therefore this is offered only as a probable Conjecture.

The Bulk, Contents, and Adherences of the Gall-Bladder to the Right-side, were without doubt to him a very sensible, and to us a visible Cause of his first Symptom, the increasing Weight he had felt in the Region of the Liver, for 14 Years before his Death.

The Current of moving Humours in the Animal Body, is always determined most strongly to the Place of least Resistance: Therefore by the partial Obstruction of the cystic Duct, a greater Quantity of Bile than usual will be forced upon the biliary Ducts, leading directly from the Liver into the great hepatic Duct, to discharge itself by the *Choledochus communis* into the *Duodenum*, sufficient for the moderate Uses of the Animal Oeconomy; though not so perfectly sufficient, but that the peristaltic Motion in our Case felt the want of the cystic Bile, or at least the Defect of it, so far as to become weak and imperfect, too weak to propel the Excrements, or keep the elastic Air within due Bounds; and therefore the Patient must be subject to flatulent Distentions, and some Degree of Costiveness, only to be relieved by supplying the want of a sufficient natural Stimulus of the Gall, by the artificial Stimulus of Purgatives and Clysters, to assist from time to time the Expulsion



both of the Excrements and also of the Flatus's, for the Ease of the Patient, as was practised in this Case.

As to the Jaundice which began to shew itself 4 Months before his Death, and continued increasing till the external purulent Tumour in his Side was opened, when it began to decline, and quite disappeared soon after the Gall-Bladder burst.

It is easy to conceive, that so long as the Gall, descending from the *Pori Biliarii*, could make it's Way into the *Cystis fellea*, and dilate it, there could be no Regurgitation of the Bile into the Blood, and therefore no Jaundice: But so soon as the purulent Impostem began to form itself in the Neighbourhood and Contact of the distended Gall-Bladder, it incroached or pressed upon the *Cystis fellea*, by the Force of a Multitude of Vessels, pouring *Pus* into the Cavity of the Impostem, urged on by the Circulation of the Blood, which is more forcible in these Vessels than in those of the Liver: and therefore this purulent Tumour increasing, will very forcibly incroach on the *Cystis fellea* in Contact with it, and not only hinder it's farther Distention, but even force the Gall it contains to regurgitate, or return again by the *Pori biliarii* upwards, and from thence by the Capillaries of the *Vena cava* into the Blood, and so produce the Jaundice; without raising an Inflammation or Obstruction in the Liver itself, whose Vessels and Passages remain open, though the Bile take a retrograde Course in it's biliary secretory Ducts.

But so soon as this accessory Pressure is taken off from the *Cystis fellea* by opening and emptying the purulent Tumour or Impostem in it's Neighbourhood, adjoining and adhering to it, the Bile begins again to flow freely into the *Cystis fellea*, and to dilate it as before; therefore the Regurgitation of the Bile into the Blood ceaseth, and the Jaundice begins to decline.

Then so soon as the Rupture or Bursting of the Gall-Bladder happened, and it began to be emptied, all Degrees of Resistance being now totally taken off from the *Pori biliarii*, they spew out their Contents so copiously, that the Hepatic Ducts are gradually frustrated by such a strong Revulsion; the Bile begins to flow all to the wounded and almost emptied *Cystis biliaria*, and either very little or none to be carried by the *Ductus hepaticus* to the *Choledochus communis*, whose Diameter and Passage into the *Duodenum* we found larger than usual, but empty. In this State, which was the last Stage of his Distemper, the peristaltic Motion begins to fail, the Expulsion of the Excrements to be very tardy, or not at all to succeed without the Assistance of purging Medicines or Clysters, which also had but a very slender Effect; the Patient ceaseth to be nourished, tho' he took a competent Quantity of Food, and dies in a Week after this Costiveness began.

The Degree of Perfection of the Natural, Vital, and Animal Functions in this Person, during 14 Years Indisposition, was certainly owing to the Soundness of all the *Viscera*, and an almost sufficient Secretion and Excretion of Bile by the *Ductus hepaticus* into the *Choledochus communis*, whose



whose Cavity and Passage into the *Duodenum* was large and open, which could not have been and have continued, without a continual and proportional Flux of Bile through it: For it is well known, that so soon as the Fluids cease to flow through their natural Ducts, their Sides soon collapse, coalesce, and at last totally shut up. Thus the *Urachus*, and *Canalis arteriosus Botalli* in the Foetus, shut up totally soon after the Birth; and Mr *Amyand* and I have lately seen one of the Ureters totally coalesced and shut up, for want of a Fluid from the Kidney, which had secreted no Urine for some time, having become a *Cystis*, filled with a thick white pultaceous Matter, nearly of a cretaceous Consistence.

Therefore as the *Ductus cysticus* was found obliterated, and the *Choledochus communis* large and open, it is plain that no Bile had for some time flowed through the former, and that there was a constant Supply from the *Ductus hepaticus* to the latter, for the Uses of the animal Oeconomy; until the Wound or Rupture of the Gall-Bladder, gradually abating it's Current by that Channel, at last stopped it quite, and put an End to his Life in a few Days after.

II. On the 5th of *Jan.* last, I was called to *Thomas Conway*, who had received a Wound with a Skane, or great Knife, which went through the muscular part of his Fore-Arm, and into the Left Hypochondrium; it was 24 Hours after he had receiv'd the Wound before I saw him (living 12 Miles distant from me). I found the Spleen out at the Wound, and that what by pressing and thrusting of it with the Fingers, endeavouring to return it into it's Place, which they that were about him could not accomplish, and by being so long exposed to the Air, it was quite cold, black, and mortified. I considered that cutting away the mortified Part, must be attended with the greatest Danger, and was to me, an unprecedented Case; yet that the Patient must inevitably die, if it was not done: I therefore made a Ligature with a strong waxed Thread, above the unsound Part, and cut off  $3 \frac{1}{2}$  Ounces of the Spleen: Notwithstanding the Ligature, there was a pretty large Artery that sprung with great Violence, which I immediately tied up; and, after bathing all the Parts with warm Wine, I returned the remaining part of the Spleen into it's Place, leaving the Ends of the Threads out of the Wound, to draw them away by when they should digest off, which they did on the 10th Day, and came away with the Dressings: I dressed the Wound with Digestives, and the *Abdomen* was stuped twice a Day with an emollient Fomentation, and after stuping it was always malaxated with an emollient Liniment, which he told me always gave him Ease. What he most complained of, was that he could not make Water, for which I every Day gave him a Carminative Clyster, which kept his Belly from swelling; and always when the Clyster came away, he got some Water made along with it: This Symptom went off on the seventh or eighth Day. He is now perfectly well recovered, following his Business, and finds no Inconvenience from the want of the Part of the Spleen which he lost. The Wound through his Arm was also quickly cured.

An Account of  
the Extirpation  
of Part of the  
Spleen of a  
Man, by Mr  
John Fergu-  
son, Surgeon,  
No. 451, p.  
425, Dec.  
1738, dated  
Strabane, Feb.  
18, 1734-5.



*The Case of an extraordinary Dropsy, by Tho. Short, M. D. No. 466. p. 223. Read Nov. 18, 1742.*

III. Last *January* I was called to visit a young Woman of 30 Years of Age, who about 7 Years ago, had like a severe Fit of the Stone in her Left Kidney, with all the common Symptoms of a Stone, but by some Means recovered again. Three Years ago she had another Fit, but got better in a few Days; though she mostly complained of a dull Pain in that Place ever after. When I saw her, I found her *Menses* had been very irregular and small since her last *Paroxysm*, and totally obstructed since *September*; her Pulse very small and quick, her Countenance pale and languid; a Pain at the Pit of her Stomach, towards the Spleen, besides that in the Kidney; her whole Stomach and Belly full, and somewhat swelled, but harder on the Left Side than the Right; a Fluctuation of Water or Matter among the *Abdominal* Muscles, and the *Perritonæum* very hard under it: The Right Side was full, and softer. She had no Appetite, little Sleep, a small Cough, a little Thirst, slight Fever, and much Pain. I ordered her some laxative, aperient, attenuating, diuretic Pills, with an antihydronic stomachic Mixture, the Country Air, and daily moderate Riding. She pursued this Method a few Weeks with some Advantage, but not so much as she expected and desired. Then she took the Advice of another Physician, to no better Purpose. In *April* I was consulted again by her. Her Flesh was now much shrunk, the Belly fuller, Pulse quicker, Pain the same, Urine scanty, but pale, Appetite languid. I prescribed other Things to the same Purpose as above, but with no better Success. In *June* I put her on drinking *Nevil-Holl* Water (which last Year had cured 3 of Dropsies, which was all had used it for that Purpose) and riding: Upon this she made Water freely, slept tolerably well, had a better Appetite, less Pain, and much chearfuller; but the Swelling of the Belly was still the same. Always on turning her in Bed, she heard and felt a Jolting and Fluctuating of Water in the Belly: This put her on being tapped, not doubting but she would recover then. Next Day I was sent for to see the Water drawn off, *July 23*, but to my Surprize, on the Perforation, between 3 and 4 Pints of very thick, ropy, mixt Matter came away; some was Matter, some a thick white Slime, but the greatest Part was a thick, reddish-brown Liquor, like Liver mashed with a little Water: It could not get through the Canula, without often clearing it with a Goose-quill. After this came near 6 Pints of clear Water or Serum, as in a Dropsy. She seemed much easier then, all the Afternoon and Night; next Forenoon not so easy, though she came down Stairs to Dinner. Quickly after it, she was most severely and violently seized with such excruciating Pain all down the Left Side to the Foot, as threw her into the most profuse Sweat, often Faintings, Vomitings, &c. At 4 o'Clock, she wholly lost both Sense and Motion of that Thigh and Leg, at 5 she was insensible, and at 6 she died, *July 24th*.

Next Day the Body was opened before me, when a monstrous Tumour on the Left Side of the Belly shewed itself, and a large Bag of Water on the Right Side appeared, which two filled the whole Cavity.

The



The *Abdominal* Muscles on the Left Side were very large, flabby, bloated, and a livid pale. The *Peritonaeum* uncommonly hard, thick and scirrhus; the Liver and Spleen both much emaciated; the first not above 2 Pound, the last about 2 or 3 Ounces; the Stomach and Intestines, from the *Cardia* to the *Anus*, full of small, hard, white, scirrhus Knots, like small Peas, or Hailstones; the Intestines of a dusky yellow Colour: The Remains of the *Omentum* were mortified: The Kidneys were found: The *Pancreas* very small and yellow. The Tumour on the Left Side (which was the *Ovarium*) being cut up, some Pints of the same Matter as was first drawn off in Tapping, run out: It was divided into innumerable Cells, full of different Matter, some as above; some white, thick Slime, some fatty, some purulent, &c. The Partitions between the Cells very strong, cartilaginous in the Middle, so as to resist the Knife; like muscular Flesh below and above this Cartilage, so was each Cell. The whole *Ovarium*, before it was first broken, might weigh about Twenty Pound Weight. The Bag of Water on the Right Side, was the other *Ovarium*, wherein was nothing but like a large Ox Bladder, containing 9 or 10 Pints of Water; like a Bladder at the lower End, and rising up like a crooked Horn at the other End; the Skin was very thin and smooth. The *Vesica urinaria* and *Uterus* were both found.

From the abovementioned Account you will see, 1<sup>st</sup>, That here was a triple Dropsy, viz. One intermuscular on the Left Side of the *Abdomen*; one in the Cavity of the Belly; one, and the largest of all, in the Right *Ovarium*. 2<sup>dly</sup>, As I have before observed the like in some others, in much the same Condition; in barren Women, and stale Maids, Tapping should be very cautiously undertaken: Especially when the whole Belly is not equally distended, and not a free Fluctuation of the Water heard and observed from Side to Side, as the Sick turn in Bed; but especially if there was, or is, a sensible Difference to be felt in the Hardness or Softness of the Parts of the Belly, before it is distended monstrously.

IV. *March* the 26th, 1739, the Wife of Mr *Matth. Wilkinson*, of *Long-Sutton*, in *Lincolnshire*, was tapped for an *Ascites*, proceeding from frequent *Hemorrhages*, and a too liberal Use of small Liquors. She was between 30 and 40 Years old, of a very low Stature, and always of a weak Constitution. The Water was all taken away at one Time, and measured 5 Gallons. She was very faint immediately after the Operation, and remained so for near 3 Weeks after. But, by great Abstinence from Liquids, excepting *Lower's* bitter Infusion, and sometimes a Spoonful or two of Cordial Julap, she perfectly recovered her Health again; and to a much better Degree of it, than she had enjoyed for many Years before; without any Appearance at all of a Return of the abdominal Tumour to this Day. The Water was clear, and readily turned to a strong Gelly upon heating it; and I am very certain, there was unavoidably left in the *Abdomen* a Quantity sufficient

*An Ascites cured by Tapping, by Hen. Banyer, M.D. No. 471. p. 632. Read. Dec. 22, 1743.*



Of a Person who had taken several Ounces of Crude Mercury.

cient to prove the Existence of absorbent Vessels. Perhaps those Patients, in this Distemper, whose Water turns to a Gelly, have a better Chance to be cured by *Paracentesis*, than others, whose Discharge is more like Urine, and will never curdle by Heat. But Time, and repeated Observation, must confirm this Opinion.

An Account of what was observed upon opening a Person who had taken several Ounces of crude Mercury internally; and of a Plumb-Stone lodged in the Coats of the Rectum, by the late Dr Madden, Physician at Dublin. No. 442. p 291. July, &c. 1736.

V. I was present, with Dr *Robinson*, and Mr *Nichols*, our Surgeon-General, at the opening the Body of a Gentleman of Note in this Town, who, for several Years, had found great Difficulty in going to Stool. This Disorder increased upon him towards the latter End of his Life, and he was seized with a violent Distemper, of which I can give you no Description, having never attended him.

In order to procure a Passage downward (which I suppose was a principal Complaint) he took, by the Advice of a Physician, since dead, several Ounces of *crude Mercury*, at different Times without any Relief, and at length died.

Upon opening the *Abdomen*, which was very much distended, there burst forth a great Quantity of Wind, though the Guts and Stomach were not wounded.

The Stomach was empty; and upon opening it we found the inner Coat very much inflamed from one End to the other. We observed in several Places of the small Guts some scattered Grains of *crude Mercury*, and along with them we generally found a black gritty Powder, very like *Æthiops Mineral*, which was, without doubt, the *Mercury* changed into that Consistence.

The *Colon* was distended, at it's Origin, to twice the Thickness that an ordinary Man's Arm has about the Shoulder. This extraordinary Thickness extended itself about the Length of 10 or 12 Inches; from hence it gradually decreased, and where it was attached to the Stomach, it had not above a third Part of that Size.

It was much inflamed at it's Origin, and contained at least six Quarts of liquid Excrement, in which we observed *crude Mercury*, and also some of the black Powder mentioned above.

The *Colon*, where it parted from the Stomach, and diverged toward the left Kidney, adhered about the Space of 3 Inches to the *Omentum*; and upon separating the Adhesion, we found an Abscess and Inflammation, which had communicated itself to those Parts of the *Ileon*, which were contiguous to the *Colon*.

The *Colon* had in this Place a Perforation about three Quarters of an Inch in Diameter, and four smaller Perforations, about the Size of a Goose Quill, through which some Excrement had passed into the *Abdomen*.

The Coats of the *Colon*, as it approached the *Intestinum rectum*, began to grow scirrhus, about the Space of 6 Inches, and the Capacity became gradually smaller.

The Valves of the *Colon*, about this Place, were of a reddish Colour, and were more scirrhus than the other Parts of the *Intestine*.



The Coats of the Colon, where it was continued to the Rectum, were at least half an Inch thick, and it's Capacity was not above the fourth Part of the natural Size.

Upon cutting the Gut horizontally hereabout, we perceived a Body which stopped the Passage, and seemed to the Touch almost of a Cartilaginous Consistence. Having opened the Gut Lengthways, we found it was no more than two of the *Valvulae Conniventes Coli*, which were grown scirrhus, and were protruded downward into the Rectum.

We also found a small *Plumb-Stone* in this Place, which was quite buried in the *Tunica Villosa*, and had made itself a Bed between the Coats of the Rectum. It had likewise formed a small Abscess, which discharged itself into the Cavity of the Pelvis, but had not any Communication with the Cavity of the Rectum.

VI. *John Spilman*, Bricklayer, of *Maldon*, came to me Octob. 3, 1734, having a sinuous Ulcer in his Rectum, about 2 Inches from the Anus. This had remained a Twelvemonth, and was taken for the Piles, and treated as such, both internally and externally. I soon perceived a Tumour in his Buttock 2 or 3 Inches from the Anus, which coming to Suppuration, I opened it by Incision; and after dressing it several Weeks with little Prospect of Success, I discovered at the Bottom of the Ulcer something that looked like a Bone, which when extracted, proved to be the lower Jaw of a Fish, as a *Whiting*, or young *Cod*, &c. And unquestionably this was swallowed at least a Year before it came away, because the pricking Pain he felt when the sharp End of the Bone stuck in the Rectum, was the Symptom mistaken for the Piles; and when this had made it's Way through the Rectum, and got into the fleshy Part, the Aposthume followed in course; and the Bone being extracted, the Ulcer was soon cicatrized by the common Methods of Cure in such Cases.

VII. Octob. 8, 1735. *Hanvil Anderson*, a Boy, 11 Years of Age, was admitted into *St George's Hospital* near *Hyde-Park* Corner, for the Cure, of a *Hernia Scrotalis*, which he had had from his Infancy, and a Fistula between the Scrotum and Thigh terminating into it, which for a Month last past had discharged a great Quantity of an unkindly sort of Matter. The Rupture was small, and not troublesome, and Part of it could be replaced, but as it appeared that the Sinuous Ulcer sprung from that Part that could not; so 'twas evident that the Cure of the Fistula depended upon the Cure of the Hernia, which latter could be obtained by no other Operation than that for the *Bubonocèle*, which was agreed to, and performed Dec. 6, following.

This Operation proved the most complicated and perplexing I ever met with, many unsuspected Oddities and Events concurring to make it as intricate as it proved laborious and difficult.

This Tumour, principally composed of the Omentum, was about the Bigness of a small Pippin: In it was found the Appendix Cœci perforated by a Pin incrustrated with Stone towards the Head, the Point of

The Jaw of a Fish taken out of an Ulcer in the Rectum, by *Bezaleel Sherman*, Surgeon, at *Kelvedon*, in *Essex*. No. 453, P. 139, April, &c. 1739.

Of an Inguinal Rupture with a Pin in the Appendix Cœci incrustrated with Stone; and some Observations on Wounds in the Guts; by *Claudius Amyand*, Esq; Serjeant-Surgeon to His Majesty, and F. R. S. No. 443, P. 329, Oct. 1736.



which having perforated that Gut, gave way to a Discharge of Fæces through the fistulous Opening therein, as the Portion of the Pin obturating the Aperture in it shifted it's Situation. The Abscess formed in the Hernial Bag occasionally, and the Suppuration for 2 Months last past from this Place outwardly, had knit and confounded, and, as it were, inbodied together the Gut and Omentum with the Hernial Bag, and these with the Spermatick Vessels and the Testicule, so that it was as difficult to distinguish them from each other, as it was to separate them without wounding them; this Pin, whose Point was fixed in the Omentum, continually shifting it's Situation, and occasioning a Discharge of Fæces. The Pin frequently lying in the way of the Knife, and starting out of the wounded Gut, as a Shot out of a Gun, the Inundation of Fæces upon this Occasion from a Gut we could not well distinguish, were so many Difficulties in the way: But the greatest yet was, what to do with the Gut, which all this while was unknown, and of which we could not come to the Knowledge, 'till the Operation was over; for this Appendix Cœci, which was the only Gut found in the Rupture, was so contracted, carnos, duplicated, and changed in it's Figure and Substance, that it was impossible to determine what kind of Gut it was, or to find out that it was only this Appendix elongated, and in Disguise.

We apprehended none of these Difficulties, when we undertook this Operation, in which we proceeded as usual: The Omentum lying uppermost in the Hernial Bag was dissected from the Parts it was knit to, and particularly the Gut it was imbodied with, and afterwards cut off close to the Abdominal Muscles without any previous Ligature, the Vessels in it being small, and the Substance of it more like a Sweet-bread than the Caul.

Much Time was spent in this Dissection; we were streightened for Room, and greatly disturbed by the Discharge of the Fæces coming out of the Gut, upon every Motion the Pin lodged in it and the Omentum suffered, upon the Separation of these from each other. The Gut forming a double Tube, like a double-jointed Syphon, continuing in the Curve as it passed over the Testicule and Spermaticks, was separated one part from the other and from the adjacent Parts, as far as the Aperture in the Abdominal Muscles, where the unperforated End of it was separated therefrom, and thence stretched out and unfolded, which brought in View the Aperture made in it by the Pin hitherto concealed, thro' which that Part of it, which was incrusted with Chalk, had just made it's way out upon an occasional Pressure, as a Cork out of a Bottle. It was the Opinion of the Physicians and Surgeons present, to amputate this Gut: To which End a circular Ligature was made about the sound Part of it, 2 Inches above the Aperture, and this being cut off an Inch below the Ligature, was replaced in the Abdomen, in such a Manner that an artificial Anus might be made there, if the Patient's Case should require it. Afterwards so much of the Hernial Bag as had been detached from the Skin, the Spermaticks, &c. was cut off, which, as they appeared



appeared in a sound State, were preserved *in Situ*. The Fistulous Opening adjoining to the Thigh, and answering to the Aperture in the Gut, was opened; some Angles of Skin in the way removed; The Aperture in the Muscles, which had been enlarged by Incision, was stopped up with a Tent, and the rest of the Dressings and the Situation of the Patient ordered so, as to remove from the Wound all such Pressure from within as might disturb the Cure.

'Tis easy to conceive that this Operation was as painful to the Patient as laborious to me: It was a continued Dissection, attended with Danger on Parts not well distinguished: It lasted near half an Hour, and the Patient bore it with great Courage. During it the Patient vomited largely, and had several Stools, but was soon composed by half an Ounce of Diacodium, and Emollient Embrocations and Fomentations, frequently applied warm on the Belly: He was blooded, and an Emollient Carminative oily Clyster was ordered to be applied in the Evening; but as he was easy, and the Belly not tense, that was omitted. He was confined to a very sparing Diet, and his Body kept open by Clysters, injected every 2d Day, when Stools were wanted, to prevent straining. When dressed upon the 4th Day after the Operation, every thing appeared well, and we had good Reason to hope for a Cure, especially as the Discharge by the Anus was natural. The Tent put into the Abdominal Aperture was not removed till the 8th. Upon the 10th the Ligature round the Appendix Cœci, where it had been amputated, dropt off, and no Fæces followed it; and as it was then plain they had taken the natural Course, from that Time the Wound was treated like an ordinary one, saving it was observed to keep a strong and constant Pressure over the Abdominal Aperture, as well to fence against the Intrusion of the Viscera into the Wound, as by a strong Incarnation and Cicatrix, effectually to secure the Patient against a Rupture. During the Time of the Cure he was confined to his Bed, always kept to sparing Diet, and ordered never to go to Stool but in a Bed-pan; by these Means the Wound was completely healed up in less than a Month, and the Patient soon after discharged with a Truss, which he was ordered to wear some Time, to confirm the Cure.

That the Appendix Cœci should be the only Gut found in this Rupture, is a Case singular in Practice: This was full of Excrements, and occasionally could be distended with an additional Quantity, which upon Pressure was returned into the Colon, with that kind of Noise which Guts replaced generally give. This had occasioned a Diminution of the Tumour when compressed, before the Operation was performed, as the Patient was lying backwards with his Head downwards, and an Increase of it as he stood erect, when the Fæces from the Colon could get into it again.

The Patient does not remember, when he swallowed the Pin which had perforated the Gut within the Rupture. But as this Rupture was from his Infancy, fixed and unreducible, so it is likely the Pin had then



made it's Way into the Appendix Cœci prolapsed ; and that an Inflammation ensuing thereon, had occasioned an Adhesion, whereby the Increase of the Tumour had been checked, and the Reduction of the Parts prolapsed thereby, rendered impracticable.

The Surgeons who constantly dressed the Patient before the Operation, did observe then, as they have since, that the Humour discharged formerly at the Fistula, had frequently the Appearance, and, as they thought, the Smell of Excrements, so that there is no Doubt that the Cause of it was the Wound made in the Gut, by the Pin giving way occasionally to such a Discharge. The Patient also perfectly remembers, that the Imposthumation or Gathering preceding the fistulous Discharge was attended with very little Pain, or much less than generally attends Suppuration. Which shews that the Extravasation of the Excrements from the Gut into the Hernial Bag, and the bursting of this Bag, were the Cause of the fistulous Discharge, and of the continuance of it outwardly.

As to the Pin found in the Rupture at the Time of the Operation, it is observable, that  $\frac{2}{3}$  of it, incrusted with a chalky Matter, were confined and concealed within the Gut ; the other Third next the Point, had made it's way through it, the Point of which was so lodged in the Omentum wherein it was fixed, as to leave a free Passage for the Excrement from the perforated Gut outwardly, whenever the Perforation in the Gut, upon shifting the Position of the inclosed Pin, could open, and afford a Passage for the Discharge of the Fæces this way, which was as oft as this conical or pyramidal Pin did alter it's Place, or did not exactly obturate the Aperture in the Appendix Cœci, it exactly fitted. I have already observed, that the Aperture made in the Gut by the Pin lay concealed, the Point being lodged in the Omentum, lying parallel with the Gut, which was here duplicated, where it was so secured, that it seemed almost impossible it could ever make it's way out of this Place, and it's other Confinement in the Gut, as the Aperture was callous, and so resisting that it was with some Violence it was forced out of it's Confinement through an Aperture fitted for the Point only and so streight, that the Report upon it's coming out was like that of a Cork out of a Bottle ; for though it appeared the Opening had occasionally been enlarged, as the incrusted Part of the Pin was pressed forward into it, yet it is plain Nature's Attempts to get rid of it had been fruitless, and might possibly have been so during all the Patient's Life.

Sir *Hans Sloane* has furnished the Curious with Instances of Bodies incrusted in the Guts with Stone, and of some making their way out, when there was little Probability of it. Daily Experience shews how far Nature will struggle to free herself, so that it is always most eligible to trust them to her Care : This may appear from the Difficulties that have attended the Cure of this Case, which at last did not prove so successful as it was first hoped for ; for the Patient having been remiss in the wearing of his Truss, upon some Effort the Guts found a way into the Inguen  
again,



again, 6 Months after the healing of the Wound. This Case also shews that the best Operation, and the utmost Care, is no Security against the Relapse of a Rupture. This is the 3d or 4th Instance I have met with, of the Insufficiency of this Operation to effectuate a Cure of Ruptures; and yet it is plain, this is by far more likely to prove effectual, than the Caustick or any other Method cried up for the Cure of this Evil. In a growing Age, a good Spring Truss is an effectual Remedy; and in an Adult, this should be the ultimate one, though it is no more than a Palliative Cure.

N. B. The Omentum and the Gut amputated, with the Pin perforating it, are in the Repository of the Royal Society.

This Observation puts me in Mind of two I made during the late War in *Flanders*, and of two more lately in *London*.

Upon opening the Body of a Soldier who had laboured many Years with an Inguinal and Scrotal Rupture, I found in a Segment of the Ilium, an Appendix like a Cœcum, about 6 Inches long, arising from that Gut, and nearly of the same Diameter with the Gut itself, the Coats whereof were somewhat thinner than those of the Ilium this Cœcum did arise from, whose Membranes and Dimensions were Natural. This Elongation of a Segment of the Ilium appeared as if it had been lodged in the Rupture Bag it lay near to, and into which it had been stretched along the Vagina of the Spermatick Vessels down to the Testicule, according to the Expansion of the Rupture Bag, which was of the same Dimension: This Production of the Ilium, or *Appendix Ilii*, was full of Fæces, somewhat narrower at it's Rise or Opening into the Ilium than elsewhere, but nearly resembling it, and as sound as that Gut it sprung from. Obs. I.

A Soldier having been shot through the Belly, the Ball was cut out upon the posterior Part of the Os Ilium. Through both Wounds the Fæces were chiefly discharged for several Months after, and at Dressings a great Number of flat Worms, dead or alive, were found upon the Plaister. The Fæces having by degrees taken their Course through the Anus, in 5 or 6 Months after, the 2 Wounds being healed up, the Patient returned to his Duty. And Obs. II.

Eight Years after this, I had him again under my Care at the Hospital, where he was brought with the Head of the *Os Humeri*, together with that of the *Acromion* and Clavicle, in the Articulation with the *Scapula*, fractured by a Cannon-shot, which thereby was laid all open. The Limb was immediately cut off in the Articulation with the *Scapula*, having first premised a Ligature about the Flesh surrounding the Vessels, by thrusting close to the Bone a Pack-Needle armed with a strong Pack-thread, there being no room for the *Tourniquet* \*: He lost very little more

\* Mr *Le Dran*, in his *Chirurgical Observations*, Vol. II. Observ. 43. 12mo. 1731. has described the Manner of performing the Amputation of the Humerus in the Articulation with the *Scapula*, to which the Reader is referred.



Blood in the Operation, than if a *Tourniquet* had been applied; but the great Discharge of Matter sunk him, and he died the 8th Day after.

The Death of this Patient gave me an Opportunity of examining how the former Wound in the Gut had been cured. I had thought the Wound had been in the Ilium, from the Thinness of the Fæces discharged through that Wound; but, upon Dissection, I found it had been in the Colon in the broadest Part of it. This was very much contracted, and made narrow in that Part of it that had been shot through, where it appeared purled up, and inseparably knit to the Ilium Bone. However the Patient never had complained of any Inconveniency therefrom, though the Narrowness of the Gut in this Place was such, as seemed to make the Descent of the Fæces difficult.

Obs. III.

Jan. 19, 1729. I attended Miss ——— aged 14, on account of a suppurated Tumour on the Navel, whose Situation was under the *Musculi Recti*. This Patient had had, what is truly called, a Starting at the Navel in her Infancy; and of late had complained, at Times, of a Swelling there, and also of Colicks, Gripes, or Vomitings, that used to go off, particularly as that Swelling disappeared. As these grew more troublesome, she lately had taken a Vomit, from which Time she had been greatly costive, and her Reachings, Vomitings, and Colicks, had proved more constant, together with an increasing Tension and Pain in the Fore-part of the Belly, and a Tendernefs at the Navel, as Matter was gathering there.

Some Days before I was called in, Dr *Campbell* had employed the properest Remedies to remove these Complaints. Upon a Consultation, we agreed to discharge by Incision the Matter collected at the Navel, being about a Spoonful of undigested Fluid, that had made it's way through the *Aponeurosis* of the Abdominal Muscles adjoining to the Navel Cicatrix. Notwithstanding which, the Tension of the Belly, the Costiveness, the Reachings, and Vomitings, rather increasing, as in the *Misereere Mei*, and having thence a Reason to apprehend a Strangulation and Suppuration of some of the *Viscera* in the Neighbourhood of the Navel, Dr *Hollings* being called in, it was agreed to enlarge the Aperture made by the fore-mentioned Matter in the *Linea Alba*, with a View and Intent to know the State the Parts were in, to reduce what we found there, or at least to procure a more free Discharge to the Matter collected under the *Aponeurosis* of the Muscles: For a Fortnight and more, every Thing was done that could internally or externally ease the Discharge, and open the Passage for the Fæces downwards, but all in vain. The Patient was a whole Fortnight without a Stool, all the Symptoms daily increasing, though towards the latter End she vomited rather more seldom: Yet, as she was still taking in, so the Dimensions of her Belly increased in Proportion, and the more for that the Air confined and rarefied in the Fæces pent in, added daily to the Tension; which at last had stretched the Skin to the utmost. There was also a Suppression of Urine, the Fundus of the Bladder being stretched towards the Navel, at  
the



the same Time that the Neck of it was compressed by the Fæces bearing down in the Pelvis, and a Tumour sprung up about the Anus, as if they had been seeking a Passage that way. It was proposed to scoop them out, but the Rectum was found empty, and the Obstruction as far beyond the Reach of any Chirurgical Operation, as it had proved against all the Means hitherto employed.

The Patient was now reduced to the lowest Ebb. The Dejections were Excrementitious, her Pulse depressed and extremely weak; she had Rigors, clammy Sweats, and all the Symptoms that denote an approaching Death, from a Mortification in the Guts, when of a sudden the Fæces bursted the Gut, and forcing their way through the Incision at the Navel, a Quantity equal to two or three Quarts, intermixed with various kinds of Fruits and Seeds, which she had been taking during her Illness, flowed out like a Torrent, with a surprizing roaring Noise, which gave her immediate Relief. The Discharge continued very great all that Day, but the Aperture in the Hernial Bag was not answerable to that in the Gut, so that the Discharge there was at Times checked by Substances obturating it; this Aperture therefore was enlarged by Incision, and thereby the Patient released from the Violence of the Vomiting and Hiccup. From this Time we began to entertain some Hopes of a Cure; for though the Patient was extremely reduced, and the Discharge continued exceedingly great during several Days, with a Singultus and Vomitings; yet she was refreshed with Sleep, and was able to retain some Nourishment. The Tension of the Belly subsisted, though in a lesser degree, until the Fæces had made their way downwards, and so did the Vomitings at Times, so long as the Inflammation continued, The Diet was such as the Case required; Clysters were frequently applied, as well as Fomentations, and every Thing else that could determine or invite the Discharge through the Anus, and restore the distended Guts to their Tone; but from the Time the Fæces bursted the Gut, it was 12 Days before any took the natural Course; and then we were again brought to the Brink of Ruin, for they then poured down so fast for a Day or two, that the Patient was like to have sunk under them: However, this severe Evacuation was timely conquered by Absorbents and Diluents: It took off the remaining Tension of the Belly, and all Vomitings; and as from this Time the Fæces had a free Discharge the natural way, and the Discharge through the Wound decreased in proportion, so the Wound in the Gut, and the external Wound in the Integuments were healed up in about 3 Weeks, in such Manner that the Patient has ever since enjoyed a most perfect Health.

It happened that I was not a meer Stranger to the principal Circumstances of this Case, as in the Year 1716, I had attended such another with the late Mr. Lafage, Surgeon, viz. Miss ——— a Girl about 4 Years of Age, in whom the same Cause had produced the like Effects; for upon a Suppuration of the Omentum strangulated in the Navel of this Patient, the Fæces detained in the Neighbouring Gut had in like

Obs. IV.

Manner



Manner forced their Way through the Navel: The Accident previous to the bursting, and subsequent upon it, having been nearly the same as in the former Observation; only the Cure proved somewhat more tedious, for the Wound was kept open by Currants-Seeds frequently working their way out at the Navel, for about 12 Months after; when it was made complete: So that the Hardships the Patient has undergone since in Child-bearing, and several hazardous Labours, have not been able to disturb it.

Hence it appears, that the Parts inflamed and in Contact have been coalesced and knit together, so as to prevent any Extravasation from the wounded or bursten Gut into the Cavity of the Abdomen.

That the Cure in the two last Cases has been owing to a free Discharge of the Fæces through the Wound, and consequently that when in a Gut Rupture the Part prolapsed cannot be reduced, a Cure may be hoped for by making such an Opening in the Guts, before they are intirely sphacelated, as may procure a free Discharge to the Fæces pent in, and thereby secure the Patient's Life.

That if this happens to the Colon or Cœcum, the Tube of it will so far be preserved as to open a free Discharge for the Fæces the natural way; and if that cannot be obtained in a Wound of the small Gut, yet the Discharge may be secured by making the Wound an artificial Anus.

That the readiest way to obtain a Cure of a wounded or bursten Gut, is to keep it in Contact with the outward Wound, and the Patient in a very low Diet.

That the Deligation of the Vessels of the Omentum previous to the Amputation of it, being liable to many Exceptions, it is more eligible to forbear it, saving when the Vessels are large; for when reduced loose and floating, it is less liable to the Inflammations and Suppurations that attend the Separation of the Ligature.

*A Rupture of the Ileum, occasioned by an external Contusion, by Christian Wolfius, Prof. Math. Marpurg. R. S. & Acad. R. S. Sc. Paris. Soc. No. 445. p. 61 Jan. &c. 1737. Dated March 3, 1731. Of a Bubonocèle, or Rupture in the Groin, and the Operation made upon*

VIII. A strong labouring Man was bruised by a Stone falling on his lower Belly; he received no Wound by this Accident, and died unexpectedly the next Day. Upon opening the Abdomen, there was found a great Rupture in the Ileum, so that it cohered with the rest only behind, and the Contents being poured forth into the Cavity of the Abdomen, caused an abominable Stink. The Liver was pale, being quite destitute of it's natural Colour; and the same happened to the Lungs. From a livid Spot in the Abdomen, I concluded, that the Stone had fallen with it's acute Angle on the Belly, and that the Intestine was bursten by too great a Tension, as bent Bodies are broken on their upper Convexity.

IX. I. Oct. 8, 1737, Mrs Bennet of a thin Habit of Body, aged 70, had a Return of a Tumour in the Groin, with unusual Pain, which was soon followed with a cruciating one in the Belly, and such Colicks, Reachings, and excrementitious Vomitings, as usually attend the Strangulation of the Gut in the *Miserere mei*. This came upon her unaware,

and



and the Distress she was in, made her forget that for 25 Years last-past, she had had a Swelling in the Groin as big as a Hasel-Nut, which seldom had given her any Uneasiness, and which she never suspected to be a Rupture. Of late she had been more subject to Cholicks than usual, but that was imputed to bad Digestions; and that Day she had used no Motion capable of producing a Rupture: So that it was by chance that Mr *Despaignol*, who was sent for the next Day, discovered the Cause of the Complaints. She was blooded, clystered, fomented, poulticed, and embrocated; but the Complaints subsisting, with a continual *Singultus*, I was called in, the 11th.

it; by Claud. Amyand, Esq; Serjeant Surgeon to his Majesty. and F. R. S. No. 450. p. 361. Oct. &c. 1738.

The Tumour was now oblong, about the Bigness of a Hen's Egg, somewhat inflamed, yet not tense, nor so painful as to take much Notice of it. Upon the repeated Use of the forementioned Means, and of lenient Purges and Opiates, the Vomitings and Hiccough were at times stopped, and the Patient made so much easier, as to ground Hope of Success; but as during 6 Days, the Patient had had no Passage, and the Tumour could not be reduced, so we thought it unsafe to delay the Operation any longer. At this Time she was free from Fever, the Belly was not tense, and she had great Intervals of Rest.

The Tumour felt unequal (though it appeared even) and pappy, as the Tumours of the *Omentum* generally are, and therefore of that Kind that is always most difficult to reduce; the *Omentum* wanting that elastic Springiness which favours the replacing of the Guts. Upon Dissection we found it was embodied in the hernial Bag, and that upon the external Surface of the Slits in the abdominal Muscles, the Folds of it had form'd a round Protuberance, not unlike the *Os Tincæ*, in the *Vagina*, or like a *Bourlet*, which, by compressing the Gut, prevented the Return of it into the Belly, and by obturating the Opening, as the Gut was pressed upon it, had strangulated about an Inch of the Gut incompass'd by it in the *Hernia*.

This being the 6th Day from the Beginning of this Evil, the Gut there was found of a very swarthy Colour, but yet springy, so that it was not totally mortified. It lay inclosed in a Net formed by the *Omentum*, as a Fish in a Fishing-net, strangulating the Gut under it's Pressure without the abdominal Muscles: It was with some Difficulty the *Omentum* was torn off and separated from the Bag it was attached to; and as this lay in the way of the Reduction of the Gut, and almost sphacelated, so it was cut off without any previous Ligature, though it's Vessels were turgid and large, as it was impossible to pull it out so as to make the Ligature upon the sound Part of it; after which the Reduction of the Gut might easily have been made, without enlarging the annular Slit; for this made no Stricture to prevent it. But the Quantity of the *Omentum* within it being great and voluminous, and the Gut in a very crazy State, it was thought more expedient to enlarge it, to make the Reduction of the whole easy: Afterwards the *Omentum* was detached from it's Adherence round this Place, and pulled further out;



and a Ligature being made upon the sound Part of it, that was also replaced in the Belly, and the Entrance stopped with a conic Tent, dipped in the Yolk of an Egg, and Oil of *St John's-wort*: The Belly was embrocated, and the Dressings well secured; for as the Patient was greatly oppressed with an Asthma, so she was obliged to be sitting in Bed.

From this time the Hiccough and Excrementitious Vomitings have disappeared, but the Reachings and Vomitings continued near 5 Days longer, before the Fæces detained above the strangulated Gut could make their way downwards, though they were frequently invited by Clysters, and lenient Purges. She was blooded immediately after the Operation, and soon after took an emollient and carminative Clyster, which was repeated Night and Morning; and an oily Laxative of ʒij of *Manna*, and ʒss of Oil of sweet Almonds, in Mint and small Cinnamon-water, every 4 Hours. At first the Evacuations were extremely fetid, black, griping, and frequent; but they became more moderate as she took Absorbents and Diluents; but yet so frequent, that it was thought proper to restrain them by gentle Astringents, so that she might be enabled to bear them. In 5 or 6 Days, the Stools had removed the Tension, which appeared on the Belly after the Operations; the Reachings and Vomitings, and the remaining Symptoms, went off; the Wound digested well, and the Patient continued in a mending and recovering Way.

It has been observed, that this old Woman was greatly afflicted with an Asthma; she had, at times, violent Fits of it, and the 14th Day from the Operation she had one, with a total Stoppage of the Discharge from her Lungs, which choaked her upon the 17th Day. I should have been glad to have had the opening of her, but could not obtain her Friends Consent.

This Case confirms me in what I have frequently observed upon the like Occasion, that as the *Omentum* is the principal Obstacle to the Reduction of the Guts in Ruptures, so it is the Occasion of the greatest Accidents that attend that Evil. It wraps up and incloses the Gut prolapsed, like a Net, whose fastened End within the Belly strangulates the Part detained in the Rupture without the abdominal Apertures where it is confined; and is productive of such Folds in it, and Pressures of the Gut wrapped up in it, as is oftener the Cause of a Strangulation and *Miserere mei*, than the tendinous Slits of the external oblique Muscles in the inguinal Rupture, or tendinous Opening in the Navel, which upon these seldom is found inflamed, and can never contract so suddenly, as to obstruct the Return of the Gut into the Abdomen, when the *Omentum* is absent: Agreeable to which, it is rare to find any strangulated Rupture that is not attended by it.

The fatty Substance of the *Omentum* subjects it to Inflammations, Suppurations, and Putrefactions, that contaminate the neighbouring Parts. It wants that elastic Springiness the Guts have, which favour



Reduction in Ruptures. It frequently stays behind when the Guts are reduced, and therefore bars the Patient not only from the Benefit of retentive Trusses he stands in need of for his Security, but it directs the Gut into the Rupture where it lies, the Guts being most apt to slide down along it; and when it is fixed in the Rupture, it too often pulls and draws into it the *Cæcum* and *Colon* it is attached to, and even the Stomach itself, in proportion as the Quantity of it in the Rupture happens to be more or less; and therefore the umbilical Ruptures are most dangerous of any; for as the *Omentum* lies over the Guts, so it is always pressed in foremost, in the Ruptures of this Part, which, when large, will also cause an Elongation of the *Fundus* of the Bladder that way, and a Difficulty of Urine, in proportion as the *Urachus* attached there is stretched forwards towards the Navel.

The Pain attending the *Prolapsus*, soon swells the Vessels of the *Omentum*, and that will fill up the Apertures in the abdominal Muscles, through which the *Viscera* are fallen out, prevent their Return, and bring on an Inflammation. If, by plentiful bleeding, the Vessels emptied do not facilitate the Return of the Parts prolapsed, and all the Consequences that generally are observed upon the like Occasion, and if these do not operate soon, it is very seldom that any thing is got by the Application and Use of all the other Means prescribed. Certain however it is, that 'tis very dangerous to depend too long upon them; and that a Suspension of the Symptoms is no Security, whilst the due Course of the *Fæces* is interrupted. The Case I have here mentioned, may be a Warning to others, not to delay too long an Operation whereby the Parts are to be released from Confinement, and which oftner would be successful, if it was not delayed so long.

In the case of a Rupture with a *Miserere mei*, some deny that Excrements and Clysters from the lower Guts can ascend, and be discharged through the Mouth, upon a Presumption, that the Strangulation that prevents and stops the Descent of a thin Fluid downwards, must prevent the Ascent likewise, and especially of such solid Substances as are reported to be discharged upwards; and the rather, that the *Valvula Coli*, and the Wrinkles or Valves of the Guts, must impede the Ascent: But the Fact is true, and there is no one conversant in Practice, but has seen *Fæces* and oily Clysters discharged upwards.

If this be allowed, it will follow, that in the Gut-Rupture, there is a Passage through their Pipe, and consequently that the Strangulation must be less than it is generally ascertained.

The Inflammation of the Guts inverts, but we do not know how, the peristaltic Action of them, and the Discharge, and that so long as that is continued, insomuch that this will continue even some Days after the Reduction of the Gut is made.

Parts inflamed, and in Contact, will soon stick and coalesce together: Pain is the indicating Sign of Inflammation, and an Inflammation is an Intumescence of the Vessels in the Parts inflamed. If then



Pain happens to be an Attendant of a Rupture, wherein the *Omentum* is concerned, and the Parts so inflamed continue in Contact, that is, if the Parts prolapsed in a Rupture are not soon reduced, they will swell in the Bag, and be knit together, and by filling up the Opening, by which they had prolapsed, choak up the Passage, clog and prevent the returning back, compress the Guts under the Pressure, and strangulate them more and more, in proportion as their Bulk shall increase, so long as the Fluids can flow into the compressed Canals; in which at last they stagnate, and upon Extravasation suppurate, or the Mortification of the Parts compressed ensues.

— by John  
Huxham,  
M. D. F. R. S.  
No. 459. pag.  
640. Jan. &c.  
1741. Dated  
June 8, 1739.

2. Mr *Burman*, a Taylor of *Plymouth*, about 40, had from his Childhood laboured under a small inguinal Rupture on the right Side; but about 6 Years before his Death, from a Blow received in his Groin, the *Hernia* became very large, and the Gut always remained down in the *Scrotum*; for he wore no Bag, Truss, or the like, to support it. The Day before his Death, he was following his Work, as usual, with his Pressing-Iron, without any violent Jerk, or Straining; but, about 10 in the Morning, all at once, he felt a very great Pain in his right *Inguen*; which, continually increasing, in 2 or 3 Hours threw him into Vomitings, cold Sweats. &c. His Apothecary, Mr *Ellery*, gave him a Clyster, which brought off a small matter of thin Stool; but gave no Relief, though it had been formerly very serviceable to him in the like Disorder. About 8 in the Evening I was sent for, and found him in cold Sweats, with scarce any Pulse: The *hernial* Tumour was prodigious large, and exceeding hard; the Pains extremely violent, which caused excessive Languors. I immediately ordered, that he should be placed in a proper Posture, that a warm aromatic emollient Fomentation should be frequently and long applied, and that a Reduction of the Intestine should be attempted; or, if that did not succeed, that the Operation for the *Bubonoccele* should be performed. The Fomentation was tried a long while, emollient *Terebinthinate* Clysters injected, and the Reduction attempted, for an Hour or two, by Mr *John Start*, a skilful Surgeon, but in vain: Nay, the Swelling increased considerably during the Application; and the Pain became (if possible) more aggravated all over the *Hernia*, which before was chiefly at, and near, the Rings of the *abdominal* Muscles; and this too, though he took, with an easy Cordial, and mulled Wine, *Laudan. Solid. gr. ij. 3iis Horis*. Early the next Morning I was desired to see him again; and, finding that he had not slept a Moment, the Tumour considerably increased, and excessive hard, though not discoloured, and the Patient exceeding weak and pained, I advised the Operation forthwith, as the only possible Means of saving him: But he was unwilling to admit of it, and we were all indeed diffident of the Success. Whilst a fresh Fomentation was getting ready, the poor Man expired in Agonies. About an Hour or two after, we opened the *Scrotum*, which in so short a Space of Time appeared all livid, and the Blood-Vessels were extremely turgid



turgid and varicose. Upon cutting through the Teguments, Part of the *Colon* and *Ilium* thrust out with great Force; they were both prodigiously distended with Wind, highly inflamed, and in several Places very livid. That Part of the Guts, commonly called *Cæcum*, was blown up into a kind of globular Figure, as big as a Child's Head. It was remarkable, whether in the original Conformation, or by the vast Distention, I know not, that there was no manner of Appearance of the *Appendix vermiformis* to be found, though we diligently examined: And further, that the *Cæcum* was vastly thicker set with Glands, and they much larger, than I had ever seen before in any Subject. The Convolutions of the *Ilium* and *Colon* were so immensely distended with Wind, that the valvular Corrugations in both almost totally disappeared. Yet exactly at the *Valvula Tulpii, alias Baubini*, there was a very great Constriction of the intestinal Canal, as if tied strongly with a Cord; and, though we opened the *Colon* about a Hand's-breadth beyond the *Valve*, and let out the *Flatus*, we could not possibly press any Wind from the *Ilium* into the *Colon* through the *Valve*. I suspected indurated Excrement, as an Obstacle; but, on a careful Inquiry, only found the whole valvular Production, and the End of the *Ilium*, at it's Insertion into the *Colon*, highly inflamed, and quite shutting up the Passage. On dilating the Rings of the oblique and transverse Muscles, the Wind rumbled up out of the *Ilium* into the Cavity of the Belly very readily. We found pretty much bloody *Sanies* in the Guts, on flitting them open, but little or no indurated *Fæces*: A manifest Proof, that the exceeding Hardness of the Tumour was owing only to the excessive Flatulence, and great Inflammation; and shews how much we may be deceived in our Conjecture on like Occasions. The Tumour of the *Scrotum* was 28 Inches round. I was much surpris'd to find no Adhesion of the *Intestines* to the containing Parts, though he had so long laboured under the *Hernia*.

This unhappy Case gave me a severe Reflection, and I cannot but think the Malady was much increased by the repeated Application of the hot Fomentations; as it rarefied the Air greatly, and, by relaxing the Parts, gave further Room to the vast Expansion. At that time I had never seen *Belloste's* Second Part to his *Hospital-Surgeon*, where he advises, in such Cases, the most cold astringent Fomentations. In this and the like, they might have been very proper; especially if a Portion of Spirit of Wine camphorated had been added to prevent Mortification.

It sometimes happens, that though the annular Perforations of the abdominal Muscles are dilated by the Operation, yet the *Hernia* cannot be reduced. I believe, as the Guts were distended to so enormous a Bulk in this Man, it would have been impracticable. In such Cases may it not be proper to prick them with a Needle, to let out the *Flatus*; as is commonly practis'd in small Wounds of the *Abdomen*, where the *Intestine* thrusts out, and becomes so turgid with Wind, that it cannot otherwise



otherwise be returned? In some ventral Ruptures (as they are called) this also may be necessary. I find Mr *Sharp*, in his late excellent Piece of Surgery, approves of this Method, from an old *English* Practitioner, who had often used it with Success. I am persuaded, Punctures in this manner are much less dangerous than the Operation; and believe, in such Cases, may be more effectual. It is a common thing with Grassiers and Cattle-Doctors, to prick the Guts of their Sheep and Bullocks with great Success, when, by feeding on Clover, or fresh young Grass, their Guts become so vastly distended with Wind, as would otherwise certainly kill them. May not a very small hollow Needle with Perforations, as in that used by some instead of the *Trocar* for a *Paracentesis*, be more proper than a common Needle? May not the hernial Tumour be perceived to be chiefly flatulent by it's being in some Degree transparent upon applying a Candle, as used in the *Hydrocele*? And may not that direct the proper Place for Punctures?

An Observati-  
on on the singu-  
lar Conse-  
quences of an  
incomplete Her-  
nia, and on the  
Functions of the  
Intestines ex-  
posed to Sight,  
by M. Le Cat,  
translated by  
T. S. M. D.  
F. R. S. No.  
460. p. 716.  
Apr. &c.  
1741.

X. *Katharine Guilmatre*, of *St Adrian*, near *Rouen*, aged 50, had a Rupture in the right Groin, for 7 Years last past. At *Easter* 1739, there happened a Strangulation in her Rupture; and, having no Assistance, the Tumour suppurated, and opened of itself. The Excrements followed the Pus, and the Patient escaped at the Expence of Vomiting, and a little Fever.

The Intestine cicatrized with the Integuments, but there remained externally an Opening, through which the Excrements passed. The Anus ceased to perform it's usual Functions; and, that excepted, the Patient was cured.

Towards *Whitsuntide*, there issued out at the Wound, besides the Excrements, a Gut 3 or 4 Inches in length; but this Gut was turned Inside out; that is, the villous Coat was outward, and it conveyed no Excrements; these were always discharged through the Wound, on one Side, and below the Gut that was come out.

In *Aug.* 1739, there came forth at the Wound another Gut, turned as the first, making with it a continuous Canal, but at it's End supplying *Fæces*, which had before been discharged through the Fistula; so that, instead of the Fistula, there was found, as it were, the Trunk of two Intestines, which made a kind of Fork.

The Woman, tired of this Inconveniency, resolved at length to seek Relief at the *Hôtel-Dieu* of *Rouen*. She was brought thither in *Dec.* I was then in the Country; She was told that her Distemper was incurable; and yet she was kept there till my Return, to shew her to me by way of Curiosity.

What was curious in this Distemper, was not an Anus formed contrary to Nature in the Groin (that Accident is pretty common); but it was the two Guts turned Inside out, their villous Coat, and their Functions, demonstrated to the very Eye; as also the *Ænigma* occasioned by these two Guts, which were both of one Piece, as appears in *Fig.* 99. and which notwithstanding had 2 Openings; the lower whereof voided



voided the Excrements, and the upper discharged nothing. I know of no other Person but Mr *Chefelden*, who has observed an inverted Gut in a living Body: But my Observation adds to his, 1<sup>st</sup>, Experiments on the Action of Purgatives. 2<sup>dly</sup>, The singular Figure of this *Hernia*, the Discovery of which has an Influence on the radical Cure of this Disease, and on those of the same kind which may possibly happen.

I think I may give the Epithet of *Singular* to this Sort of *Hernia*; because, upon Inspection, one instantly conceives, that the Gut which voided the Excrements was continuous to the Stomach, and the other to the *Anus*. But how was it possible, that these 2 inverted Guts should be of one Piece? Let one imagine a Gut cut through by a Strangulation: There remain 2 Orifices, one that runs to the Stomach, the other to the *Anus*: If the Canal of each of these Orifices turns Inside out, and prolapses, as it happens, to the *Anus*; you then have 2 Guts prolapsed and turned, but they are distinct one from the other, far from being of one Piece. — It must be allowed, that the *Ænigma* is puzzling: And indeed, a good Number of Surgeons saw this Singularity, but not one of them accounted for it.

The villous Coat, and the Functions of these *Intestines*, being exposed to the Eye, afforded a Circumstance still more curious and useful. These 2 Portions of Guts seemed to be 2 large living Worms. They move here-and-there, twisting, shortening and lengthening themselves like Reptiles. The lower Gut was much more alive and foundered. One time that I handled it, it twisted round my Fingers like an *Eel*. The upper Gut, that answered the *Anus*, had less Motion, and was beset with Pustules.

The Expulsion of the *Fæces* engaged our particular Regard: We remarked in it's Mechanism 2 Sorts of Motion.

The first is the vermicular Motion, allowed by most Authors. In this, the Gut first swells, and becomes smooth; then grows narrower, running into Wrinkles, and forming Waves the whole Length of the Gut, where these 2 Motions happen alternately. The Streightening is performed behind, and upon the Excrements, to drive them down; the Dilatation happens before these *Fæces*, in order to open them a Passage: For Example: When the *Fæces* were at the Orifice, through which we saw them issue, this Orifice was spread open.

The second Sort of Motion that we observed in the Guts, generally preceded the one above described. In this Motion the Surface of the Gut being swelled and smooth, was rendered uneven by many small Impressions [or Hollows] distributed here-and-there, and which seemed to be formed by little local Convulsions, circumscribed by the *intestinal Fibres*. These convulsive Impressions resembled, in little, those that are made in the *Abdomen*, upon contracting some one of it's *Muscles*. They made the Surface of the *Intestine* a little pale, and thereby formed a sort of Undulation on it's Surface. It was chiefly in this sort of Motion.



Motion, that there was squeezed out of the villous Coat of the *Intestines*, a Mucilage and Serosity, which flowed from it in Abundance. Both these seem to serve for diluting the *Fæces*, and preparing them an easier Passage. The cold Air did not fail to excite these Motions, and the Woman felt some Touches of the Colic.

After having made these Observations on the natural Functions of the *Intestines*, it occurred to my Thoughts to observe the Effect of Cathartics therein. One does not often see the Inside of the Guts of a living Person in good Health, and freely performing his Functions: Wherefore I was willing to make use of so uncommon an Occasion.

First, I put a little Pulp of *Cassia* on several Places of these two Portions of Gut. This Medicine made very little Impression on those Parts; they stirred very little, especially the upper Gut.

Next, I laid on *Manna*. This, when somewhat dissolved, formed a sort of Froth, and then the Gut was agitated by vermicular Motions, and by small convulsive Contractions, much more distinct than in the Conditions I had examined it before.

I took off the *Manna*, and strewed Powder of *Jalap* on the Gut. At first it had no Effect; but, when it was moistened, the Gut was violently agitated, discharged much Serosity, and the Patient complained of Gripings. I removed the Powder, and under it I found a great Quantity of Mucilage, that was already gathered there.

I thought it needless to harrass this Woman by further Trials, which would prove much the same with the foregoing; and therefore turned my whole Attention on the Means of curing her of this Accident, and thereby rewarding her for the Services she had rendered us.

*The Nature of  
this Accident  
explained*

At first Sight of this Disease, I was as far as the other Surgeons from comprehending the *Ænigma* of the Figure of the two Ends of the Gut continuous [or of one Piece]. I plainly saw, that they were Portions of the *Ileum*; but I was obliged to meditate on it a second time, in order to guess at the rest; and yet nothing so easy when a Person has hit it off.

The *Hernia* which this Woman had at first, was one of those named an *incomplete Hernia properly so called*; that is, a *Hernia* wherein there was but a Portion of the Side of the Gut pinched within the Ring. This strangulated Portion mortified; the sound Lips cicatrized with the *Integuments*; the rest of the Canal remained within the Belly; and the Excrements, which this Remainder of the Canal received, issued at its Outlet towards the Groin.

The Patient, being recovered, quitted her Bed, and by little and little occasioned the turning Inside out, and Fall of the Portions of the intestinal Canal, situated above and below the open Part. By this Inversion, the remaining Coats of the opened Gut came out likewise. This Part is situated between the 2 Portions, one of which answers to the Stomach, and the other to the *Anus*; and with these 2 Portions it makes but one and the same Part, or a continued Plane: Wherefore  
it



it was found, out of the Belly, between these two Portions, and formed, as it were, the Trunk of these two Branches.

The Portion, or Branch, corresponding with the *Anus*, must have had less Motion, and be less found; because it is deprived of the Share of Life that would come to it from the Continuity of the *Fibres* that were pinched and carried off by the Strangulation, and that it is continually exposed to the Air. The other Portion is full of Life, because it's Continuity with the Stomach makes it enjoy all the Life that this Communication can furnish it with; and that besides it remains within the *Abdomen*, while the Patient is in a recumbent Posture.

In order to give the Pupils of our *Hôtel-Dieu* a clear Notion of the Formation of this singular Rupture, I made one just like it on a dead Body. For that Purpose I made an Incision in the *Abdomen*, at the Place of the Rings. I passed into it a Gut, in which I made an Opening. I sewed the Lips of this Opening to those of the Wound of the Belly; and having turned Inside out the Portions of Gut placed above and below this Opening, they afforded us a Bifurcation of Guts continuous and entirely like that of the Observation.

This same Portion of Gut that supplied the *Faces*, and that was so lively, was drawn back into the Belly, when the Patient lay down, as I have already said; and the other only constantly continued out. This Circumstance made me conceive Hopes of curing this Accident.

*Method of curing this Accident.*

Thus I reasoned with myself: It is but first making this last Gut enter in, and bringing the Disease to it's first State: Then, seeing there is a pretty large Portion of a Canal still remaining between these 2 Guts, as appears by the Bigness of the Trunk of the Branches formed by them; what remains to be done, after the whole is reduced, is to close the exterior Orifice of this demolished Canal; that is, to close the Opening made by the Strangulation and Mortification; and I conceive; that this last Operation is very feasible. The next thing to be done is to refresh the Lips of the Fistula formed by the Integuments of the *Abdomen*, which are thick enough, and on which shall be afterwards made a *Gastrographia* proportionate to these Parts.

The great Difficulty is, to reduce this End of Gut, which is grown hard, and full of Tubercles. I have already made a fruitless Attempt, both with Cataplasms to repair the Damages, and with manual Operations proper for making it re enter. I am actually watching a favourable Moment for this Operation. If I succeed, I intend to stay for making a second Operation, till this Gut has remained long enough in the Belly to repair itself, and resume it's Functions. In order to that, I shall content myself for the first 8 Days, with keeping it in the Belly, applying resolving Fomentations, and giving proper Clysters. Then will I put into the Opening of the intestinal Canal, that answers to the Fistula, a silver *Canula* of the same Bore with the Gut, in order to push this Portion of a Canal into the Belly, to support it therein, and re-establish it's Communication with the Portion newly reduced.



This silver *Canula* will be fixed by a Plate of the same Metal, guarded with Plaister and Linen, and placed on the Fistula, where it shall be secured in it's Situation by a Bandage. I shall then redouble the Use of the Clysters, and when I shall be ascertained of the Re-establishment of the Communication of the two Guts, and the Functions of the Portion continuous to the *Anus*; then I will withdraw my silver *Canula*, and will perform the Operation, as I have said above.

Fig. 97.

Fig. 97. The Woman with the *Hernia* in *Situ*.

Fig. 98.

Fig. 98. The *Hernia* represented at about half it's natural Size. A. The lower Part of the Intestine communicating with the Stomach, and emitting the Excrements. B. The upper Part of the Intestine, which is continued down to the Anus, and emits only Mucus, and serous Humours.

Fig. 99.

Fig. 99. The upper Part of the Intestine raised up, that the Connexion of these two Parts of the Intestines may the better appear.

A Case of an extraordinary Stone voided by the Anus, by Mr J. Mackarness, Apothecary, in Chip-ping-Norton, in Oxford-shire. No. 458. p. 500. Sept. &c. 1740.

XI. Mrs *Mary Smith*, Wife of *John Smith*, of *Chadlington* in the County of *Oxon*, aged about 31, a tall well shaped strong-made Woman, was seized with a violent Fever, accompanied with great Heat, Restlessness, Pain in the Head, Twitchings of the Tendons, pale Urine, unequal Pulse, Difficulty of breathing, great Costiveness, and without Thirst. She had a hard Labour about 3 Weeks before. This Fever seized her *Jan. 2. 1727*, and lasted till the 17th, during which Time she was very costive, and continued so till she had another Child, which was the latter End of *Feb. 1728*, and was frequently subject to Attacks of a Fever, notwithstanding she observed a most regular Temperance: Her Labour was always difficult, and she bred her Children very fast: She lay-in again in *Dec. 1728*, and in *May 1731*, and the Child she lay-in with at this Time had a hollow Dent above the Temples, on the left Side of the Head, and is now living. She lay-in again in *Sept. 1732*, and in *Oct. 1733*. These two last Labours were the most violent, and the Children had both Dents in the same Place of the Head, the last the biggest, the Hollow being big enough to contain half a small *Orange*; and the 2 Children were still-born, but alive till the Moment they came to the Birth. In *Dec. 1733*, she was seized with a Fever, and violent Pains cross her Loins and Back, great Costiveness, Pain at the Neck of the Bladder, and a Pain and Heaviness about the Region of the *Os Pubis*. I took some Blood from her, gave her soft gentle Purges, with the intermediate Use of balsamic and diuretic oleaginous Mixtures and Apozems; but it was difficult to get any common Dose of purgative Medicines to work with her: I then had Recourse to Clysters, but all without any Effect, except that her Fever remitted; but she had no Relief from her Pains, and her Costiveness increased, having no Stool but what was from Purges, or Clysters, or both; and the Excrements that came from her were formed in a very odd Figure, like the Leaves of the great *House-leek*, in *Strata*, one on the other; and thus she was for several Months, and then her Urine began to grow fetid, and a slimy Substance fell to the Bottom of the Pot: Her Pains

still



still continued; she found no Relief from any Medicines, except Opiates; and these I was obliged to use but seldom, because of her Costiveness. The Stench of her Urine increased, and now a purulent Matter discharged itself in great Quantity: I concluded she had an Ulcer in the Bladder: Mr *Wisdom*, a neighbouring Surgeon, passed a Catheter into the Bladder, and he perceived a Swelling just above the Groin, in the left *Hypochondre*, which was very hard: We advised her to Patience and Resignation, in hopes Nature might point out some Method for her Relief; and gave her no more Medicines, but a soluble Electuary to procure her Stools, which she took every Night. After some time, the fetid purulent Matter ceased from discharging itself in the Urine, but came away through the *Vagina*, after the manner of the Whites. She was quite emaciated, and grown to a Skeleton, by continual Pain, and those Discharges. In *April 1735*, another Turn happened: That purulent fetid Matter, which discharged itself at the *Vagina*, now came through the *Anus*; she complained of a prodigious Weight there, and about the Middle of *June 1735*, she had frequently very bloody Stools, and once a Discharge of more than  $\frac{1}{2}$  a Pint of fresh Blood. On the 2d of *July*, having Occasion to go to the Close-stool, as she sat there hard straining, but to no purpose, she thought she felt a hard Substance ready for Expulsion, and sent for her Neighbours, who found a large Substance hard and rugged, (so much, that it tore one of the Womens Fingers, and made it bleed) in the lower Part of the *Rectum*, close to the *Sphincter Ani*. Mr *Wisdom*, the Surgeon, was immediately called, who endeavoured to extract this Substance, and broke some Part of it off, but was forced to dilate the *Rectum*, and so extract it that way. It was a hard, unequal, ragged, flinty Stone, 10 $\frac{1}{2}$  Inches round, and weighed  $\text{zviijss}$  after it was extracted. The Woman has been easy from that moment, the Wounds are healed, she goes about her Business, has got a good deal of Flesh, and is recovered perfectly, except a Numbness and Contraction she has in some of her Fingers of both Hands and both Feet and Toes.

Fig. 100.

XII. Sir *Rob. Hacket*, an *English* Knight, of a robust Constitution, and good State of Health, except that he was sometimes miserably afflicted with the Gout, lived in *Barbadoes*, where he indulged himself in a liberal Use of Wine. For many Years, when he had drank too freely, he was troubled with the Heart-burn, to remove which, he took Crab's-Eyes, and such like terrestrial Correctors of Acids. Finding some temporary Relief from these, and his Heart-burn returning daily, he took a large Quantity of Crab's-Eyes, Chalk, testaceous Powders, and such like, every Day for several Years. But the Heart-burn increased, and he began to be sensible of a troublesome Weight under the Diaphragm, accompanied with Vomitings, and intense nephritick Pains, till at last in the 56th Year of his Age, and, I think, in the Year 1694, he died in great Torture.

Of Stones in the Stomach and Kidnies, occasioned by an immoderate Use of Crab's-Eyes, and other terrestrial Absorbents, by Jo. Phil. Breynius, M. D. F. R. S. No. 459. p. 557. Jan. &c. 1741.



Fig. 101.

His Body was opened by two Surgeons, who found a great Number of Stones, of various Bigness, in his Stomach, the largest of which was branched like a Coral; and though it had lost some of it's Extremities, as appears by the Figure, weighed  $\text{ʒij}$  and  $\text{ʒv}$ , Apothecary's Weight. It was shewed me by his Son, *William Hacket Esq*; when I was at *Oxford*, in 1703, who also gave me this Account.

Fig. 102.

Another weighed  $\text{ʒj}$  and  $\text{ʒj}$ . The rest were smaller, approaching to a spherical Figure, from the Size of a Poppy Seed, to that of a large Pea.

All these Stones were involved in the Stomach by a very mucous and tenacious Humour, which being dried in the Air upon a Piece of Paper, turned to a Powder very like the Stones.

Their Substance was not all over the same, for they were generally of a whitish and ash Colour; and in some it was of the Consistence and Colour of Occidental Bezoar, and in a very few, especially *Fig 101. a, b*, like Oriental Bezoar; *d* shews the Surface of the Extremity *c* broken off, to discover the inner lamellated Structure.

Fig. 103.

There was a Stone also found in the Kidney, weighing  $\text{ʒij}$ , which seemed to be composed of 6 Globes, and of a Substance much like those in the Stomach. There is mention of a Stone, not much unlike the first of these, found in the Stomach of a Woman, by *Mr. W. Clerk* \* There is another Example of a Stone in the Stomach in the *Ephemerid. Nat. Curios. D. 1. Ann. 2. Obs. 131.* with a *Scholium* of *Phil. Ja. Sachsus.*

Description of  
a very extraor-  
dinary Stone or  
Calculus taken  
out of the Blad-  
der of a Man  
after Death,  
by the Mar-  
quis de Cau-  
mont, in a  
Letter to Sir  
Hans Sloane,  
Bart. transla-  
ted from the  
French by  
T. S. M. D.  
F. R. S. No.  
450. p. 369.  
Oct. &c. 1738.  
dated Avig-  
non, June 30,  
1732.

Fig. 104.

An Account of  
the Case a-  
bove-mention-

XIII. 1. I send you the Figure of an uncommon Stone found lately in the Bladder of a dead Body, which I had engraven in my own Presence. 'Tis exactly conformable to the Original. The most able Physicians, and the best Anatomists, whom I have consulted on this Subject, assure me they never saw any thing like it of the kind. I can vouch, that the engraving, though very exact, does not come up to this singular Work of Nature; the 10 Branches of which, that spread from the Centre, have some Resemblance with those of certain Plants. It is a matter of Difficulty to me to think, that the System of Juxt-Apposition, which is employed to explain the successive Growth of common Stones, or *Calculi*, can hold good on this Occasion. I dare not however advance, that Vegetation has any Share herein: Though the Shape of the Branches of the Stone, of the Canals, or *Papillæ*, which seem destined to convey the nutritious Juices, do in some measure favour this Hypothesis. I hope, Sir, you will be so kind to give me your Thoughts on this *Phenomenon* of Nature. I thought proper to join to the Figure of the Stone, the Account of the Patient's Distemper, in whose Bladder it was found; as *Mr Salien*, Surgeon of *Lisle* in the County of *Venaissin*, has sent it to me.

2. One *Joseph Vasse*, Inhabitant of *Le Thor*, a small Town at a short League's Distance from *Lisle* in the County of *Venaissin*, aged 66, of a

\* Vol. III. Chap. IV. § 78.



Fig. 95.



Fig. 96.

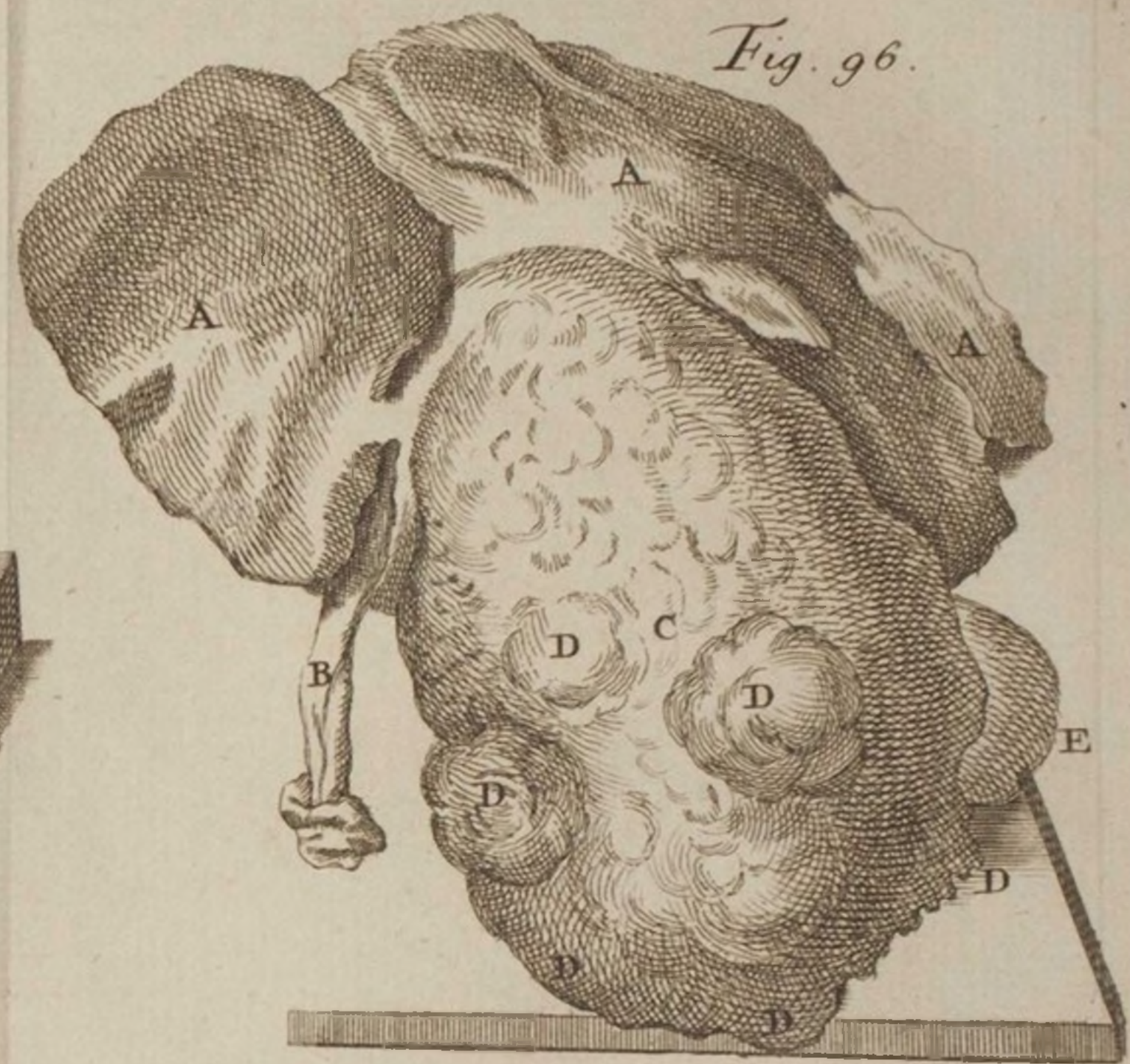


Fig. 97.



Fig. 98.



Fig. 99.



Fig. 100.



A Scale of 6 Inches for Fig. 98 & 99.

1 2 3 4 5 6







robust Constitution, who used to travel about to Fairs and Markets in that Country, dealing in Corn and Cattle, without having ever complained of any Indisposition, began *Feb.* 14, 1731, to feel in the Night-time some Difficulty of making Water, attended with a Smarting about the *Glans*; which however did not hinder him from attending his Business as before.

*ed, by M. Sa-  
lien, transla-  
ted from the  
French by Mr  
Zollman,  
F. R. S. Ibid.  
p. 371.*

On the 28th of *March* 1732, the said *Vasse* was seized in the Night with a true *Ischuria*, which cruelly tormented him. I was sent for on the 29th in the Evening, to search him, and to draw off the Urine. I drew accordingly 6 Cups, each containing  $1\frac{1}{2}$  Pint. The Patient found immediate Ease, and continued without Pains or Fever, so that he thought himself entirely cured. But the Night following the Pains returned, which made him resolve to come to *Lisle*, to be near at hand to be sounded: He came on the 30th, and had his Water drawn off regularly every Day, Morning and Evening, till the 15th of *April* next, during all which Time he suffered no Pains, did not fall away, nor had any Symptoms of Sickness upon him.

On the 15th of *April*, he supped with his usual Appetite; but half an Hour after Supper, he was seized with a violent shaking Fit, which lasted a full Hour, upon which a burning Fever ensued, attended with an unquenchable Thirst, with great Head-ach, and an extraordinary Restlessness.

In this Condition I found the Patient about 8 in the Evening, being the Hour I usually went to sound him. I immediately prepared myself to draw off his Water, according to Custom, thinking thereby to procure him some Ease. Till then the *Catheter* had entered without any Obstacle; but this time, upon my pushing it into the Bladder, I felt a Stone which obstructed it's Passage. I turned the *Catheter* to the left, and hit upon one of the Branches of the Stone. In order to know whether there was not another Stone, I drew the *Catheter* a little back, turning it to the right, which was done without any Difficulty; and having pushed it in again, I met with another Branch of the same Stone, which I took for a Stone different from the former, and concluded then, that I had found several Stones in the Patient's Bladder; and that if the bad Symptoms which appeared, should continue any longer, there was no Probability of his recovering. Accordingly, the Hiccough coming upon him on the 20th, and the other Symptoms not discontinuing, he died on the 28th. The Stone was taken out 4 Hours after his Death, in the Presence of *M. Granet* the Curate, *M. Casari* a Burgher of this Town, and two of my Apprentices.

The extraordinary Figure of this Stone will be of no great Use for Practical Surgery; but it may furnish Matter of much Reasoning for Philosophers, to know how it could be formed in the Bladder, and yet not be troublesome to the Patient for so long a Time; what it may be that has given it so particular a Figure, and so regularly shaped. For my own part, I do not question but it was suspended in the Bladder of



the Patient, where it might be framed by the Urine; the dried membranous Filaments, which are still perceived on the Extremities of some of the Branches, are a new Proof of this Conjecture. The Stone happening afterwards to loosen itself, may have occasioned to the Patient all those Symptoms that beset him at last, and afterwards Death itself. This Opinion may appear extraordinary to able Lithotomists, and I willingly submit it to their better Understanding.

Sir Hans  
Sloane's Answer to the  
Marquis de  
Caumont's  
Letter, concerning this  
Stone; translated from the  
Latin by Tho.  
Stack, M. D.  
F. R. S. Ibid.  
p. 374.

3. I am extremely obliged for the Favour of your Lordship's Letter, and the inclosed Figure and Account of a Stone taken out of the Bladder; which is so singular, that among some hundreds of those in my Possession, I have not any that comes near it. Once indeed I had under my Care a Gentleman between 60 and 70 Years of Age, who had extraordinary Difficulties in making Water, and an Inconveniency even beyond that; which was, that he could not sit in an ordinary Chair without suffering extremely in the Region of the *Peritonæum*. With the Help of lenient soft Medicines and Waters, he voided by the *Urethra* a Stone, which was flat in the Middle, and smooth, but had 5 Points, resembling the Rowel of a Spur. The Points of the Rays were sharp, but there was no Asperities or Crystallizations on their Surfaces. It was small, so as after many Days to pass along the *Urethra*: But if it had not passed through the Neck of the Bladder, but remained in the Bladder, it would in all Probability, have attracted Matter to all the Points or Rays, and increased in all Dimensions.

It is very common, that when any extraneous solid Substance gets into the Bladder, there is either attracted to it, or adheres to and surrounds it, a tartareous calculous Concretion, which assumes the Figure of the said Body now in it's Centre, as a *Nucleus*.

There was a Soldier cut in *St Thomas's Hospital, London*, for the Stone, which, when taken out, was found to cover a Musquet-bullet, that had been shot into his Bladder, where it was covered by a calculous Concretion.

I have a silver Bodkin, which a Gentlewoman used for her Hair; and thinking with it to thrust back a Stone that was engaged in the Neck of her Bladder, it slipped into it, and the calculous Matter gathered on the larger End into a Stone of an oblong Figure, and equal Thickness, of half an Inch all round the Bodkin.

I have likewise a common Pin, which by some means or other had got into the Bladder of a young Woman, and was there coated all over by a calculous Matter; but having occasioned a fistulous Ulcer in her Groin, it was discharged thence with the Matter of the *Fistula*.

It is in this manner that Bezoars are formed: for I have the common *East-India* Bezoars, which are roundish, and have in their Centres the Seeds of a sort of *Acacia*, which had attracted, or was coated over by that Substance, esteemed a great Cordial or *Alexipharmic*; while others are long, and are gathered in Layers or Coats upon the Stalks of  
Vege-



Vegetables. And I have one formed round the Stone of that great Plumb, which comes prickled from thence, and is called *Mango*.

As to the Asperities or Prickles on the Rays, they are taken notice of, so long since as the Time of *Cornelius Celsus*, who calls them *Calculi Spinosi* \*.

It may seem very strange and paradoxical, what I can assure your Lordship is true, that the fewer the Knobs, Asperities, or Prickles, are on the Surface of *Calculi*, the more troublesome they are to the Persons in whose Bladders they lie. *Dr Hickes*, a very learned Divine here, and deservedly famous for his Knowledge in Antiquities and the Northern Languages, was the most tormented with the Stone in his Bladder of any I ever knew, especially upon any Motion. He would not submit to be cut for the Dittemper, upon the account of his Age, and many other Reasons; but ordered his Executors, that he should be opened after Death, and the Stone taken out of his Bladder, put into a Silver Box, and given to me, who had been his Physician for many Years, to place it in my Collection of such kind of Curiosities. What is very particular in this Stone, is, that the Protuberances and Prickles upon it were few, and at a Distance from each other. Every one of them had made a Hole in his Bladder, like a Sheath or Socket; and when, upon Motion, they were removed out of their corresponding Sheaths, they hurt the Bladder in the sound Parts, and put him upon the Rack of Pain.

When they are thick-set, one hinders the other from entering or wounding so deep; and perhaps gets not much farther than the *Mucus* which lines the Inside of the Bladder.

XIV. 1. *William Jarman*, of the Parish of *Bayton* in *Suffolk*, was cut for the Stone about 15 Years ago, and a large Stone taken from him.

He says, that he continued easy for about 4 Years after he was cut; that the Wound was quite healed up, and that he made Water in the natural Way, without any Leakage at the Wound.

In *July* last, he says, he felt great Pain at the Place where he was cut, and that it was much swoln. It looked black, and a little Hole broke open there, out of which the Water came; and a Stone appearing, the Hole grew wider by the Force of the Water, and his frequently touching it, till at last the Stone came away whole. It was broken afterwards by a Fall.

As soon as the Stone was come away he says, that he grew easy, and the Swelling abated. The Wound is now reduced to a small Compass, and the Water still comes away through the Wound, and but very little Water comes out the natural Way.

*William Jarman* is about 30 Years of Age. He says, that the great End of the Stone came away first, which he suffered to lie at the Mouth of the Wound near a Fortnight, but he applied to no Surgeon.

\* Lib. VII. Chap. xxvi.

*A Calculus making it's way through an old Cicatrix in the Perinæum, by David Hartley, M. A. F. R. S. No. 456. p. 349. Jan, &c. 1740.*



An Addition by  
C. Mortimer,  
M. D. R. S.  
Sec. Ibid. p.  
350.  
Fig. 105.

An Account of  
a Stone, or  
Calculus, mak-  
ing it's way out  
through the  
Scrotum; by  
Mr John Si-  
sley, Surgeon,  
Ibid. p. 351.

An Account of  
several Stones  
found in Bags  
formed by a  
Protrusion of  
the Coats of the  
Bladder, as  
appeared upon  
opening the Bo-  
dy of one Mr  
Gardiner, by  
Edw. Nourse,  
F. R. S. No.  
462. p. 11.  
Read Jan. 7,  
1741 2.

2. I shall add to the foregoing Case Figures of Stones, which made their way through the *Perinaeum* of a Man at *Leyden*, in 1724, and were seen by me there. At A they articulated, or rubbed against each other, while in the Bladder; one having a round Head, the other a Cavity.

XV. *Robert Swann*, of *East-Malling, Kent*, a hard working Man in the Woods, had a large Swelling on his *Testicles*. On the upper Part of the *Scrotum*, I found a small Hole or two, and he told me, his Urine oused out sometimes. I passed the Probe in, and found a hard Substance, which seemed to be large: I told him he had a large Stone lodged there, at which the poor Man was much surpris'd. I told him, I would make Incision and take it out; he refused to be cut. I dilated it in another Manner, made the Orifice pretty large: The Swelling of his *Testicles* asswaged, he goes to work as usual; about a Week alter, coming home at Night with a large Bundle of Wood at his Back, he found himself more in Pain than ordinary; as soon as he got home, he complained to his Wife, and told her he was very much in Pain, went to bed, desired me to be sent for immediately; but before I could get to him, the Stone forced it's way out. It's Weight at first was  $\text{ʒv}$  and  $\text{ʒij}$ , now almost  $\text{ʒiv}$  and  $\text{ʒvj}$ . This Man lived about 7 Years after this, in a good State of Health, and lived to the Age of 60 or upwards. He told me, he believed the Stone had been growing there for near 30 Years; but never apprehended it to be a Stone, but used to complain of a Weight, as it were half a Pound, carried between his Legs.

XVI. Permit me to lay before you the Bladder of Mr *Gardiner*, who was, the 5th of *March* 1739, before the Trustees appointed by the Parliament to inquire into the Efficacy of Mrs *Stephens's* Medicines, produced as an Instance, where they had been effectual in dissolving the Stone in the Bladder.

Mr *Gardiner* was searched by me on *Sat. Dec.* 30, 1738. I felt a Stone the Moment my Instrument was introduced; which was likewise felt by Mr *Wall*, his Apothecary, then present.

The *Tuesday* following, he began to take Mrs *Stephens's* Medicines, and continued them 8 Months.

*Nov.* 30, 1739, I saw him at *Chila's* Coffee-House, when he told me, he was quite free from his usual Disorders: I there searched him again, in the Presence of several Physicians and Surgeons, who likewise felt for the Stone, but none could be found.

Mr *Gardiner* dying on *Jan.* 2. 1741-2, the next Morning, in the Presence of Mr *St Hill*, and Mr *Wall*, I opened his Bladder, and therein observed 6 preternatural Apertures of different Sizes, the biggest capable of admitting the Top of my Finger. Each of these Openings led to a separate Bag, formed by an Inlargement of the internal Membrane of the Bladder, protruded between the Fibres of it's muscular Coat.

These



These Bags are to be seen on the back Part of the Bladder, a little above the *Vesiculæ Seminales*; and when viewed on the Outside, seem to be but two; though they are in Number equal to the Openings within, already mentioned; and divided from one another by the Duplication of the internal Membrane, which forms a *Septum* between each of them.

In these *Sacculi*, or Bags, are contained nine Stones; the largest about the Size of a small Nutmeg; and with what Facility some of them moved out of, and returned into, the *Sacculi*, the following Circumstance will clearly evince.

When I had opened the *Abdomen*, Mr *St Hill*, handling the Bladder, brought 2 of these Stones up to it's *Fundus*, where they were felt by Mr *Wall* and myself. We then examined the Kidnies: The right contained a little Matter, otherwise it was as it should be: But of the left,  $\frac{2}{3}$  were wasted; it's *Pelvis* was contracted in Proportion, and the *Ureter* almost impervious. Upon rehandling the Bladder, neither of us could feel any Stone; I therefore laid it open, and we found them all in the *Sacculi*. The Stones that are in one of these *Sacculi*, have been so much enlarged since their Lodgment, that without Force and Laceration they cannot be got out.

Fig. 106. Shows the Bladder cut open. 1. 2. 3. 4. 5. 6. The preternatural Apertures opening into so many *Sacculi*, in which the Stones were contained. 7. 8. The two *Ureters*. 9. 10. Their Openings into the Bladder. 11. The Opening from the Bladder into the *Urethra*. 12. The prostrate Gland, which was scirrhus and enlarged. 13. The *Urethra* cut off. Fig. 106.

Fig. 107. Shows the Back-part of the Bladder, upon which the external Membrane being taken away, the Fibres of it's muscular Coat are very apparent. A. The Fibres of the *Detrusor Urinæ*. B. B. The *Sacculi* formed by the internal Membrane, protruded between the Fibres of the *Detrusor Urinæ*. CCCCCCCCC. The Stones, as they appear in the *Sacculi*, eight in one, and one (the largest N<sup>o</sup> 6.) in the other. D D. The *Ureters*. E E. The *Vesiculæ Seminales* turned back, to shew the whole Extent of the *Sacculi*. F F. The *Vasa Deferentia*. G. The Back-part of the prostrate Gland. 1. 2. 3. 4. 5. 6. The Stones which came easily out of the *Sacculi*. 7. One of the Stones sawed, the *Nucleus* of which appears white, and the Surface of them all appears reddish. Fig. 107.

XVII. *William Payne*, aged about 71, had been afflicted with the Stone in his Bladder, and other calculous Complaints, for several Years: He had taken Mrs *Stephens's* Medicines for 15 Months\*.

He was subject also to a scrotal Rupture on the left Side, from which however he suffered no great Inconveniency, unless upon Neglect of his Truss, which he had been directed to wear; and even then, if the Intestines came down, he used to return them with Ease.

\* See *Hartley's View*, &c. p. 8. Case III.

*The Case of Will. Payne, with what appeared upon examining his Kidnies and Bladder, by Mr George Bell, Surgeon, Ibid. p. 54. Read Feb. 4, 1741-2.*



About the Beginning of *January* last, he was attacked with a severe Fit of the Stone, attended, upon every Attempt to make Water, with a strong *Tenesmus*, that forced into the *Scrotum* a considerable Quantity of the Intestines, which exceeding his Skill to reduce, he sent for me. I found the Tumour large and unequal, but without much Tension or Inflammation; his Pulse low, with clammy Sweats; he complained of violent Pains in his Back, propagated thro' the whole Length of the *Ureters*, accompanied with Nausea and Vomitings; he felt exquisite Pain about the Neck of his Bladder and *Glans*, with an unusual Weight in *Perinæo*; he had frequent Inclinations to make Water, but seldom made above a Spoonful at once, and that Drop by Drop, with much Pain, and sudden Stoppings: The Urine was extremely fetid, sometimes mixed with purulent Matter, at others tinged of a Coffee-Colour.

He had received, just before I saw him, a Clyster, which produced two Stools, and encouraged me to hope it might facilitate the Reduction of his Rupture. I attempted it by all necessary Means possible, but without Success: For although the largest Part receded and gave way, yet a considerable Portion remained, which I could not possibly return. I therefore concluded, as the Intestines performed their Office, and were free from Tension, Inflammation, &c. that the Parts adhered; so left him, with Directions for a Bag-Truss to support them.

*Jan. 22*, being informed of his Death, I applied for Leave to open him, which was granted. In examining the Contents of the *Abdomen*, I found the left Kidney quite wasted, scarce any thing remaining except the Coats, and those filled with Blood and purulent Matter; the *Ureter* very much enlarged above it's natural Capacity, and full of the same.

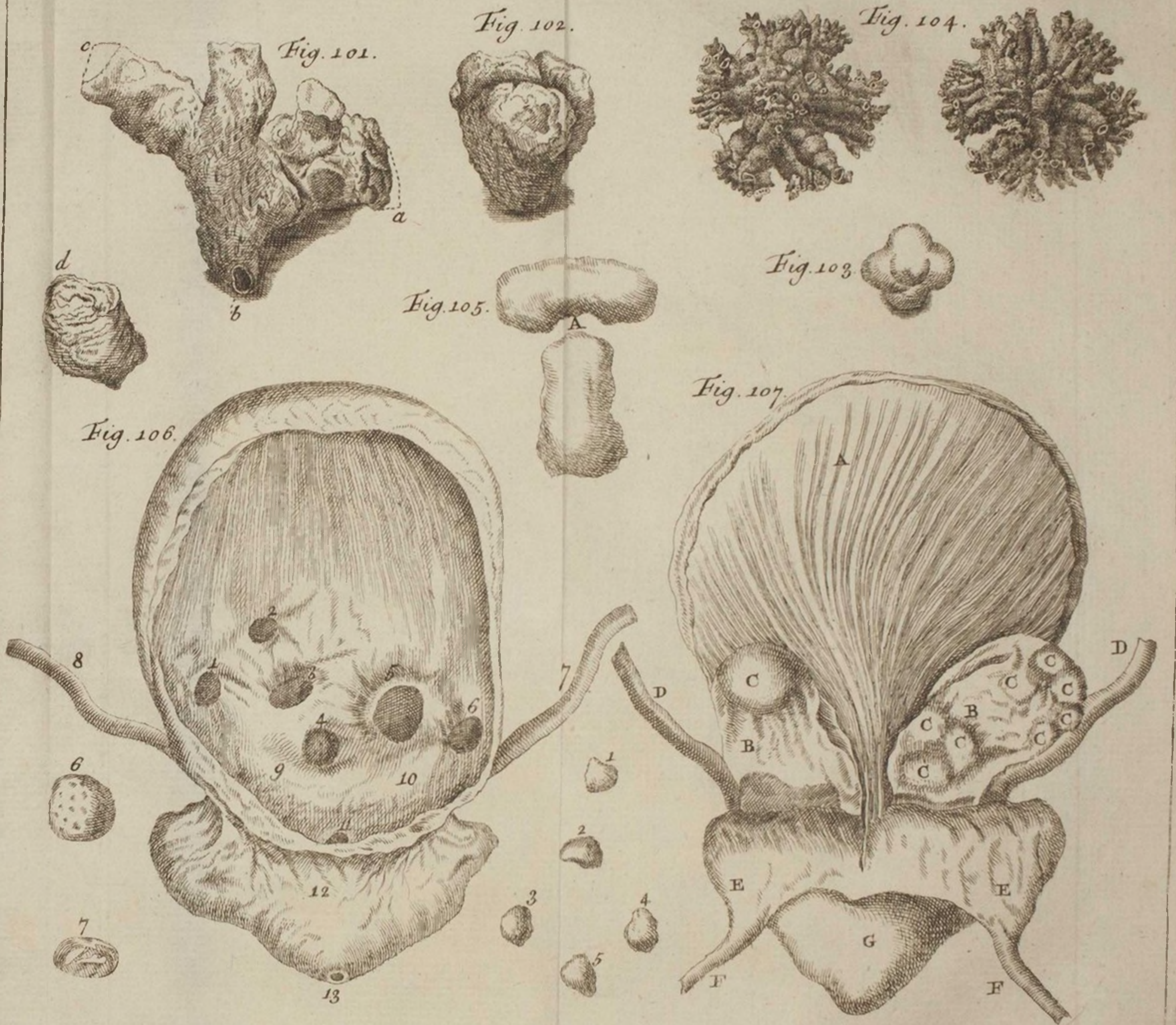
The right Kidney was ulcerated in several Places, and full of purulent Matter, mixed with Grit; several Hydatids appeared upon it's external Surface; the *Ureter* was somewhat enlarged.

I next examined the Bladder, which was exceeding large, and contained above 3 Pints of clear Urine; upon opening it and introducing my Hand, I found two smooth flattish Stones, somewhat larger than common *Windsor Beans*: I discovered a third in the Neck of the Bladder, which probably had been forced there during the Paroxysm, and appeared to me to be the immediate Cause of his Death: It was about the Size of a *Filbert*, and had quite corked up the Passage.

Upon dissecting the hernial Bag, the first Part that presented was a large Piece of Fat, about half a Pound; and immediately underneath it lay a large Portion of the *Colon*, in Length about 10 Inches; the internal Surface of the *Peritoneum* was strongly attached to the *Colon* by several Filaments, and to the *Scrotum* by it's cellular Substance.

All the other *Viscera* were in a natural State.











XVIII. A poor Widow, in the 50th Year of her Age, had been troubled for 40 Months with a very great Difficulty of Urine; when having Occasion to make Water in the Night, she discharged about  $\text{℥ij}$  of pure Blood; and at the same time a Stone, shaped as in the Figure, weighing when dry  $\text{℥ij}$  and gr. xxix [oz. 1, dwt. 17, gr. 4 Troy]. During the time of her Disorder, she was sensible of a great Weight, and continual Pain, at the Neck of the Bladder, whether lying or standing; and now, after a full Month, her Urine comes away involuntarily, mixt with *Sanies*.

XIX. As this Operation was left off very precipitately, in order to introduce that Method now called the *Lateral Operation*, which has been practised for some time with good Success; notwithstanding, had the Operators at that time had the Advantage of this Instrument, I am persuaded the Advantage would have been more than equal in favour of this *High Operation*, and preferable to any other Method yet practised: And I hope, that the Description, and the Method of using this *Catheter*, will be a means of reviving an Operation so happily begun, and calculated for the Good of those that are afflicted with the Stone in the Bladder.

This *Catheter* is made either of Silver or Steel, of different Sizes, to suit different Ages; and has the outward Appearance of a common *Catheter*, and will answer the same Uses: But, in respect to this Operation, it differs from the common in this, that it is composed of two Legs, with blunt Points, a long Tube, a Sliding-bolt, and a Handle, which serves to open and shut the Legs: The Bolt, which is fixed to the Extremity of the Tube, goes into two Holes, fixed in the Plate of the Handle: The one serves to keep the Legs close during the time it is to be introduced into the Bladder; the other to extend the Points at the Distance of an Inch or more, during the time the Operation is performing.

The Method of using this *Catheter*, is, first, (after having taken the necessary Precautions, and filled the Bladder) to introduce the *Catheter* into the Bladder, then unbolt it at the Handle, and by holding the Tube in one Hand, and the Handle that moves the Legs in the other, then turn or open the Legs, till the Bolt becomes opposite to the second Hole upon the Plate into which the Bolt must be thrust; then by pressing gently the Handle downwards betwixt the Patient's Legs, the 2 blunt Points will be easily felt above the *Os Pubis*, in the Protuberance made by the Injection into the Bladder.

The Advantages I propose by using this Instrument, are these: First, To be a Director for the Operator, in determining the Place where the Puncture is to be made in the Bladder; it also serves as a Support to the Bladder, when the Water flows out; and keeps it from subsiding during the Time of the Operation, and till the Stone is extracted: It serves likewise to resist the Pressure of the abdominal Muscles and *Peritoneum*, and also hinders the *Intestines* from being forced down upon the Knife; and keeps the Orifice open, till the Stone or Stones are brought away.

*An Account of a very large Stone voided by a Woman thro' the urinary Passage, by S. Antonio Lepratti, F.R.S. Physician to the Pope No. 468. p. 363. Read Jan. 27, 1742-3. Fig. 108.*

*A Description of a Catheter, made to remedy the Inconveniencies which occasioned the leaving off the High Operation for the Stone, by Archibald Cleland, Surgeon to General Wade's Regiment of Horse. No. 461. p. 844 Aug. &c. 1741. dated Ap. 5, 1739. Fig. 109. Fig. 110.*



away. And, lastly, by the Help of this Instrument it may be discovered, whether the Bladder is indurated or scirrhus.

The Method of performing this Operation, with Safety is, after having introduced and fixed the *Catheter* with it's Legs open, to feel for the 2 Points above the *Os Pubis*, and place the Finger and Thumb gently upon them; then give the Handle to an Assistant, to keep it firm in that Position; then, with the Knife in the right Hand, make a Puncture at once into the Bladder, exactly in the Middle betwixt the Points; but for the more Security, somewhat lower, near the *Os Pubis*; and, without drawing out the Knife, make a large Incision downwards, inclining under the Arch of the *Pubis*, in proportion to the Bigness of the Stone, taking care not to wound the Cartilage that joins the Bones together, when the Knife is withdrawn: The Bladder being thus supported, the Stone may be extracted with the Fingers, or with a small Pair of Tenets, there being little Danger of breaking it in this Method. When the Operation is finished, raise the Handle of the *Catheter*, and unbolt it; shut it close and fix it so; then withdraw the *Catheter*, and dress the Patient.

Fig. 109. *The Catheter, as it is to be introduced into the Bladder, the two Legs A and B being closed together.*

Fig. 110. *The Catheter, it's two Legs A, B, being open. C, D, The Tube. E, The Sliding-bolt. F, The two Holes into which the Bolt is to be slid. G, The Ears fixt to the Tube C, D, which is all of one Piece with the Leg A. H, The Handle, which opens the Legs; this Handle is all of one Piece with the Leg B, which Leg B is a Continuation of a Wire, that runs through the Tube C D, and is fastened to the Handle H, and turns with it.*

Concerning  
hairy Sub-  
stances, voided  
by the Urinary  
Passages, by  
Mr John  
Powell, No.  
460. p. 699.  
Jan. &c.  
1741. dated  
Pembroke,  
July 16, 1733.

XX. 1. A Widow-Gentlewoman of this Neighbourhood, has voided the Substance inclosed ever since *Michaelmas* last was two Years, unless it were about 9 or 10 Weeks last Summer. She is near 40 Years of Age, and has been married about 17 Years, and had a Child about 12 Years ago, that lived about 9 Weeks.

About *August* last was 2 Years, she was seized with a Stoppage in her Urine, a small Pain in her Bladder, and a great Pain in the Bottom of her Feet, with the making whitish Water like Whey; and she had then a great Weakness in her Limbs, and a Pain in her Bowels; for which another Gentleman, ordered her to go into the cold Bath, by which she found great Benefit for the Pains in her Limbs; but the Pain in her making Water rather increased, and then her Urine began to grow fetid; and about *Christmas* was 2 Years, she voided the largest of the Things you find in the Box, without any very great Pain then, being she had taken a quieting Draught that Night to compose her; but, almost ever since, they put her to most exquisite Pain before she can get them off; and she is commonly forced to take the small Part of the hairy Part between her Fingers, before she can get them off; and oftentimes a good



a good deal of Blood comes off with her plucking them, which makes her very sore inwardly.

Upon using gentle Evacuations last Spring was Twelvemonth, she grew much better; such as Vomiting with the *Hypocacuanba*, Purging with *Manna*, Oil of Sweet Almonds, &c. and, taking sometimes Calomel the Nights before, and very often diuretic and balsamic Pills, with and without *Trochise. Gordon.* and emollient Decoctions and Emulsions of several Kinds, the Fetor and Ropiness in her Urine abated, and she was pretty hearty and brisk, so that she undertook last *August* a Journey into *Herefordshire*, and staid there 2 Months, and, I fear, she might take some Cold in her Journey; for her Pains grew worse, and more troublesome, after her return home; and she then voided great Quantities of those large Substances, as well as small; and her Urine grew extraordinary ropy and fetid, notwithstanding all the Endeavours of another Gentleman and myself; and very often the Substance she voided would be so stiff and ropy, that we could scarce separate it from the Pot; at other times so pliant, that you might take it up a great Height with a Sprig of a Broom, or a Feather, and so fall down again like a Lump into the Pot.

She has for this considerable time voided one or more of these hairy crustaceous Substances every Day or Night; they looking, when they are first voided, like Hair and Coralline; and her Pains are so very exquisite, that we are forced, every third Night at farthest, to give her an Anodyne to quiet her; and that often cannot be done, her Pain being so very great.

The Continuance of this severe Pain has brought her to a very considerable Weakness, and almost a total Loss of Flesh; and, what is her great Misfortune, (especially at this Season of the Year) that Milk will by no means agree with her: She has often tried to conquer it, but never could, it constantly making her very sick in her Stomach, and she vomiting it up in great large Lumps.

We have used Injections of 2 or 3 Sorts, but she cannot well bear them; and she has had her *Menses* very regularly, till within the 2 or 3 last Times; and for these 10 or 12 Days past, she has complained of a Swelling in her Belly, but none in her Thighs nor Legs.

One thing I had almost forgot to have told you, that she has often found a *Crepitus*, or a breaking of Wind, as it were, in her Bladder, which would make one believe, that there is an Aperture from the *Intestinum Rectum* to the Bladder.

Her Bladder has been searched, and the Surgeon who did it, assures her, he can discover no Stone; and he is a very ingenious Person in his Profession.

She has for these 4 or 5 last Days complained, at times, of asthmatic Fits, which I must attribute to the Heat of the Weather.

The voiding of these hairy crustaceous Substances never occurred to me in my Practise before; though I have above once had Persons voided large



large Bladders, like the *Hydalis* in Fish, and large Quantities of them, and cured them.

P. S. She drank the Hot-well-waters both at *Bristol* and here, but with little Success; has taken *Cantbarides* inwardly, as prescribed by Dr *Groenvelt*, in Ulcers of the Bladder, and all other things we could think of.

Sir Hans  
Sloane's An-  
swer to Mr  
Powell. Ibid.  
p. 703, dated  
London, July  
26, 1733.

2. I received your's of the 16th two Days since, together with the Box, and Contents thereof; which I have considered, and am satisfied, that the hairy Excretions are generated most likely in her Kidnies. I have seen, in my Practice, some Instances of the like, and have by me what was brought off by Urine from some of them. The first I remember, was from a Gentleman near the *Exchange*, who would frequently, 40 Years since, void with his Urine long Hairs, which were received on white Paper; and the Urine passing off, would remain there, and, by their Transparency and Angles, yielded, on viewing by a Microscope, the finest Colours imaginable, such as we find by a Prism. This Gentleman did not suffer much, though he complained of a Sharpness of Urine. The Person who was affected the most, and applied to me for Help, was a Brewer, who had such Hairs matted or woven together, voided by Urine with great Pain: But then there was no calculous Matter, or very little, added to them. It is very likely, that that Matter is added to those of your Patient in the Bladder, by being retained there. I have a Pin, that a young Woman had swallowed, and was afterwards taken out of her Groin from an Apostem after a Tumour; which Pin was covered or incrusted, as these hairy Substances, with such calculous Matter, and got there from the Urine in her Bladder, where in all likelihood it had contracted that Crust. I have a silver Bodkin, the broad End of which is covered with a pretty large Stone. A poor Gentlewoman thought, by thrusting this Bodkin up the *Meatus urinarius*, to remove a Stone which pressed upon the Neck of her Bladder, and it slipt past Recovery into her Bladder; whence, after 3 Years, it was taken, and on which, as on a Centre, was bred the Stone. I have other Instances of the same, where an extraneous Body, passed into the Bladder, hath proved as a Centre to attract or have affixed to it such Matter.

As to the Cure, Dilution seems to be the best. The Brewer was cured by drinking plentifully of soft Liquors, which he often poured down; and twice a Week he took the purging Waters. You may guess my Opinion to be, that the less is generated of this Matter, and the less Time it remains in either Kidnies, *Ureters*, or Bladder, the Disease will be mitigated, and, I hope, cured. I believe *Bath-waters* drank warm, Mallow-Tea, Linseed-Tea, Oil of Sweet Almonds, Syrup of Marshmallows, little and often taken, with Baths of emollient Herbs, may be of great Use; and perhaps moderate Exercise may help them off. Opiates, in excessive Pain, are necessary; and now-and-then Bleeding, will take off the Inflammations that must of necessity attend such



such a Distemper. I also think, that some Balsamics, such as *Locatelli's Balsam*, may be useful; and perhaps, with the emollient Method, take off that Disposition in the Kidnies, which produces this uncommon Distemper. The Pains in her Feet, and about her, seem not to have any Relation to this Distemper; and I am of Opinion, that violent Diuretics or Exercise will rather hurt than help her.

3. The hairy Substance, or fine *Capillamenta*, inclosed in the Pill-box, were discharged along with the Urine of a Gentleman during a severe Fit of *Ardor Urinae*; the Gravel that came away was inconsiderable, so that the Cause of the Dysury was chiefly, owing to the hairy Substance with the gritty Matter that adheres to it, inflaming, by their Irritations, the *Ureters* and *Sphincter Vesicae*, and Parts adjacent. For, notwithstanding *Phlebotomy*, lenient Clysters, Emulsions, Opiates, and such-like Remedies, were strictly used, all proved ineffectual, till all this extraneous Substance was come away.

These fine *Capillamenta* seem to be the Tegument of an Animal which had got into the *Primæ Viæ*, and passed the *Venæ Lactææ*, and, by Circulation, passed also the *Glandule Renales*. For it is more probable, that they were extraneous, than that they were generated in the urinary Passages, in an equivocal Manner.

The greatest Objection that offers to me, is, that it is judged absolutely necessary, that the *Venæ Lactææ* should be smaller than the finest Artery in the Body, that nothing might enter, which might stop Circulation of the Blood. Also,

That the Mouths of the *Lacteals*, which are open into the Cavity of the *Intestines*, (from whence they receive their Chyle) are so small as not to be seen by the best Microscope in dead Bodies.

To obviate these Objections, may not the Mouths of the *Lacteals* be perceptible in living Bodies, when dilated, distended, and turgid with Chyle? And may not these *Capillamenta*, when relaxed with any Humidity, become very flexible, pliable, and susceptible of being contorted, and of assuming any Figure\*; and, when thoroughly relaxed, disseminated and floating in a Fluid, enter the *Lacteals*; and consequently may pass through the Convolution of small Arteries, whereof the Glands and secretory Vessels are formed? For a Gland is said to be nothing else but a Convolution of small Arteries.

N. B. This Gentleman has kept a strict Regimen of Diet for many Years, as being subject to frequent Fits of the Gout, an Incontinency of Urine, &c. In the Morning early, a Draught of Cow's Milk, *statim ab Ubere*; which oft doth not pass a *Colatorium*, whereby some of the downy Hair about the Udder might get along with the Milk into the *Primæ Viæ*.

\* The *Capillamenta* whilst in the Urinal, and till the Urine was decanted, appeared only like a gross turbid Liquor, the Filaments being so diffused.

— by Mr T. Knight. Ibid. p. 705. dated Carnarvon, Feb. 20, 1737.



A Remark, by  
C. Mortimer,  
M. D. &c.  
Ibid. p. 707.

Account of a  
large Glandu-  
lar Tumour in  
the Pelvis; and  
of the pernicious  
Effects  
of crude Mer-  
cury given in-  
wardly to the  
Patient, by  
Andrew Cant-  
well, M. D.  
Monspel, da-  
ted at Mont-  
pellier, June  
23. 1732.  
N. S. No.  
446. p. 139.  
July, &c.  
1737.

4. I doubt of these Substances being *real Hairs*; I imagine they are rather slender grumous Concretions, formed only in the Kidnies by being squeezed out of the excretory Ducts into the *Pelvis*.

XXI. P——r M——n, born in *France*, but settled in *Cadiz*, having been very ill these 2 or 3 Years last past, had lost the Use of his left Leg and Thigh, was subject to frequent Head-achs and Pains in his Bones, but more especially in his Legs: For which, because he had been given to Women, his Physicians in *Cadiz* salivated him twice, sent him to several hot Waters, and gave him all the Remedies they could imagine, but to no purpose; for his Illness increasing, he had from time to time great Difficulty of making Water, and going to Stool. In this Condition he came from *Spain* to *Marseilles*, and from thence was sent to the Waters of *Balleruc*, of which he drank a great Quantity. But as they did not pass, his Physician there ordered him strong Purges, with Clysters of a Decoction of *Tobacco*, and the like. He then began to vomit his Excrements; upon which the Physician to the Marquis of C——'s Regiment in *Spain*, who happened to be there, ordered him half a Pound of crude *Mercury* by the Mouth, which made him suffer the most exquisite Pains; and his Belly swelled, and became as stiff as a Drum. Here Dr *Montagne* was sent for, who soon discovered the Error in the preceding Practice, by feeling a solid Body near the *Rectum*, which obstructing the Passage, hindered the Clyster-pipe from entering far enough into the Gut. After his Departure, the Patient was again ordered Clysters, which were injected with a crooked Pipe, and several Purges; till at the End of eight Days he died, having his Belly bigger, stiffer, and harder than ever. Though I arrived the Day before his Death, I saw him not till after he expired. I sent for the Surgeon of the Village, who with a *Bistouri* (the only anatomical Instrument he had) opened the *Abdomen* by my Directions, which was filled with a whitish Liquor of some Consistence. The *Epiploon* was all dissolved, and swam in this Liquor like so much *Pus*. This Water poured out, I examined the Intestines. The *Colon* was bursten under the Stomach, and in three other Places at it's lower Part; and so was the *Cæcum*; the *Ileum* all inflamed, and in one Part gangrened. The Lips of the Ruptures were plastered with Excrements, all beset with a prodigious Number of Globules of *Quicksilver*; and when the Intestines were disengaged and taken out, the *Quicksilver* fell from them in large Drops. The other *Viscera* were in the natural State, except the Liver, which was gangrened. As I was very solicitous about the Tumour, I looked into the *Pelvis*, where I found an Excrecence of a prodigious Size, which filled all it's left Side. I cleared all round the Tumour; whereby I found the urinary Bladder close pent up between the anterior Part of the Tumour and the *Ossa Pubis*, which occasioned the Strangury the Patient had been tormented with: The *Rectum*, which lay upon the Middle of the *Os sacrum*, was also vastly pressed on by the Tumour, which seemed to take it's Rise from the Holes that are in the left



left Side of that Bone. The Surgeon was so unluckily impatient, that while I laid down the Knife, in order to separate the *Ossa pubis* with a Hatchet, he cut out the Tumour. I then examined the *Os sacrum*, which was so very soft, that my Fingers entered it every where on the left Side. The Tumour is of an ovoïde Figure, covered over with several Membranes: It's Weight is  $\frac{1}{2}$  lbs; it's longest Axis is 5 Inches and somewhat more than  $\frac{1}{4}$  French Measure; it's shortest  $4\frac{1}{2}$  Inches. At first Sight I took it for a *Parenchyma*, but, upon Dissection, found it analogous to the Liver in Substance, Colour, and Consistence. It's Artery, Vein, and Nerve are very big, and are distributed through it's whole Substance: Wherefore I really take it to be one of the conglobate Glands of the *Pelvis*, whose Vessels yielding to the Blood impelled thither with greater Force and in larger Quantity than usual, on account of the violent Exercises of Dancing, Jumping, &c. which the Patient very much practised, gave room to it's Increase to that enormous Size. Upon opening, I remarked three very apparent Divisions in it: And where the *Psoas* lay over it, and one of the *Pyramidales* beat upon it, it was ossified. I preserve it in Brandy, and find that the small Vessels, that were most filled with Blood, press it out into the Interstices of the neighbouring ones.

The Weight the Patient constantly complained of at his left Hip; the Difficulty he had in going to Stool, and that of thrusting a Syringe far enough into the *Rectum* to give him a Clyster with any Success; the Tumour itself, which was easily felt upon putting the Finger into the *Anus*; together with the Palsy of the left Leg and Thigh, might, I think, have given other Indications to the Physicians, than those they took. And the Frictions and other heating Medicines the Patient was plied with, contributed to augment his Illness. In fine, the crude *Mercury* he swallowed, the vast Quantity of *Balleruc* Water he drank before it, with the strong Cathartics taken by the Mouth and *Anus*, seem to have cut him short of some Months, which he might have lived, had he used no other Remedies than a slender relaxing Diet.

XXII. I was called to the Assistance of a Woman in Travail. The Fœtus presented in a transverse Position; I soon recovered the Feet, and in a few Minutes delivered the Woman. The *Funiculus Umbilicalis* was so short, that it was with Difficulty I could make a Ligature upon it, in order to make a Separation: I immediately extracted the Secundine, and measured the *Funiculus*, which was little more than 4 Inches long. As soon as the Woman was taken care of, I examined the Child, which I found to be imperfect in several Parts, there being no *Anus*, neither Privities to distinguish of what Sex it was: Where the *Vulva* should be, there was a small Perforation, (though no Appearance of *Labia*) thro' which the Urine always passed away; there was likewise a large *Hernia Umbilicalis*, and a little lower in the *Linea alba*, was a Perforation, into which the *Intestinum rectum* opened, and there the Excrements passed during the time the Child lived, which was almost 10 Weeks. Several

*An Account of a Pin taken out of the Bladder of a Child, by Mr William Gregory, Surgeon. No. 450. p. 367. Oct. &c. 1738. dated Brompton near Chatham, Jan. 4, 1733-4.*



veral Days before the Child died, a Gangrene appeared on the *Hernia*, which soon passed into the Intestines, and occasioned the Child's Death: The *Hernia*, in my Opinion, was occasioned by the Shortness of the *Funiculus*, which did not grow in Length proportionable to the Fœtus; the Child in all other Parts was perfect. When the Child died, I had Liberty from the Parents to inspect into it: I did not go through a regular Dissection; I only inspected into the *Intestinum rectum*, (which I found as above described) and the urinary Bladder, which I found very small, and no Urine in it; the Child was never observed to make Water in a Stream whilst it lived, which makes me of Opinion, the *Sphincter Vesicæ* was imperfect. In handling the Bladder, I found something sharp pointing to my Finger; I could not discover what it was, until I snipped off the Neck of the Bladder: I then took out of the Bladder a tough kind of Substance, about as big as a small Fig, in which was a Pin with the Head on, and very black; the urinary Bladder, Pin, and viscid Substance, (though now somewhat wasted) are here preserved in *Sp. Vin. R.*

The Figure of  
of the Canal of  
the Urethra  
determined by  
solid Injections,  
by M. le Cat,  
M.D. F.R.S.  
Surgeon to the  
Hôtel-Dieu at  
Rouen. No.  
460 p. 684.  
Apr. &c.  
1741.  
Fig. 111.

XXIII. I melted Resin with Wax, and injected this Liquid thro' the *Urethra*. I filled the Bladder but half way with it, in order to preserve all the Wrinkles of the Canal. When the Injection was cold and solid, I cut thro' the *Ossa innominata*, and dissected the left Side of the Canal and Bladder.

Fig. 111. A. The Glans. B. An Elbow, which the *Ligamentum suspensorium* causes the Penis to make. C. Folds, or Wrinkles, of the Bulb or of the Gulf of the Urethra. D. The Entry or Streights of the Prostate. E. The Gulf of the Prostate, or the *Verumontanum*. F. Elbow, or Streights of the Entry into the Bladder. G. A Section of a Portion of the Bladder. H. A Section of the Pubis. I. The Root of the left *Corpus cavernosum* cut through.

I injected another Subject with very thick Glue. I entirely filled the Bladder therewith through the Canal of the *Urethra*, until it was somewhat stretched. I let this Injection remain to the next Day, and then found it solid and elastic. I cut the Parts round it, as I had done in the preceding Subject; and afterwards I made an exact Division of the Injection: I put one half of it on Paper, in order to have it's Shape exactly; I have added in pricked Lines, a pretty exact Section of the adjacent Parts.

Fig. 112.

Fig. 112. A. A Section of the Bladder. B. A Section of the Pubis. C. The Cavity of the Abdomen. D. The Peritonæum. E. The Integuments of the Abdomen. F. The Space between the Pubis and the Peritonæum, taken up by the cellular Membrane. It is the Place of the Incision in the high Operation of Lithotomy. G. The Rectum. H. The Glans. I. The *Corpus cavernosum*. K. The Urethra. L. The Elbow of the *Ligamentum suspensorium*. M. The Bulb or Gulf of the Urethra. N. The Streights and Elbow at the Entry of the Gulf of the Prostate. O. The



O. The Gulf of the Prostate. P. P. P. Sort of Elbows, or blind Cavities, found therein. Q. The Streights of the Entry into the Bladder.

XXIV. In the Middle of February 1735, Jane Dawson, of the Parish of Mansfield in Nottinghamshire, an unmarried Woman, aged 30, received a violent Strain by lifting a Tub of Water, and immediately complained of great Pain in her left Side. In March following, she found a Lump, or little round Swelling, in that Side of her Belly; and soon after the whole *Abdomen* swelled, but more in the left than in the right Side. She complained frequently of severe Pains in her Bowels, which, in Time, became so violent, that she had neither Ease nor Sleep, but by taking large Quantities of Opium. During her Illness she made very little Urine, and was so costive, that she had seldom any Stools but by the Help of Purges or Clysters: The former gave her always Pain, and the greatest Relief she found, was from emollient Clysters that emptied the *Intestines*. Her Thighs and Legs were not swelled, but these and other Parts of the Body were much emaciated. In this unhappy Condition the poor Woman lived about 2 Years, 9 Months, and died Nov. 17, 1738.

*A large Quantity of Matter or Water contained in Cystis's or Bags adhering to the Peritonæum, and not communicating with the Cavity of the Abdomen, by Dr Walter Graham, Physician at Mansfield. Ibid. p. 708.*

I should have mentioned, that, before this Accident of the Strain, she had always enjoyed a tolerable good Share of Health; and seldom made any Complaint, but of missing her *Menstrua*.

Upon viewing the naked Body, the *Abdomen* was vastly distended, and most at the Navel: The Swelling was unequal, the left Side being more swelled than the right; and there appeared a very distinct Protuberance all along the left *Epigastrium*: This Protuberance was much softer than the other Parts of the Belly, which were so hard, that upon Pressure they did not pit.

Upon opening the Body, we observed as follows:

The *Membrana adiposa* was very thin, and the *Abdominal Muscles* were much extenuated by the great Distention, as is usual in like Cases.

The *Peritonæum*, which was the chief Seat of the Distemper, and the principal Part to be taken notice of, was grown to so monstrous a Thickness, that it's Section at the Navel was  $5\frac{2}{15}$  Inches; and it was of the same Thickness below, but somewhat thinner above it. All over the *Peritonæum*, and throughout the whole, there appeared a prodigious Number of Glands; and the Space between one Gland and another was filled with a white spongy Flesh. Some of these Glands were round, others oblong: Many of them were as large as a Goose's Egg, others about the Bigness of a Pigeon's Egg, and some less; the largest were on the left Side. Their internal Substance was destroyed, and only the external *Membranes* left, whose Cavities were full of Liquors of different Colours and Consistence: Some contained a thin whitish Humour, others a pellucid viscous Gelly, like the White of an Egg, and some a white thick Matter, like *Pus*. As the Contents of these *Glands* thus differed, so did their *Membranes*; some were very thin, others thicker, and many of them were become *cartilaginous*: In general, those whose



*Membranes* were thin, contained a thin whitish Liquor; and those that were *cartilaginous*, a thick white Matter like *Pus*. Their internal Surface was quite smooth, and none of their Cavities had any Communication with each other; nor could the Matter be pressed out, without opening them with a Knife.

The Protuberance on the left *Epigastrium* was occasioned by a Quantity of Liquor lodged in a Cavity formed by the *Peritonæum*, which in this Place was about  $\frac{2}{3}$  of an Inch thick: This Cavity extended itself over the Kidney and Spleen, and there was found in it above 2 Quarts of thin Liquor of a darkish Colour. The whole Quantity of Matter taken out of the fore-mentioned Cavity, and those of the *Glands* which were opened, was about four Gallons.

In the Cavity of the *Abdomen* there was found no Matter, or Water. The *Omentum* was very white, and much decayed.

The Coats of the Stomach and *Intestines* were very thin and tender, and inflamed in several Places. The *Intestines* lay in the right Side, and were filled with hard Excrements, forced into that Situation by the large Protuberance on the left.

The Liver was very large, of a Colour more red than common, and full of Blood, which upon the smallest Incision flowed freely out of it; and the greatest Part of the Blood in the whole Body seemed to be accumulated in this *Viscus*, and was of a darker red Colour than usual.

The Gall-Bladder was not bigger than natural, nor did it contain any Stones, or concreted Matter; and upon gentle Pressure, the Bile moved easily through the *Ductus Cysticus*.

The *Pancreas* was smaller than common, and adhered closely to the *Duodenum*.

The Kidnies were a little inflamed, and of a flatter Figure than usual; occasioned, as I suppose, by the Pressure of the *Peritonæum*.

The Cavity of the *Thorax* was greatly lessened by the *Diaphragma's* being pressed upwards, by which the Lungs were likewise much compressed, and they adhered in several Places to the *Pleura* and *Mediastinum*. The Heart was of a paler Colour than common: From the Middle to it's *Apex*, it was pressed flat, and there was little or no Water to be found in the *Pericardium*.

*An Observation of Hydatides voided per Vaginam, by Mr Will. Watson, F. R. S. Ibid. p. 711.*

XXV. A Gentlewoman aged about 48, the Mother of many Children, after a Respite of 6 Years, had, in *Nov. 1739*, the Symptoms of Conception, which left her in *February*; from which time to the End of *March*, she every Night discharged *per Vaginam Uteri* a considerable Quantity of Blood; and, not perceiving an Increase in her Belly, nor (which in Cases of Conception is the *Pathognomonic* Sign of something preternatural) her Breasts, she concluded her *Menses* were leaving her at their usual Period. But upon the first of *April*, being taken with great Pains in her Back, and having other Symptoms antecedent to Delivery, there came away, at short Intervals, a very large Number of *Hydatides*, of all the intermediate Sizes, from a Nutmeg to a Pin's



a Pin's-head, some filled with clear, others with bloody *Lymph*; all of them propagated in the manner of a Cluster of Grapes from a spongy Substance, answering the Purposes of a *Placenta*. After the Discharge of these, in a few Days she recovered her accustomed Health.

Upon boiling some of these *Hydatides*, they appeared like the *Ovary* of a boiled *Hen*, with this Difference; in the *Hen*, the Contents of the *Ova* concrete: in this Case, not; but the Transparency was changed to the Colour of Bile diluted with Water.

XXVI. September 21, 1739, a Woman died in our *Hôtel-Dieu*, at *Rouen*, who had an *Abscess* in the right *Hypochondrium*, through which she discharged *Hydatides*; with a considerable Tumour at the left *Hypochondrium*.

Her Body was opened. The *Abscess* of the right *Hypochondrium* was between the common and proper *Membrane* of the Liver. The Tumour on the left Side was almost as thick as one's Head, and twice as long. It was between the common and proper *Membrane* of the Spleen. It ran between the floating Parts of the *Abdomen*, had displaced them, and went so far as to push against the Integuments of the Belly, in it's Passage adhering to the Stomach.

I laid this Tumour open, and found it filled with *Hydatides* of all Sizes, with clear Water, and mucilaginous *Membranes*, which were the Remains of large *Hydatides*, that were bursten by the Motions of the Patient. I examined with Care both the *Hydatides*, and their Bag: The *Hydatides* were composed of 2 mucilaginous transparent, and yet very elastic, *Membranes*. The inward *Membrane* had on it's concave Surface a sort of Villofity wrinkled and mamillated, that pretty much resembled the Surface of a rough Skin, or what is called a *Goose's Skin*. The softest and most gelatinous of these *Membranes* were very like the vitreous Humour of the Eye. The Water contained in all these *Hydatides* was entirely like the aqueous Humour of the Eyes.

There were Clusters of these *Hydatides* quite resembling the *Ovary* of a *Hen*, or a Bunch of *Grapes*, which were made up of Globules of all Sizes.

The Bag that contained these *Hydatides* was pretty smooth on the Side opposite to the Spleen; that is to say, that Part of the Bag formed by the common *Membrane* of the Spleen, or by the *Peritonæum*, was pretty smooth; but on the Side next the Spleen, the Bottom of the Bag was very thick, and composed of several *Lamelle* half destroyed, which fell off in Bits or Scales, and in Slime, at the least Touch.

It appeared plainly upon the Inspection of these Remains of the Bottom of the Bag, that that was the Source of the *Hydatides*; and, upon considering what Sort of Parts are found on the Surface of the *Viscera*, under their Integuments, it seems evident to me, that these lymphatic Globules were nothing else but the glandulous and lymphatic Grains of the Surface of the Spleen, dilated into Excrescences by the Disease,

An Observation on Hydatides, with Conjectures on their Formation, by M. Le Cat, translated from the French, by T. S. M. D. F. R. S. Ibid. P. 712.

What Hydatides are.



ease, and puffed up by the Lymph, which the Distemper caused to accumulate therein. And thus I conceive this Effect to be produced.

Proofs.

I have proved in my *Physiology*, which is actually in the Press, that these glandulous Grains are nothing but the Ends of the Nerves, or nervous *Papillæ*, which receive the Ends of the lymphatic Vessels into their spongy Texture: And I have, among others, instanced in the *Papillæ* of the Tongue, called *glandulous Papillæ*, which are at the same time the Organ of Taste \*, and the Receptacle of the salival *Lymph*.

A Part of the Nerves, which are distributed into the Substance of the Liver and Spleen, terminate in the Surface of those *Viscera*, under the Form of glandulous or pulpous Grains. This same Surface is the Seat of a great Number of *lymphatic Vessels*: And it is not to be doubted but those glandulous Grains are as necessary for those *Lymphatics*, as the *parotid Gland* is necessary for the *Lymph* of the *salival Duct*, and the *glandulous Papillæ* of the Tongue for the Liquor that distils from them. In Quality of *Glands*, they are the Receptacle of those Liquors: As *nervous Papillæ*, they furnish the Spirits necessary for the Functions of those Liquors.

As long as the *glandulous Papillæ* are found, their excretory Pores pour forth the *Lymph* according as their Cavities receive it from the *Lymphatics*: But if these Pores happen to be obstructed by a Disease; if the Surface of these Grains is altered by an Erosion; or if the natural Tone of these Solids is perverted; the *Lymph* brought into these Grains will be retained therein: It will stretch these Globules; their Substance having lost it's Elasticity, will easily give way; the nutritious Juice, which they will not be able to drive farther, will be there assimilated, and will contribute to the Dilatation. In fine, a Vesicle will be formed filled with *Lymph*, or an *Hydatide*, such as those we have examined.

This Congestion of *Lymph*, or *Hydatides*, will not fail to soften, relax, and raise up the *Membrane* that covers them; and thus a Bag will be formed like that which we found.

When an *Hydatide* swells to a considerable Size, the Volume of the Fluid will become disproportioned to the Force of the Teguments; these will be burst by the shaking of the contained Fluid, upon the least Motion of the Body. This Fluid will extravasate into the common Bag, upon opening which the Waters and *Membranes*, which result from that Rupture, will be found.

Most Part of the glandulous Grains are distributed into Clusters, as is well known to Anatomists; wherefore *Hydatides* will also be found disposed in Clusters, like *Ovaries*.

Yet the greatest Number of this Heap will be composed of separate *Hydatides*; because, when one of these Globules has acquired a certain Bulk, it will generally break the too feeble Pedicle, which held it attached to the Cluster; and thus it will fall into the common Cavity.

\* See his *Traité des Sens*, Rouen, 1742. 8vo.



This kind of Eruption, or general Disengagement from the Surface of the Bowel, must destroy it's natural Texture, and reduce it exactly to the State in which we found the Bottom of the Bag of *Hydatides*, that were the Subject of this Observation.

XXVII. E—S—, aged 57, died in St James's Market, Jan. 1725. In examining the *Pelvis* of this Woman, I found a large *Bony-Substance*, which was contained in the Womb, and so strictly united to it, that they seemed to be one and the same Body. Upon cutting the *Substance* asunder, I observed, that the *Offification* went no farther than the Thickness of a Shilling; the Part immediately under the *Offification* is like firm Flesh, and this Flesh grows softer and softer as it draws near to it's Center.

The Woman never had but one Child, of which she was delivered about 27 Years before she died: Her chief Complaints, for some Years, were a short Cough, great Difficulty in Breathing, frequent Uneasiness in making Water, or in going to Stool, and a constant Weight, or Bearing-down, upon the Parts of Generation.

The immediate Cause of her Death was, undoubtedly, an *Asthma*; for she had only one *Lobe* of the *Lungs* left that was perfectly sound; the rest adhered firmly to the *Pleura*, were very much contracted, and in some Places scirrhous.

A. The *Bony-Substance*. B. The Substance of the *Womb* cut open, and turned backwards. C. Small *Fibres* connecting the *Bony-Substance* with the *Womb*. D. The right *Fallopian Tube* lying upon the *Membrane*, which joins the *Tube* to the *Womb* and to the *Ovarium*. E. The *Ovarium*. F. The *Morsus Diaboli*. G. The left *Fallopian Tube* cut off. H. The Neck of the *Womb* cut open as elongated by the Disease. I. The Mouth of the *Womb* laid open. K. The greatest Part of the *Vagina* likewise laid open.

This *Womb*, with the *Bone* adhering to it, having been kept 10 Years in Spirits before it was sent to the Engraver, the *Vagina*, *Fallopian Tube*, the *Membrane* on which the *Tube* lies, and the *Ovarium*, must be supposed to be greatly contracted; but that Part of the *Womb* distended by the Substance, is indeed very little contracted; for it was scarce so thick as a Half-Crown Piece, when it was first taken out of the Body.

XXVIII. This poor Woman, about 9 Years since, was with Child, and, at the Expiration of the usual Time, was attempted to be delivered. The Child was so far advanced in the Passage, that the Midwife declared, that in less than 2 Minutes the Child would be in the World; but, on the Woman's suddenly turning herself, the Child slipped from the Midwife, and could not be found by her again.

Previous to her being pregnant, she had been afflicted with the Venereal Disease, and had had a violent Discharge of a fetid Matter from the *Uterus*, and was then under the Care of Mr *Balgay*, Surgeon, who favoured me with being present when he opened the Body. She had been salivated once or twice in our Hospitals, but to no purpose. After the

An Account of a large Bony-Substance found in the Womb, which was shewn to the Royal Society, May 17, 1733, by Edw. Hody, M. D. F. R. S. No. 440. P. 189.

Explication of Fig. 113.

Of a Woman who had a Fœtus in her Abdomen for 9 Years, opened May 6th, 1739, by Wm. Bromfield, Surgeon. No. 460. P. 697.



the Time of attempting to deliver her, to the Hour of her Death, she had prodigious Discharges of a fetid Gleet, and frequently indigested Matter with Blood from the *Uterus*. There appeared a Tumour on the right Side, which was moveable to the other, though it's Attachment was chiefly to the right. She was troubled with a Suppression of Urine, ever since the Attempt of Delivery, and within this Twelvemonth went to Stool in a Cloth insensibly, and what *Fæces* descended into the *Rectum*, were immediately discharged. She gradually wasted from a hale lusty Woman, till she was reduced to a mere Skeleton. This Account is the best I could collect from the good Women who were present at the opening of the Body, and most of them at the Time of her expected Delivery, and have been very conversant with her ever since.

Upon opening the Body, the *Omentum* was entirely wasted: The *Peritonæum* was greatly inflamed, and adhered to the subjacent Tumour, which I expected (not being acquainted with the Case) to be a Tumour of the same kind I had lately seen, which was chalky; but, upon cutting into it, there appeared the *Os Frontis*, and, on proceeding farther, the Arm, Leg, and Ribs, on the left Side, with some viscid Matter in the Interstices. It was seemingly contained in a thick membranous Cyst, which, upon Dissection, proved to be the containing *Membranes* of the *Fœtus*, contracted to the Shape of the *Fœtus* in *Utero*, and gave the Tumour an oval Form. The Situation of the *Fœtus* was in the concave Part of the right *Ilium*, and by it's Cyst was attached to the *Intestines*, *Colon*, and *Cæcum*. It had some Vessels that ran on the Surface of the Cyst, that were sent from the internal *Iliacs* of the contrary Side. By it's Pressure on the right *Ureter*, it had hindered the Descent of the Urine, and had greatly enlarged both the *Ureter* and *Pelvis* (of the right Kidney) which was greatly distended with Urine, so that what descended into the Bladder, must steal in *guttatim*.

The *Uterus* and *Fallopian Tubes* appeared of their usual Size, only inflamed. The *Fimbriæ* were loose and fluctuating. On examining farther into the *Pelvis*, there was near six Ounces of fetid Matter lying between the *Rectum* and *Uterus*, which near it's Neck was perforated, and the Parts were very rotten. From it's Neck almost to the Extremity of the *Vagina*, the Muscles of the *Anus* were nearly destroyed. There were some few indurated little Tumours adhering loosely to the Cyst of the *Fœtus*. There were several little Parts appeared like carious Bones found in the Matter contained in the *Pelvis*.

From what has been said, it appears that the *Fœtus* had been 9 Years in the *Abdomen*.



Fig. 112.

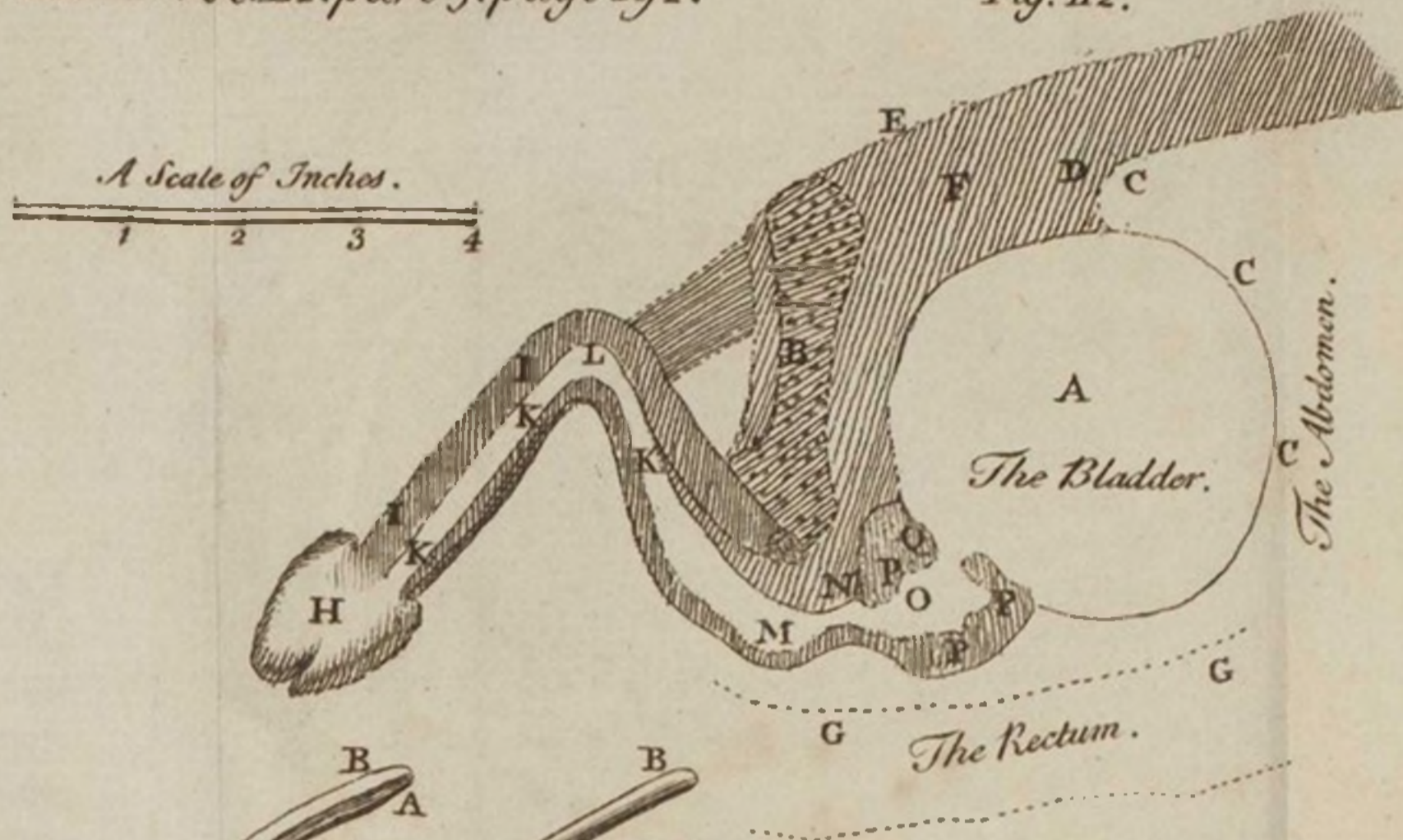


Fig. 113.

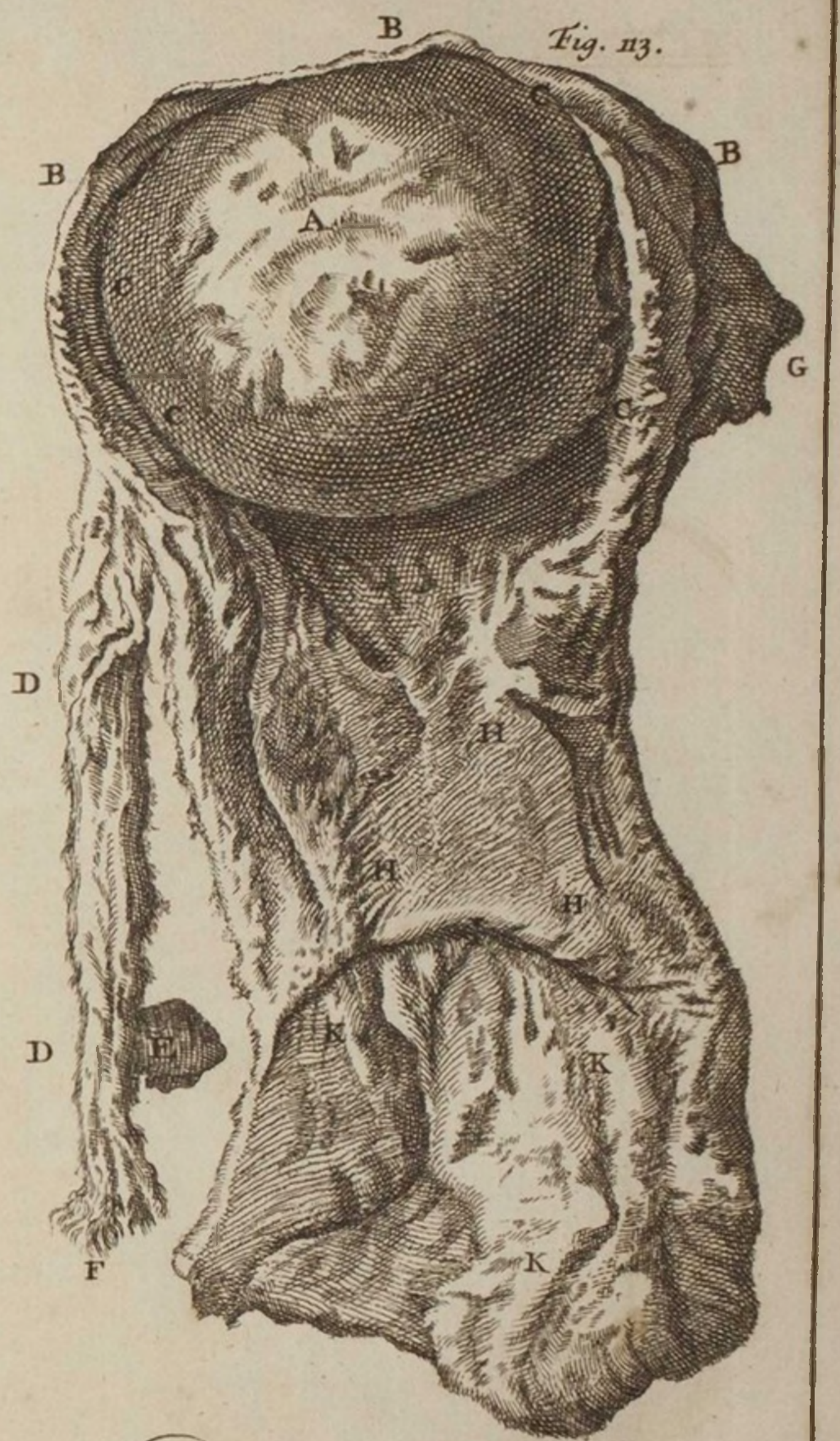


Fig. 109.

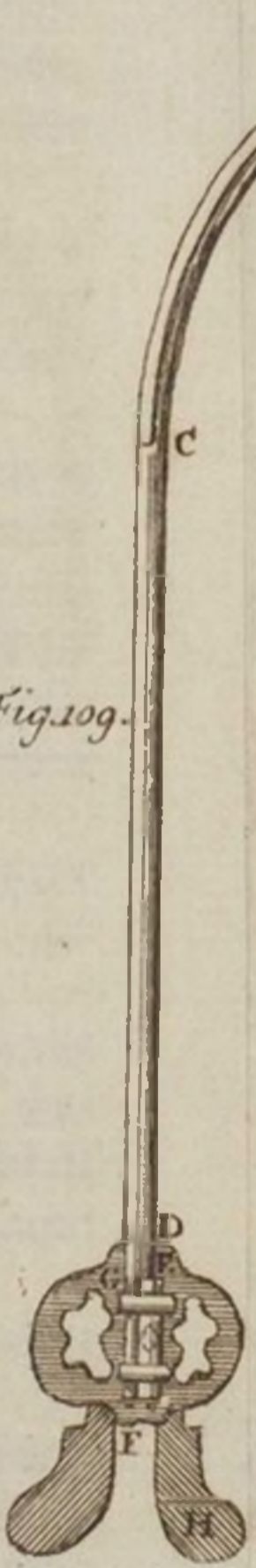


Fig. 110.

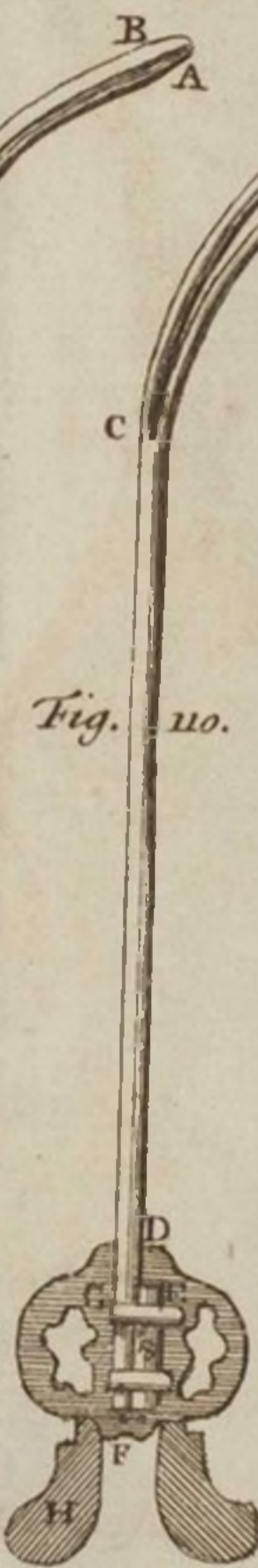


Fig. 111.

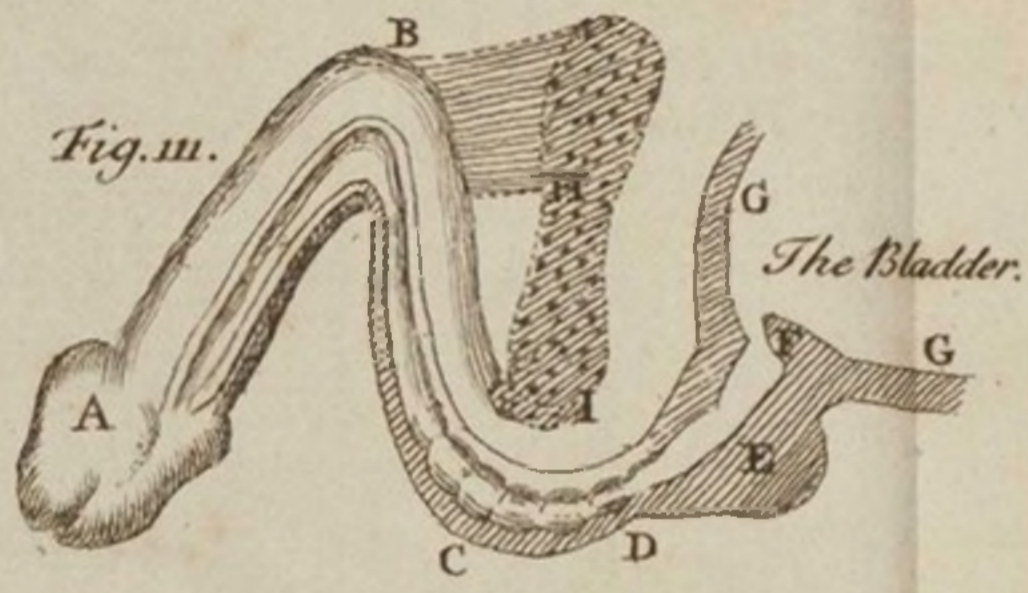


Fig. 108.



A Bony Substance found in the Womb of a Woman Aged 57 Years.





*Portrait of a man in profile, facing left.*



C H A P. V.

The Humours and General Affections of the Body.

I. JOHN WICKS, Carver, in Bromley-street, about 40 Years of Age, had been ill about 3 Weeks by a Loss of Appetite and Indigestion, and at last a Pain and Distention of his Stomach, with a low Degree of an inflammatory Fever; his Tongue dry, rough, and of a rusty brown Colour in the Middle, with a white soft List on each Side; his Urine very high coloured, with a slimy pink-coloured Settlement in great Quantity; Stools very yellow and loose.

An Observati-  
on of a white  
Liquor resem-  
bling Milk,  
which appear-  
ed instead of  
Serum separa-  
ted from the  
Blood after it  
had stood some  
time, by Alex.  
Stuart, M. D.  
F. R. S. &c.  
No. 442. p.  
289. July,  
&c. 1736.

Eight Ounces of Blood being taken away, instead of Serum nothing appeared above the Coagulum but this white Liquor, resembling Milk, which I poured off to the Quantity of  $\zeta$ iv, or thereabouts. There was no Smell perceptible at first, but in 6 Days it began to have the Smell of rotten Eggs: It stood in a Room, where there was a Fire for some Hours of the Day, for 3 Weeks more, in which time it did not alter it's Consistence nor Smell.

He had eat very little for a Week before I first saw him; and only a little of a Calf's Foot stewed the Night before for Supper, and no Breakfast that Day. He was addicted to drinking of strong Pale-Malt Liquor every Day in his Health.

If this be Chyle, it is a Substance very different from Milk, which is apt to turn sour and thick by keeping, and never contracts the putrid Smell of rotten Eggs, as this did. Whether it be not Chyle turned putrid, and near to Purulency, by a long Circulation in the Blood Vessels, but not converted into Blood, through some Defect in the Sanguification, is a Question which I doubt cannot be decided without more Observations and Experience.

The Coagulum of the Blood was covered with a sily Pellicle, about the Thickness of a Shilling. The red Part was of a grumous, tender, incoherent Consistence.

Though he was much better in a Week's time, I ordered 5 Ounces of Blood to be taken away, to see what Change had been made, and found the Coagulum covered with a sily Pellicle to the Thickness of Half a Crown, the red Part of a due Consistence, the Serum clear, without any Chyle.

The Urine became clear, and he recovered in about two Weeks after I saw him first.

II. In Jan. 1729, Daniel Goddard, a Gardener, about the Age of 24, at Wisbeck in the Isle of Ely, Cambridgeshire, had a slight Puncture from a rusty Nail in the Sole of his right Foot. And, notwithstanding there was not wounded any Tendon, or Blood-vessel, larger than small Branches of Veins, the whole Foot was immediately swollen to a very

An extraordi-  
nary Hæmor-  
rhage, by Hen.  
Banyer, M. D.  
No. 471. p.  
628. Read  
Dec. 22.





unusual Degree, without a Fever, or other apparent Cause for it. It was also attended with great Pain, and an extraordinary Pulsation upon the Part, as in Wounds of Arteries; and so distended as if the Blood would burst out of it's Vessels.

Accordingly, after 2 Days, upon opening a superficial Sinus, to enlarge the Wound, there rushed out immediately such an obstinate Flux of Blood, as would not yield to any styptic Means, longer than the Bandage was holden on by some strong Hand. And, although, by this Incision, no Vessels were wounded, but Capillary Veins; yet this *Hæmorrhage* continued to shew itself as violent as at first, for 6 Days successively, whenever the necessary Means were relaxed. Upon which, for the sake of *Revulsion*, the Patient had a Vein opened on the Arm of the opposite Side; and it had such a sudden and surprising Effect, that the Flux of Blood in the Foot instantly ceased, and the Wound healed very soon without any further Trouble; but the Flux of Blood, consequent upon Venesection, became equally as difficult to restrain, as that in the Foot, for the Space of 4 Days; all which time it would have continued to flow most violently without the strictest Bandage, and the same Care of the Hand, as before. Perhaps the Period of this *Hæmorrhage* might have been much longer, if I had not suffered the Ligature on the Arm to be loosened now-and-then, as I judged the Redundancy of Blood required, for the sake of some Evacuation, at each time. After the Bleeding, he soon recovered his Strength, so as to do his Business in the Gardens; and continued very well till *March* 1730. About the Middle of this Month, he complained of Sleepiness, and a particular Heaviness all over his Body; which was followed, in 3 Days, by a violent *Hæmorrhage* from the *Nose*. This Flux, in spite of all Means being tried, except Venesection, continued 7 Days, and could never be totally stopped, all this time, for one Hour together. He recovered again in a very short time, and was able to work in the Summer-season, without any Complaints, till *Oct.* following. Then the *Hæmorrhage* returned again at the *Nose*, as before, with all the same Circumstances, and in Defiance of all Endeavours, continued the Period of 7 Days. Thus it returned in like manner of Bleeding, by *Stools*, in the Middle of *March* 1731, and continued to discharge this Way great Quanties of Blood, in one Motion, and sometimes two Motions every Day for 7 Days together, in Opposition to the most efficacious Restringtons. Also it made it's regular Return by vast Profusions of Blood from the *Intestines*, in the Beginning of *Oct.* following, to the End of the first Period of 7 Days, without Gripings, or any such uneasy Sensations. Thus, again, it kept as orderly Returns about the Vernal and Autumnal Equinoxes of 1732, 1733, with vast Profusion of Blood by Stool, for the usual Term of 7 Days, agreeing in all Circumstances with the preceding Years. Likewise at, or very near these two grand Seasons, in 1734, 1735, this habitual *Hæmorrhage* broke away by the *Kidnies and urinary Passage*;



Passage ; and still constantly, for these 2 Years, kept it's old stated Time of 7 Days, without any other Variation.

This young Man was seized in Dec. 1735, with the *Small-pox*, of the distinct Kind, which produced such a Change in his Constitution, that he escaped those periodical *Hæmorrhages*, or any other spontaneous Evacuations equivalent thereto, for the 2 Seasons of the Year 1736 ; and remained in very good Health till *Christmas* following, being above 13 Months free from any Symptoms of his old Eruption. But, upon *December* the 27th, without any previous Notice of Heaviness and Sleepiness, the *Hæmorrhage* returned by the *urinary Passages* ; but much more favourably, and continued only 3 Days. Again, on *May* 13, 1737, he felt the previous Warnings, and bled again by Urine to the 20th ; with this Difference, that for 3 Days the Urine was only Coffee-coloured, but afterwards, for 4 Days longer, every Discharge resembled an Effusion of Blood from a Vein just opened. He presently recovered his Strength, even although the Air was exceeding warm at this Time ; and I saw him 5 Months after, very robust and healthy, and, as he told me himself, was free from all kinds of Tendency towards his old Complaint. But he had always the Appearance of too much Fulness, tho' I am of Opinion, that his Constitution did not suffer so much as might reasonably be imagined, from such prodigious *Hæmorrhages*. Of my own Knowledge, he had no Return of his Bleeding, or any thing like it, the ensuing Autumn ; but remained perfectly well all the following Winter. Afterwards I had no Opportunity of making further personal Inquiries, but was informed by an intelligent Man, that in *March* 1738, this unfortunate Person got a slight Wound again, somewhere upon one of his Legs, which proved equally as difficult, with respect to the Flux of Blood, as the first Puncture in his Foot. And, whether from too strict a Restraint of the *Hæmorrhage*, or for want of Venesection, he fell into very violent Convulsions for 4 or 5 Days, and died in a manner like Suffocation, from too much Redundancy of Blood.

As this *Hæmorrhage* never once depended upon any other Distemper, or observed any regular Concurrence with the Revolutions of the Moon, it appears to be a very extraordinary simple *Plethora*. During the 4 Years that this Flux of Blood came from the Nose and Intestines, the Urine was never of a higher Colour than Amber ; nor was there any Symptom of a Fever by the Pulse, or otherways, for the whole Term of the Disorder.

III. In my short Essay on the Use of the *Bile* in the *Animal Oeconomy* \*, some Points, which required a farther Illustration, having been there, for the sake of Brevity, only hinted at ; it is necessary, and I hope may be of some Use, to set these Points in a clearer Light : Which I shall endeavour to do, by solving such Difficulties, and answering such Remarks, as have occurred in Conversation and Correspondence on that Subject.

*Explanation of an Essay on the Use of the Bile in the Animal Oeconomy, by Alex. Stuart, M.D. F.R.S. &c. No. 427. p. 5. Jan. &c. 1733.*

\* See Vol. VII. Part iii. Chap. vi. §. 5.



The first Remark, which deserves Regard is, that I take no Notice of the Effect of the Gall spilt upon the external Coat of the *Intestines* from the Wound in the *Gall-Bladder*, whose *Stimulus* on the Out-side is supposed sufficient to have produced, and to have solved all the *Phænomena*, or Symptoms observed and related in the Case: So that all the Symptoms which I attribute to a Want of the *Stimulus* of the *Gall* on the Inside of the *Intestines*, might have been more properly ascribed to the same *Stimulus*, acting upon the Outside of the uppermost *Guts*, situated nearest to the *Gall-Bladder*, whose compleat Contraction by the Force of that *Stimulus*, expelling the Air out of their Cavity, and forcing it into the inferior *Guts* (as in windy *Cholics*) would have distended them to the Pitch mentioned in that Essay. At the same time it is acknowledged, that had the Gall been carried clean out of the Body by any Vent, so as that no *Stimulus* had remained to act either upon the Inside or the Outside of the *Intestines*, then my Way of accounting for the Symptoms had been good, and the Conclusions just.

I acknowledge that there is some Appearance of Reason for this Remark, and the Objection which it implies; but the whole Strength of the Argument lies in a Supposition that a *Stimulus* on the Outside of the *Intestines*, is capable of exciting a Contraction, supplying the Want of that *Stimulus* on the Inside, and also of causing a preternatural Distension of the whole Canal. The contrary of all which I shall endeavour to prove.

In order to this it is necessary to premise, what perhaps may not have been universally adverted to, yet can be no sooner proposed than acknowledged.

1. That the whole Action of the *Nerves*, whether in Sensation or in Muscular Motion, is exerted at their Extremities only.

2. That the Sides of the *Nerves* every where along their whole Tracts, are entirely insensible, and serve neither for Sensation nor Motion.

The *Apparatus* of Nature towards both these Actions makes this plain. Towards Sensation we see, that the *medullary* Substance of the *Nerves* at their Extremities is divested of it's Coverings, which are Processes of the *Dura* and *Pia Mater*, and ends bare in the Form of small soft *Papillæ*, from their Figure, called by *Anatomists* *Pyramidales*, on the Surface of the *Cutis*, covered over with the *Cuticula*, where they act their Part in Sensation, or Feeling, Tasting, and Smelling. The soft denudated Branches of the *Optic Nerve* which compose the *Retina*, and what for the same Reason is called the *Portio Mollis* of the *Auditory Nerve*, the immediate Instruments of Seeing and Hearing, prove the same.

Again, it is the Extremities of the *Nerves* that enter with their Coverings into the *Muscle*, and into each *Fibre* of the *Muscle* to which they belong; where they deposit their Contents, or act their Part in muscular Motion.



But the Sides of the *Nerves* along their whole Tracts, are insensible or void of Feeling, because their *medullary* Substance, and it's Contents, which are the only immediate Instruments of Sensation in them, are here covered with the *Pia* and *Dura Mater*, the last of which is the strongest, densest, and most impenetrable Membrane of the whole Body, capable of defending and conveying the tender *medullary* Substance of the *Nerves* and it's Contents, safe, unhurt, and undissipated to the several Organs of Sensation and Motion, at their Extremities the Seats of their Action.

A further Confirmation of this from Experience, is the Insensibility of the Side of a large visible Branch of a *Nerve*, which sometimes happens to lie bare and exposed in a Wound or Ulcer, where it will bear the Touch of the Probe without feeling, and occasions no more Pain than in Wounds and Ulcers of the same kind, where the *Nerves* are not exposed, unless the investing Membranes, the *Dura* and *Pia Mater*, be by any Accident wounded, lacerated, or corroded; in which Case, the *medullary* Substance being laid bare, exquisite Pain is felt, and very severe Symptoms ensue, which are hardly to be overcome, or never so easily as by cutting the *Nerve* quite through, so as that the Extremity may retire within the Flesh, and the *medullary* Substance be protected by it.

By which it appears, that the Sides of the *Nerves* are insensible or void of Feeling, and that the Extremity of the *medullary* Substance, either by Nature, or by some Accident, laid bare, is the only immediate Instrument of Sensation.

This being premised, the Structure of the *Intestines*, the Parts in Question in the Case before us, comes to be considered. They are made up of four *Tunics*, or Coats. The first, or external Coat, is a common membranous Covering, borrowed of the *Peritonæum*. The second is composed of their annular, contractile, muscular *Fibres*, the immediate Instruments of their peristaltic Motion. The third is the nervous Coat, a reticular *Plexus* of *Nerves* intermixed with *Blood-Vessels* and *Glands*, placed immediately under the muscular, and over the villous Coat. The fourth is the villous or innermost Coat, on the concave Side, rightly called villous, as it appears viewed through a Microscope; though from it's Appearance to the naked Eye, it be erroneously called the mucous Coat. This is generally allowed to consist of the capillary Extremities, or rather Roots of the *Lacteals*, and the excretory *Ducts* of the *Glands*, which together form these *Villi* that are seen in it. Among these, suitable to Analogy in all other Parts of the Body, the *Papillæ Pyramidales*, or Extremities of the *Nerves*, are lodged under the *Cuticula* of the nervous Coat, for the Uses of Sensation, so necessary for the Purposes of Nature, in this very sensible Part the Inside of the *Guts*, which is known to be so quickly and necessarily affected by the Qualities of their Contents.

The



The proper *Nerves* of the first or outward Coat, are those of the *Peritonæum*, of which it is a Part, arising from the *Medulla Spinalis* of the Loins and *Os Sacrum*: Whereas the *Nerves* proper to the *Guts*, are of the *Par Vagum*, and *mesenteric Plexus*: Therefore as there is no Communication of *Nerves* between this external Coat or Covering, and the proper Substance of the *Intestines* themselves, a *Stimulus* acting upon this external Coat only, would not affect the *Guts* so as to excite any considerable Degree, either of Sensation or Motion in them.

Again the proper *Nerves* of the *Intestines*, whose Origin, Disposition, and Situation have been already described, terminate either in the muscular contractile *Fibres* of the Coat immediately above them, or carry their Extremities to the Inside, where they terminate under the *Cuticula*, for the Use of Sensation; so that a *Stimulus* on the Outside of the *Intestines*, besides the Difficulty of passing through the two external Coats, before it could reach the proper *Nerves* of the *Guts*, would at last only irritate their Sides, where they are insensible, because covered with the *Dura Mater*: And if it might be supposed, that such a *Stimulus* as is in Question, to wit, the *Gall*, could have penetrated through these Coats into the Cavity, where the sensible Extremities of the proper *Nerves* of the *Guts* lie exposed to it, yet such a Filtration through all these Coats, as it could not be performed soon, nor in great Quantity, so it would enter at last, divested in a great Measure of it's grosser, saline, oleaginous, and pungent Parts, by the Filtration, and thereby lose the Power of a *Stimulus* on the Inside; as the Situation of the Parts, and Disposition of the *Nerves* above described, made it an ineffectual one on the Outside, as much as if it had been carried quite out of the Body.

To conclude; if the *Gall* spilt on the Outside of the *Guts*, had been capable of exciting a Contraction in any Part of them, so soon as it came to cover the whole Surface, it must have had the same Effect equally every where, and the whole Canal should have been found contracted to it's smallest Diameter: Whereas it was found every where distended to a great Pitch.

It is therefore plain, that a *Stimulus* on the Outside of the *Intestines*, has not the Effect of such a *Stimulus* on the Inside. It can neither excite them to a Contraction; promote their peristaltic Motion; nor supply the Defect or Want of such a *Stimulus* on the Inside, much less occasion such an universal Distention, or account for the Symptoms arising from it, which is what I undertook to prove.

It was for these Reasons, and to avoid Prolivity, that the *Gall* spilt on the Outside of the *Intestines*, was not taken notice of in that Essay.

The second Difficulty is how a fresh Recruit of *Chyle* should be a Cause of Sleep.

The Experiments which I made before this Society\*, I hope may serve to justify what I shall here assume, concerning the Nature and

\* Ibid. §. 7.



Existence of the *nervous Fluid*, or animal Spirits, in the Solution of this second Difficulty.

The Argument which has been offered, runs thus: It is well known, that People after eating plentifully are often inclined to Sleep, long before the *Chyle* can be supposed to be got into the Blood; therefore a fresh Recruit of *Chyle* cannot be the Cause of Sleep; but there must be some other Cause, at least at that time.

Which Cause is assigned by supposing, that after a plentiful Meal the distended Stomach will load and oppress the descending *Aorta*, so as to hinder the *Blood* in it's Descent, and thereby force a greater Quantity than usual into the *Aorta Ascendens*, which by it's distended Branches in the Brain will obstruct the Secretion of the Animal Spirits through the *Glands* of the cortical Substance into the Origin of the *Nerves*, and thereby produce Sleep.

This being generally esteemed a mechanical Account of the Cause of Sleep after Meals, deserves the greater Attention.

In answer to which, if such was the true Cause of Sleep after Meals, it ought to have the same Effect upon the *Cerebellum*, from whence most of the *Nerves*, that serve in the natural and vital Functions arise; and so would hinder these Functions, to wit, Digestion, the peristaltic Motion, Respiration, and the Circulation of the *Blood*, all which, on the contrary, are observed to be more regular and stronger in Sleep, than when we are awake; at least in a healthy and temperate Person, who has used moderate Exercise.

Again, Gluttony, Drunkenness, and Flatulences, which overload the *Stomach*, and therefore, according to this *Hypothesis*, ought to produce the quietest and most serene Repose in Sleep, do, on the contrary, bring Inquietude, or broken and interrupted Rest; and when to the greatest Excess, a lethargic Sleep, which is a Disease for the Time, and sometimes terminates in Death.

The *Incubus* also, which is justly supposed to arise from an Inflation or Distension of the *Stomach*, in a supine Posture in Bed, oppressing the *Aorta Descendens*, ought to produce quiet Rest; whereas nothing disturbs more, as it first brings the Person out of quiet Sleep into a sort of waking Dream, with a Sense of Oppression, and at last awakes him quite, in a kind of Terror, with Palpitation of the Heart.

And indeed as nothing contributes more to sound and quiet Rest than an easy Digestion and Respiration, a sedate, equal, and regular Circulation of the *Blood*; that is, an uninterrupted Function of all the natural and vital Parts; the Reverse of these, and particularly an interrupted or difficult Circulation, if to any considerable Pitch, must produce the contrary Effects, to wit, Restlessness or Inquietude of some kind or Degree; as in Fevers and other Distempers attended with such Irregularities of the *Animal Oeconomy*.

The Difficulty which is suggested about the *Chyle's* not getting soon enough into the *Blood*, by the way of the *Lacteals*, to produce this Effect



fect in such as sleep immediately after a plentiful Meal, vanisheth when we consider, that this very rarely happens, at least never attends temperate People in perfect Health, and in a temperate Climate; but such as are gross Feeders, Drunkards, Corpulent, Short-necked, by Constitution or Make liable to Apoplexy or Palsy, or have formerly suffered by such Distempers, or live in a hot Country.

In gross Feeders, Drunkards, and such as are corpulent, from these Causes the *Lacteals* are never quite empty; in such the Food of the present Meal, by exciting the peristaltic Motion, will, in a few Minutes, press forward the *Chyle* of the preceding Meal into the *Blood*. In full Vessels or *Tubes* the Reception and Discharge will be instantaneous, or nearly such; because supposing the Apertures to be free or unobstructed, as much precisely will issue at one Extremity of a full Vessel or *Tube*, as is forced into it at the opposite Extremity; and that instantaneously, because of the Contiguity of the *Globules*, or Particles of the *Fluid* it contains.

In short-necked People the Passage between the *Heart* and the *Brain* being proportionally short, the Force or *Momentum* of the Circulation in the *Brain*, is by so much the greater; but a strong and swift Circulation is an Enemy to all Secretions, as is evident in *Fevers*, and mechanically demonstrable; for all the Secretions being by lateral Branches going off at or near to right Angles (which is very remarkable in the *Brain*) a swift Circulation or Motion along or parallel to the *Axis*, carries along with it what should be laterally secreted. Hence a Paucity of Animal Spirits in short-necked People, who by this Make are liable to Apoplexies, Palsies, Coma's, Lethargies, a Listlessness, Inactivity, and Drowsiness, especially after Meals, when the fresh *Chyle* has got Admission, to absorb a Part of the already few remaining Spirits, which must be recruited in Sleep.

Again in hot Climates, a continual Waste or Dissipation of the Spirits by Heat, makes the Inhabitants generally lazy and unactive: In such the recent *Chyle*, the grossest circulating *Fluid* of the whole Body, will quickly absorb the few remaining Spirits, and dispose them to sleep after every Meal: Except when the Cool of the Evening checks Perspiration and the Evaporation of those Spirits, which were recruited by Sleep in the Day-time, and therefore remain plentiful enough to support their Activity after Supper, when the Business of the meaner, and Diversions of the richer Sort begin; which, in colder Climates, is the Case after Breakfast and Dinner.

For a farther Confirmation of this, Brandy, and the Spirits of fermented Liquors, are known to produce a drowsy Stupidity in such as drink them to any Pitch, and an habitual Dulness in habitual Drinkers of them; and, when drank to Excess, throw the Drunken into a kind of lethargic Sleep for some time. Yet the Quantity taken down, sufficient to produce these Effects, is never so much as to load or distend the *Stomach*, so as to oppress the *Aorta Descendens*, or to hinder the Circulation downwards; and therefore cannot be supposed to produce  
Sleep



Sleep or Sleepiness in that Manner, but in a different Way, which shall be described in the Sequel of this Discourse.

Thus this Position concerning what has been generally esteemed a mechanical Cause of Sleep after Meals, being, I think, sufficiently refuted, it remains that I endeavour to establish such a general Cause of Sleep, as may be conformable to what is advanced in the Essay under Consideration.

I believe it will hardly be denied, that the Cause of Sleep in general is a Want of a sufficient Quantity of animal Spirits for the Use and Exercise of the animal Functions: Therefore whatever prevents their Recruit; hinders or impedes their Secretion; absorbs or fetters them when produced; and whatever exhausts or evaporates them, by occasioning a Paucity of Spirits, will, in a healthy Person, produce a Listlessness, Laziness, a Tendency to Sleep, or Sleep itself, in Proportion to that Paucity of the remaining Spirits.

If we enumerate all the known remote Causes of Sleep or Sleepiness, we shall find that in some one or other of the Ways above set down, they do all of them tend to produce this immediate or proximate Cause; to wit, an Impairment of the nervous *Fluid*, or animal Spirits, and thereby bring on these several Dispositions to Sleep, or Sleep itself.

All the remote Causes of Sleep, or Sleepiness, I think may be fully comprehended in the four following Particulars, and considered in the following Order.

- I. Exercise.
- II. A too plentiful Meal.
- III. Drunkenness, or a too great Quantity of fermented Liquors, or of their distilled Spirits.
- IV. The whole Tribe of *Narcotics*, or *Soporifics*, of which *Opium*, and it's several Preparations, are the chief.

I. Exercise appears to waste all the *Fluids*, and particularly the animal Spirits, the active Instruments of all Motion; so that the Remains are not sufficient for the Exigencies of the natural and vital Functions; and also to supply the Demands of voluntary Motion, and to assist in Sensation, and the Operations of the Mind.

And here it is proper to show how this Waste necessarily brings on Sleep in a healthy Person, and how the natural and vital Motions, and Functions of Digestion, Respiration, and Circulation, notwithstanding this Waste, do necessarily go on in Sleep, leading the Remains of the Spirits to their Assistance, and making the Deficiency fall to the Share of the animal or voluntary Motions and Organs of Sensation.

In order to shew this, let us observe what is very obvious, that when any *Muscle* is brought into Action against our Will by a superior Force, as when a stronger Man bends or extends my Arm contrary to my Will or Inclination, the Benders or Extensers of my Arm swell and contract



in the same manner, and the Afflux of the Blood and Spirits to the contracting Muscles, is the same as when I do it voluntarily: Therefore by any external or adventitious Force, the Blood and Spirits will be derived upon the Part thus forced into Action.

But all the natural and vital Parts have such an external or adventitious Force continually acting upon them. In the *Primæ Viæ* the Weight and other Qualities of our Food and Drink, mixed with Air and *Bile*, excite the peristaltic Motion, as necessarily as the Weight of a Clock, or Spring of a Watch wound up, keeps the Wheels and Pendulum, &c. in Motion.

The *Chyle* forced from thence, together with the *Blood* returning into the *Heart*, as necessarily set it's elastic Springs at work, and the same *Blood* and *Chyle* forced into the *Arteries* by it, make their *Diastole* and following *Systole* unavoidable.

The Air by it's Elasticity, and the whole Weight of the Atmosphere, forceth itself into the elastic Pipes and Vesicles of the *Lungs*, and dilates them; which by their Elasticity and Mechanism, assisted by various *Muscles*, and the Ribs and Cartilages of the *Thorax*, as necessarily repel it in Expiration.

It is therefore evident, that all these natural and vital Parts are acted upon, and set at work by an external adventitious and irresistible Force, continually exciting them whether we will or not, whether awake or asleep; therefore the *Blood* and remaining Spirits after Labour, will be mechanically and necessarily led to all these Parts that are thus forced into Action at all times, but especially most regularly and copiously in Sleep, when all external Objects cease to solicit our Senses, and the Will does no longer determine the Spirits into the *Muscles* of voluntary Motion; which two Kind of Actions, as well as the Operations and Passions of our Mind, do, in the Day-time, make strong Derivations of the Spirits from the natural and vital Functions; which, for that Reason, are never so perfect as in sound and undisturbed Sleep.

Those who are acquainted with the Doctrine of Derivations and Revulsions, founded upon innumerable Observations in the *Animal Oeconomy* and Practice of Physick, do know, that a Flux of any of the animal *Fluids* arising from Nature, or from a Disease, or provoked by Art to any one or more Parts of the Body, or to any Organ of Secretion or Excretion, will cause a sensible proportional Diminution of the Afflux to, and of the Secretion and Excretion by the other Parts and Organs.

Therefore so soon as a Deficiency of animal Spirits happens by Labour, or from any other Cause whatever, that Defect will be first felt in the Organs of Sensation, the Muscles of voluntary Motion, and the Operations of our Mind; because these are not acted upon by such powerful and irresistible Agents, as the Organs of the natural and vital Functions are in perfect Health; for the Mind being sensible of the Defect of Spirits for it's Actions and Operations, chooseth to forbear;



we retire from external Objects, and then the Whole of the remaining Spirits are led to the natural and vital Organs, by the Mechanism above described; and the Organs of Sensation and voluntary Motion must be entirely deserted by them for that time; which is the State of Sleep, and which will continue until a greater Quantity of Spirits be recruited, than is consumed in the natural and vital Functions; at which time the Redundancy or Overplus begins again to be secreted into the other deserted *Nerves*, to wit, into those of Sensation and voluntary Motion; which, flowing now copiously into the relaxed *Muscles*, excites Stretching, Yawning, &c. and at last rouseth out of Sleep.

II. A too plentiful Meal is known to cause a Heaviness, Inactivity, Littlefness, an Aversion to Motion or Action, a Drowsiness, Sleepiness, and in some Sleep itself, soon after eating.

It has been proved above, that this cannot proceed from a Distension of the *Stomach*; I have also endeavoured to prove, that in such the *Lacteals* are never empty, and that the *Chyle* of the preceding Meal is forced through them into the *Blood* by the succeeding, almost instantaneously, or so soon as the peristaltic Motion is excited or increased by the Food taken down, which must be during the time of such a Meal, or very soon after, according to the Degree of Fullness of the *Lacteals* before that Meal. What Change then can we imagine to have happened to the Body in this time of a Meal so remarkable, and so likely to affect the *Oeconomy*, as that of the Admission of a *Fluid* into the *Blood*, much grosser and less fluid than itself? Such a Mixture must render the whole Mass grosser, or of a thicker Consistence than before, as it quickly mixeth with the finer, and absorbs it's most fluid Parts; but it will hardly be denied, that if there is such a *Fluid* as animal Spirits, they must be the finest and most depurated *Fluid* of the *Blood*: These therefore will be absorbed, and mixed with this grosser crude *Fluid* the *Chyle*, and therefore will be diminished by it; and being thus intangled, will be more difficulty secreted, and in less Quantity: Hence that Paucity of Spirits, which will dispose to sleep in the manner above described, in speaking of a Paucity of Spirits after Labour or Exercise.

III. How far strong fermented vegetable Juices or Liquors, and their distilled Spirits drank to any Pitch of Excess, do bring on Sleep, or some Degrees of it, has already been said.

The distilled Spirits of fermented Liquors, are known to lessen all the Secretions and Excretions, and therefore are of use in *Diarrheas*, in excessive and colliquative Sweatings; and I have known *French Brandy*, taken incautiously, to have put a Stop to a Sweat procured by *Sudorifics*. In habitual Drinkers of them, they gradually lessen the Secretion of the *Bile*, and insensible Perspiration, and thereby bring them at last into the Jaundice and Dropsy.

Spirituos Liquors, and particularly *French Brandy* in the most remarkable Manner, being mixed with the *Blood* as it flows from a Vein



into a Porringer, unites the serous with the globular red Part of the *Blood*, to such a Degree, as that no *Serum* separates from it in many Hours, and in some not at all; an Experiment which may be easily made; which shews in what manner it hinders the Secretions in the Body, these being all of them of the serous Kind: Hence that great Impurity of the *Blood* arising from a Retraint of the Secretions in such People; and also that Paucity of Spirits, the general Cause of Sleep and Dulness, very different from the Alacrity and Vivacity of the Temperate, and even of Water-drinkers.

That therefore which fetters or binds up all the *Serosities*, or most fluid Parts of the *Blood*, and proves a strong *Copula* between them and the red *Globules* thereof, may be reasonably supposed to fetter or tie up the finest *Fluid* of all, to wit, the animal Spirits with the rest, and in the same manner to hinder their Secretion, and thereby produce Sleep, or some such Degree of it as is above-mentioned.

IV. As to *Opium*, and all the Class of *Soporifics*, if we compare the visible Effects of them with what has been said above of *Brandy*, or Spirits of fermented Liquors, we shall find them much the same. *Opium* is known to lessen or suppress all the Secretions and Excretions, and is therefore of such remarkable Use in *Fluxes*, *Rheums*, *Catarrhs*, &c. it has indeed been conceived to be a *Sudorific*, but that only in Composition with *Aromatics*, as in *Venice* or *London Treacle*; or with *saline* Bodies, as the *Sapo Tartareus* in the *Pil. Matthæi* or *Starkii*; and that too assisted by plentiful Dilution with warm Sack-Whey, or such like Liquors, and the Addition of volatile Spirits of *Hart's-Horn*, &c. which are known to thin the Blood, as Mr *Leewenboeck's* Microscopical Observations, and the mixing of these volatile saline Spirits with *Blood*, as it runs out of the Vein into a Porringer, do sufficiently evince. Which shews, that these volatile Salts are good Correctors of *Opium*, as they break down and colliquate the *Blood*, and therefore tend to promote the serous Secretions, which *Opium* by itself, and all distilled Spirits of fermented Liquors do retain, or restrain for some time, incorporating the *Serosities* with the red *Globules* of the *Blood*, as has been observed before.

In hot Countries, where large Doses of *Opium* are taken, the Effects are nearly the same with what we observe in Drinkers of distilled Spirits of fermented Liquors; to wit, a small Dose exhilarates, a greater brings on some Degree of Drunkenness, or temporary Madness; this increased will lay to sleep, and a very great Dose will kill.

In this Comparison therefore, may we not justly conclude a Parity in the Causes, from the Similitude of the Effects; though all the secondary Qualities of such Causes, which offer themselves outwardly to our Senses, be apparently very different; thus Gunpowder is as much a latent Fire as Brandy, and will exert itself in that Shape to a far greater Degree than it, in equal Circumstances, that is by the least Contact of Fire; therefore, I say, that though *Brandy* and *Opium* shew no out-ward



ward Resemblance to our Senses in Smell, Taste, Colour, Consistence, and such like secondary Qualities, no more than *Brandy* and *Gunpowder*; yet if in proper and equal Circumstances, that is, in Contact and Mixture with the *Blood*, they produce the same, or nearly the same Effects, we may justly conclude, that there is a latent Similitude of primary Qualities in their Natures, which they make manifest in proper and equal Circumstances, in producing the same or parallel Effects.

But it has been shewn above, how, and in what manner *Brandy* fetters and intangles the animal Spirits, and other *Fluids* of the *Blood*, uniting them too intimately with the grosser Parts, and thereby hindering their due Secretion for some time; whence a Paucity of Spirits, which discovers itself by an Inequality and Irregularity of their Distribution in Drunkenness; a still greater Defect in Dulness and Drowsiness; yet more in Sleep, and a total Suppression of their Secretion, as well to the natural and vital as to the animal Organs, which is Death, the Effect of the greatest Doses either of such distilled Spirits or of *Opium*.

From what has been said on this Subject, it seems as plain as the Nature of such a physical Demonstration will admit of.

I. That the universal Cause of Sleep is a Paucity of animal Spirits.

II. That this Defect will arise from whatever exhausts, wastes, or evaporates them when produced, as Labour or Exercise; or from whatever absorbs them, as a great Quantity of crude *Chyle*, recently and suddenly admitted into the *Blood*, in the Time of, or soon after, a plentiful Meal; or whatever can fetter or re-unite them with the grosser Parts of the *Blood*, as much as *Brandy* or spiritous fermented Liquors and *Opiats*. All these either by evaporating and wasting them, or by hindering their Production or Secretion, do bring on that Paucity of Spirits spoken of, and Sleep or some Degree of Sleepiness, as a necessary Consequence.

Yet it will be still true upon the same foot of Reasoning, that where the *Blood* is extremely depurated, and the Secretions and Excretions from it already perfectly performed, as in long Fasting the whole Mass of *Blood* is become only fit for the Secretion of Spirits; has no Crudity or Impurity in it, to absorb or fetter the Spirits already produced; and no crude *Chyle* admitted to answer that End; in such a Case *Opiats* can have no Effect, the Spirits cannot be absorbed, fettered or restrained, where the Qualities of the Mass of *Blood* do not concur to that Effect.

Another concurring Cause of the Inefficacy of *Opiats* in the Case of Fasting, is, that all the natural Parts, those, to wit, of the *Prima Viæ*, which serve for Digestion, are at Rest, for want of the Weight and Stimulus of Food, and also of the *Gall* in the Case referred to, to keep up their peristaltic Motion; therefore few or none of the Spirits being spent on those Parts, there is a greater Supply sent to the animal Organs of Sensation and voluntary Motion; and indeed in such a Case even the vital Parts for Respiration and Circulation do act but very sluggishly



gishly for want of a Recruit of *Blood* and *Fluids* proper to excite their Functions: Hence also the Supply of Spirits to the Organs of Sensation and voluntary Motion is by so much the greater; and the Possibility of restraining their Secretion, for the Reasons above assigned, impracticable by any Power of *Opium*, without the Accession of a fresh Recruit of *Chyle*.

Hence also those who have any considerable Defect in the natural and vital Functions, or in either of them, by Obstructions of the *Viscera*, are generally bad Sleepers, or watchful; and in such *Opiats* have but little Effect to procure Rest; with this great Disadvantage, that by impeding the Secretions, they increase the Obstructions; though in many Cases, where the *Viscera* are sound, they must be acknowledged to be excellent Medicines.

What has been said, will also sufficiently account for the anodyne Power of *Opium*; for if it impedes the Secretion of the animal Spirits, the immediate active Instruments of all Sensation, it must certainly obtund or abolish for that Time the disagreeable Sensation of Pain.

The third Difficulty is, how *Pus* should be the Product of *Chyle*, and not of the *Blood* or *Serum*. As to which, I think it would not be difficult to prove that all the gross Secretions are from the *Chyle*; these being only the Depurations of it in *Sanguification*, or in order to bring that crude and gross *Fluid* the *Chyle* into pure and defecated *Blood*, from which no Secretion can afterwards be made, but of that purest *Fluid*, which it secretes into the *Nerves* for the Use of the whole *Oeconomy*.

If this be true, then *Pus* in a Wound, Ulcer, or Impostume, being a very gross feculent Humour, is likelier to issue from the *Chyle* than from the purer and more defecated Part of the *Mafs*; but the farther Proof of this would be too tedious for this Place.

N. B. *The Reader will be pleased to excuse an Omission in the Symptoms in the Essay here referred to, relating to the Quantity of Urine, where the following Words ought to have been added [Not exceeding 3, or at most 4 Ounces in 24 Hours, so far as I was able to judge without measuring it].*

*An Account of a Woman 68 Years of Age, who gave Suck to two of her Grand-children, by Tho. Stack, M. D. No. 453. p. 140. April, &c. 1739, dated Jan. 8, 1733.*

IV. 1. A Gentleman of Credit having lately informed me of a Woman near 70 Years old, who actually suckles one of her Grand-children, and courteously offering to accompany me to her, excited my Curiosity to see so uncommon a Sight; and the more, in order to try if I could not discover some Fallacy in the Affair. Wherefore I went yesterday, in Company with the aforesaid Gentleman, to a House in *Tottenham-Court-Road*, where the Woman we inquired for appeared in an Instant. Her Breasts were full, fair, and void of Wrinkles; tho' her Face is very much withered, her Cheeks and Mouth vastly sunk in, her Eyes red, and running with a clammy Humour; and though she has, in short, all the other external Marks that one may reasonably expect to find in a Woman, who has spent the last Half of her past Life in Labour, Troubles, and other Concomitants of Poverty, and through them



them has reached near to her 70th Year. Upon pressing her right Breast, she fairly squeezed out Milk, which gathered in small Drops at three of the Lacteal Ducts terminating in the Nipple. This Experiment I made her repeat a second time, having myself carefully dried the End of the Nipple with my Handkerchief, as I had done before her first Trial. Convinced of the Truth of the Fact, I asked her several Questions, in order to procure Materials for a History thereof. The Substance of her Answers was as follows :

Her Name by Marriage is *Elizabeth Brian*. She is in the 68th Year of her Age since last *Off.* and has not borne a Child these 20 Years and upwards. About 4 Years since, her Daughter being obliged to leave an Infant she then gave Suck to, in the Care of this her own Mother, and likely to be a considerable time absent ; the old Woman, finding the Child froward for want of the Breast, applied it to her own, barely in order to quiet the Infant, without the least Thoughts of Milk. And this having reiterated several times, a Son of her's, by that time grown a Man, perceived that the Child seemed to swallow somewhat from the Nipple ; whereupon he begged Leave of his Mother to try if she had not Milk. The Experiment succeeded : The Youth drew Milk from that same Breast from which he had been weaned above 20 Years, and which had been unaccustomed to any for 17 or 18 Years before : The good Woman then continued to suckle her Grand-child in earnest : And in some time her Daughter, *viz.* the Infant's Mother, seeing she was provided with such an extraordinary and tender Nurse, was emboldened to bid fair for an Increase of Issue, which till then she knew not how to nourish or provide for. Accordingly, at the End of 2 Years, she brought forth another Child ; whereupon the Grandmother weaned the first, and suckled the latter ; which she has done these last 2 Years, and still continues to do. And this Infant, in my Presence, took the Nipple with as much Eagerness, and seeming Delight, as I ever perceived in a Child of 2 Years old ; and at it plainly performed the Actions of Suction and Deglutition. The two Children, both Girls, are, as to Constitution, such as I could wish to the dearest Friend ; plump and firm in Flesh ; in Complexion cleanly, fair, and healthy, and in Temper brisk and sprightly ; considering the Lowness of their Condition and Education, and the mean Diet of the Nurse.

When this good Woman came to Town, which was near 2 Years since, her Milk abounded to that Degree in both Breasts, that, to convince the Unbelieving, she would frequently spout it above a Yard from her : A Particular which, among others, the good Man and Woman of the House, and others of the Neighbourhood, likewise assured me of. Now her left Breast is run dry, and she has no great Quantity in the Right : But what there is, is as good Milk as one may desire in a Nurse.

The



The poor Woman seems perfectly honest and artless, and even inclines strongly to Dotage. She very religiously throws the whole upon a Miracle.

*Of a Man, who gave Suck to a Child. by the R. R. Robert, Lord Bishop of Corke, No. 461. p. 813. Aug. &c. 1741.*

2. I will venture to give an Account of a Man that I met at *Inishan*, about 10 Miles from this Place. He was an old Man about 70 Years of Age, by Birth a *Frenchman*, but was a Refugee on account of his Religion, was bred a Gardener, and, by all Accounts, had been industrious, till deprived of his Strength by Age.

He asked me for Charity, and I gave him half a Crown. I mention this Particular, that the remaining Part of the Story may not seem to be told for the sake of Gain. After I had done this, and was gone into the House, I heard a Noise at the Door: The Man, out of Gratitude, had returned to shew me a Curiosity, which was that of his Breasts, with which he affirmed he had once suckled a Child of his own: His Wife, he said, died when the Child was about 2 Months old: The Child crying exceedingly while it was in Bed with him, he gave it his Breast to suck, only with an Expectation to keep it quiet; but, behold, he found that the Child in time extracted Milk; and he affirmed, that he had Milk enough afterwards to rear the Child. I looked at his Breasts, which were then very large for a Man; but the Nipple was as large or larger than any Woman's I ever saw. Some Ladies were then passing by; so I sent him off in Haste, and have not seen him since.

I have either heard or read of one Instance of this kind before.

*Concerning some Children inoculated with the Small-pox, at Haverford-West in Pembroke-shire, by Mr Evan Davis. No. 429. p. 121. July, &c. 1733, dated Aug. 25, 1732.*

V. Our Inoculators are two Surgeons of good Note and Repute in this Town (who also keep Apothecaries Shops) and are the only Persons that I hear of in these Parts who are come into that Practice. Upon my requesting it, I received from them this last Week the Account following.

Some little time before last *Christmas* the Small-pox appeared in this Town, chiefly of the confluent kind: Some had it with Purple-Spots, and other violent Symptoms, whereof several died. Towards the Spring, the Measles became more epidemical, and also more fatal, than the Small-pox. Some of the Subjects that had been visited but a little time before with the Small-pox, and upon their Recovery had their Bodies purged, yet died of the violent Cough which attended and succeeded the Measles, which afterwards seized them. The Measles continued to rage 'till almost all the Subjects in this Place were visited with them, the Small-pox continuing also during the whole time, yet making but a slow Progress; and to this time it has not left us.

About the End of *Feb.* last, Mr *Francis Meyler* inoculated his own Son, near 3 Years old, from a Child of about the same Age, who had the distinct Sort of Small-pox, but the Pustules small. He made a slight Incision on both Legs, which took only in one: After four Days a Pustule appeared on the Part wounded, but did not much inflame it, nor make much Progress. On the 7th Day the Child grew feverish,



feverish; and on the 8th, or towards the 9th Day (instead of the intended Small-pox) the Measles appeared all over his Body, attended with a Cough; at which time the feverish Disorder abated, till the 11th or 12th Day: Then he grew feverish again, and towards the 14th Day the Small-pox appeared, a small distinct Sort, and few in Number. After the Eruption was full, he grew hearty, and so continued, not being visited with a second Fever. After this Mr *Meyler* inoculated two other Children from his own Son, by applying the Matter after a slight Incision, to both the Legs of each of them, but it did not succeed. About the same time he inoculated two other Children, a little way out of Town, from a Neighbour's Child, but neither of them were infected. It's not succeeding he knows not what to impute to; whether to the Slightness of the Incision, or to the Want of a Sufficiency of Matter to infect with, or to the Want of a Disposition in the Subjects to be infected.

About the latter End of *March* last Mr *Richard Wright* inoculated a Daughter of *Tho. Kymer*, Esq; of this Town, between 3 and 4 Years of Age, from another Child of about the same Age, who had a distinct kind. The Matter was applied to one of her Arms, the Incision being made pretty deep. The Inflammation thereof began about the 4th or 5th Day, and afterwards appeared considerably great. She proceeded until the 7th Day in a very hearty and brisk State, at which time she began to grow heavy, sick, and very feverish. Then an Eruption of the Small pox was expected; but her Fever increased, and the next Day there were Eruptions seen all over her Body, which proved to be the regular Measles. She was treated accordingly, and grew well, excepting a pretty severe Cough she had, and this Cough continued through the whole Course of the following Small-pox. About the 12th Day she sickened again, and about the 14th the Small-pox appeared, the distinct Sort, and very favourable; they came out, filled, and dried away very kindly, and were attended with very little of a second Fever. She went through the Distemper with a great deal of Chearfulness: She was purged afterwards, and seemed very well; but in a little time after, a Boil came on the lower Part of the Shoulder-Blade of the same Arm wherein she was inoculated, which was brought to suppurate, and was healed in a common Manner.

From this Subject last mentioned Mr *Wright* inoculated two Daughters and a Son of *Nicholas Rock*, Esq; at his Seat, about 5 Miles distant from this Town. These three Children were aged from 3 to 8 Years. The Incision was made in one Arm of each Child; it produced the same Effect on every one of them as it did on Miss *Kymer*, viz. the Measles on the 7th or 8th Day, and the Small pox of the distinct Sort on the 14th Day. They went all three very well through every Stage of the Distemper; the secondary Fever was but slight. One of these had them somewhat thick, and the other two had a pretty many of the



Pox appearing over them likewise ; but they thoroughly recovered all of them, and have all since continued in a good State of Health.

I have just Cause, I conceive, to incline me to think very favourably of this Method, from what I have myself observed of it's Advantages. In the Beginning of this Year, I lost one Child out of five I had, by the Small-pox in the natural Way ; and I have seen what great Sickness and Misery the other four suffered, who all of them had the confluent Sort, in comparison with what the Inoculated underwent. One Boy of mine particularly, between 7 and 8 Years of Age, had it so violently, that his Life first, then his Limbs, Senses, and Intellects, were endangered by it ; and he is not yet fully recovered from the Effects of it to his former good Health and Strength, though he had it in Dec. and Jan. last, among those who first fell into it, when it came this last time to this Place.

P. S. Concerning the four Children above-mentioned, on whom the Operation did not succeed, but remained uninfected after the variolous Matter was applied in the usual Way to them. They have all of them since escaped the Measles, though most other Children about them had them, and none of them have yet had the Small-pox, though it still continues in the Town. There are not many now that are sick of it, but it is of the bad confluent Kind, attended with Purple Spots, and watery Bladders that are mixed with the Purples. It is observed, that most of these who have of late been visited with it, have died thereof. This probably will incline some to use Inoculation again, and to make that Practice, under Providence, their Refuge. Oct. 25, 1732.

*A Paragraph taken from Dr E. Timons's History of the Inoculated Small-pox, communicated by S. Herseman, M. D. - No. 432. P. 296. Apr. &c. 1734.*

*A Letter concerning a Person who made bloody Urine in the Small-pox, and recovered, by Pierce Dodd, M. D. Fellow of the R. Coll. of Phys. Lond. and Phys. to*

VI. At first there was one, who cut the Skin with a Razor, and putting the dried Pustules of the Small-pox into the Wound, made a Ligature upon the Place. But, besides the Pain, which occasions much Difficulty in performing this Operation on Children, it did not succeed. For sometimes the Small-pox came out slowly, and with a Crowd of the worst Symptoms : sometimes the Incision was in vain ; and the Places, where they were made, were filled with malignant Ulcers. To some also the Operation proved fatal.

VII. Making bloody Water is universally esteemed as terrible a Symptom as any that can happen in the *Small-pox* ; and all who have writ concerning that Distemper, do unanimously agree, that it is a certain Forerunner of approaching Death. Dr Cade, indeed, says, in his Letters to Dr Friend, concerning Purging in that Distemper, that he has sometimes cured this Symptom, by the Help of *Camphire*, and a copious Quantity of Acids ; but then he adds, that this Relief was only temporary ; and that, to confess the Truth, he never knew any body, that made that sort of Urine, who ever survived the 16th Day from the Eruption : And there is no body whom I know, that has been conversant with this Distemper, but has constantly experienced, sooner or later, the like Fatality in consequence of it. I mean, when this



this sort of Urine has proceeded from a broken *Crisis* and Contexture, or, as it were, a thorough Dissolution of the whole Mass of Blood: For I know very well, that you shall now-and-then have several Streaks, and sometimes larger Quantities of Blood in the Urine, from the Acrimony of the *Spanish Flies*, upon the Application of Blisters, which are frequently used, and so frequently likewise absolutely necessary, in one or other of the Stages of this Distemper, and yet the Patient shall do well. And Dr *Browne* gives an Account of a Gentlewoman, who lived in *Dean's-yard, Westminster*, who made bloody Urine in the *Small-pox*, 4 or 5 Days together; which made Dr *Needham*, who attended her, to forsake her, and yet she recovered: But they found afterwards, that this bloody Water was not occasioned by the Malignancy of the Distemper, but by a sharp Stone, which was at that time descending from one of the Kidnies through the Ureters into the Bladder, and which she afterwards voided.

St Barth. Ho-  
spital. No.  
470, p. 559.  
Read June 23,  
1743.

A young Spark, about 15 Years of Age, Son to a Gentleman of a very considerable Fortune in *Jamaica*, was taken with a Fever, and great Pain in his Head, *April* 20th last, and had the *Small-pox* come out upon him the Day following, notwithstanding which the same Symptoms still continued, and nothing almost would stay upon his Stomach, and his Head likewise was very delirious: He was obliged therefore to be blooded, and to take a Vomit, and to have Blisters applied to his Neck and to his Arms; which, together with a proper Quantity of *Pulvis à Chelis Cancrorum comp.* and *Nitre*, were the first things, that I had an Opportunity of ordering for him.

The next Day every thing was more quiet, and so again the third Day from the Eruption; but the *Small-pox* were very numerous all over him, and of a little, rank, angry Sort; as they generally are, I think, upon the *West-India* Constitutions: But this young Gentleman had besides over-heated himself a little before, by performing a Part at the *Mountain*, near *Eton*, where he was a Scholar.

Things continued in much the same State the 4th Day, but towards the Evening there were a few Streaks of Blood mixed with, and subsiding in his Water; which did not much alarm me, because I did not know but it might be caused by the Blisters. I had but one Reason to doubt the contrary, and that was, he had little or no Strangury: But as certain Persons do aver, there is sometimes such, or even a more bloody Sort of Waters, occasioned by the Flies, even where there shall be no Strangury at all, I was willing to hope the best, and so made no other Alteration in my Process, than to direct a very free Use of *Spirit of Vitriol*.

What was ordered, happened to succeed: We had no more of that Sort of Water, either that Night, or the next Day, or the Morning following: But I was sent for in a great Hurry that Day, *viz.* the 6th, in the Afternoon, and found his Friends in the most terrible Conster-  
nation;



nation; not only because it returned, but began to increase upon them, and was pouring off in a free Manner.

It was necessary therefore to proceed in another Method, and I accordingly ordered some *Gum Arabic*, *Olibanum*, and *Pulvis Amyli*, and *Alum*, together with a Mixture of *Black Cherry-water* and small *Cinnamon*, and *Treacle-water*, with some *Tinctura Antiphthifica* and *Terra Japonica* in it, and the *Tincture* of *Roses*, strongly acidulated and sweetened with *Diacodium*; upon the Use of which it began to abate, and the next Day the Urine returned to it's usual State and Colour.

There was nothing farther observable in the Course of this Case, except that the Distemper was of the coherent Kind, and accordingly attended with many other dubious Symptoms likewise: For though it is generally thought, that the coherent Sort is not so formidable as the confluent; yet, as Dr *Freind* has judiciously observed, and *Moreton* before him, there is not so much Difference between them, but they are almost always attended with much the same Appearances, and the same Fevers plainly at the time of Maturation: For that the Danger does not arise so much from the Sort, as from the Number of the Pustules; which if it be great, there is the like Reason to be fearful of the Event, whether they flux, or whether they only cohere: All which notwithstanding, this young Gentleman had the good Fortune to escape.

*The Case of Mr  
— Cox,  
Surgeon at Peterborough,  
who fell into a  
pestilential Fever,  
upon Tapping a Corpse  
lately dead of  
an Hydropsy-  
drawn up by  
himself. No.  
454. p. 168.  
July, &c.  
1739.*

VIII. An elderly Gentlewoman, labouring of a Dropsy about 12 Months, underwent the Operation of Tapping four several Times, by which 35 Quarts of Liquor were discharged; and dying at last of the same Distemper, I was desired by her Friends to let out the Water that was then contained in the *Abdomen*, as well to preserve the Corpse the longer from Putrefaction, as to prevent an Annoyance to the Company at the time of her Funeral. Yet notwithstanding this was done within a few Hours after Death, the included Humours were arrived to such a Pitch of Putrefaction, as to discolour the external Parts with a green and livid Hue. The Liquor itself was green, and somewhat thicker than new Milk, in Smell more fetid and offensive than what I ever met with, and so sharp and acrimonious in it's Nature, as deeply to corrode a Silver Canula, through which it passed. And what shewed it to be highly malignant, may be judged of from the following Circumstances.

The Night after the Operation, I was somewhat restless and uneasy, and the next Day afflicted with small Tremors, and an unusual Lassitude; in about 3 Days after, several angry Pustules arose upon my Hands and Fingers, and I believe on every Place where the least Drop of Water fell; some of which coming to Matter, went off soon; those which did not, continued painful, and remained much longer. The Thumb of my right Hand, and middle Finger of my other, were affected more severely than any other Part, the Pain more exquisite, the Swelling more hard and large, and of a red dusky Complexion. This was about the 6th Day of my Illness, and although the strongest Suppuratives were made use of, yet they failed of the desired Success,

the



the Pains being continual. Being persuaded from the great Pulsation and heavy Pains I underwent, that Matter must lodge either under or upon the *Periosteum*, an Incision was made to the Bone, by which only 2 or 3 Drops of Matter were discharged. 'Twas expected this small Discharge might in some measure mitigate my Pain, but it did not; the same Evening, that Pain I at first complained of was changed into universal Convulsions, and the Oppression upon my Vitals so great, as to threaten immediate Death.

The Intentions of Cure (which were strictly attended to, by Dr *Charles Balguy*) were to fortify the Heart with Cordials, to enable it to resist and throw out the Malignity, and to bring the Sores to a plentiful Digestion.

The first was treated with the highest Alexipharmics; the latter, as at first, with strong Suppuratives: This being about the eighth Day of my Illness, and the Convulsions continuing, with an unequal and low Pulse, and as there was little Appearance of Matter, Blisters were plentifully applied, as near to the Parts affected as possible, in order to make a Revulsion from the Heart, and throw off the morbid Matter by the Wounds. In about 3 Days this Point was gained, the Convulsions began to abate, and the Wounds digest; in four more, I found a Cessation of Symptoms, except a Faintness and Lowness of Spirits, which hung upon me for a great while after, which pestilential Fevers (as this was judged one in an high Degree) are known always to leave behind them.

I suppose I might receive this Infection as much by Inspiration as Contact; for some of my Assistants, who were in the Room only, and never touched one Drop of the Liquor, found themselves much disordered, and afterwards broke out with red and livid Eruptions; which sufficiently shewed, that not only the Liquor itself, but the *Effluvia* too, were in the highest Degree subtle and malignant.

IX. If the Venereal Disease was never known in *Europe* till the Siege of *Naples* 1495, it must have made a very quick Progress thro' *Europe* in a short time; for in 1497, I find it raging in *Edinburgh*, and our King and his Council terribly alarmed at this contagious Distemper, as appears from a Proclamation of King *James* the IVth, in the Records of the Town-Council of *Edinburgh*. The Minute of Council is dated the 22d of *September*. I have pretty nearly observed the old Spelling, except in Numbers.

“ 22. *Sept.* 1497.

“ It is our Soverane Lords Will and the Command of the Lordis  
“ of his Counsaile fend to the Provest and Baillies within this bur<sup>t</sup> that  
“ this Proclamation followand be put till execution for the eschewing  
“ of the greit appearand danger of the Infection of his Leiges fra this  
“ contagious sickness callit the *Grandgor* and the greit uther *Skayth*  
“ that may occur to his Leiges and Inhabitans within this bur<sup>t</sup>; that is

*An Extract  
from the Books  
of the Town-  
Council of  
Edinburgh,  
relating to a  
Disease there,  
supposed to be  
Venereal, in  
the Year 1497.  
by Mr Macky,  
Professor of  
History, at  
Edinburgh.  
No. 469. p.  
420. Read  
March 17.  
1742-3.*

“ to



“ to say, we charge straitly and commands be the Authority above  
 “ writtin, that all manner of personis being within the freedom of this  
 “ bur<sup>t</sup> quilks are infectit or hes been infectit uncurit with this said  
 “ contagious plage callit the *Grandgor*, devoyd, red and pass fur<sup>t</sup> of  
 “ this Town and compeir apon the sandis of *Leith* at ten hours before  
 “ none and thair fall thai have and fynd Botis reddie in the havin  
 “ ordanit to them be the Officeris of this bur<sup>t</sup> reddely furneist with  
 “ victuals to have thame to the *Inche* \*, and thair to remane quhill  
 “ God proviyd for thair Health: And that all uther personis the quilks  
 “ taks upon thame to hale the said contagious infirmitie and taks the  
 “ cure thairof that they devoyd and pass with thame sua that nane of thair  
 “ personis quhilks taks sic cure upon thame use the samyn cure within  
 “ this bur<sup>t</sup> in pns nor peirt any manner of way. And wha-sa beis foundin  
 “ infectit and not passand to the *Inche* as said is be *Mononday* at the  
 “ Sone ganging to, and in lykways the said personis that takis the sd  
 “ Cure of sanitie upon thame gif they will use the samyn thai and ilk  
 “ ane of thame falle be brynt on the cheik with the marking Irne that  
 “ thai may be kennit in tym to cum and thairafter gif any of tham re-  
 “ mainis that thai fall be banist but favors.”

*An extraordi-  
 nary Venereal  
 Case, by John  
 Huxham,  
 M. D. F. R. S.  
 No. 460. p.  
 667. dated  
 Plymouth,  
 Oct. 16. 1739.*

X. Mr R. B. aged about 27, of a bilious, dry Constitution, had, for some Years before his Death, contracted a virulent *Gonorrhœa*, which was scarce well cured before he got a second, and at length a third. To complete his Misery, being in the Fleet at *Porto-Bello*, he had frequent impure Conversation with some of the *Negro* Hussies (who probably laboured under the worst Species of the *Pox*, called the *Yaws*).

He returned with a very troublesome Itching all over him, though no Pustules appeared; was much thinner than usual, and had a horrible stinking Breath, and spit frequently a foul, corrupt Matter. As he had no Running, Ulcer, *Bubo*, or *Nodes*, he thought all safe. But not many Days after his Arrival at *Portsmouth*, *post impurum cum impurâ Coitum*, a violent Green-coloured *Gonorrhœa* appears. For this he put himself under the Care of a Surgeon, who, after much Pains to no Purpose, endeavoured to salivate him, but that also in vain. The *Gonorrhœa* indeed was much abated; but a *Bubo* was risen in his left Groin, and some small verrucose Eruptions about the *Anus*.

In this Condition he returned here, and put himself under the Hands of Mr St—, an ingenious Surgeon, who endeavoured to bring the *Bubo* to Suppuration, but without Effect; for it soon receded, and forthwith violent Pains seized him in and about the Fundament, which soon produced an exceeding painful *Phyma* near the Verge of the *Anus* on the left Side.

I was consulted now, and advised to bring it to Suppuration as soon as possible, which was done in 2 Days; from whence issued abundance

\* An Island in the Frith of Edinburgh over-against *Leith*.



of purulent bloody Matter. In a Day or two more, another appeared on the other Side, which soon vented the like Matter. The *Verruce* also now grew more numerous and large, and many pustular and scaly Eruptions appeared all over him.

I ordered him to be fumigated with *Cinnabar*, and advised him to enter on a Salivation forthwith. But, antecedent to it, as his Humours were exceedingly tough and acrid, I put him on a Course of very plentiful Dilution; and this the rather, as he was naturally of a dry and hot Constitution, and besides had lately been roasted in the *Torrid Zone*.

I began, as usual, by giving him *Calomel*; which, though it neither purged or vomited him, yet, after having taken  $\text{ʒv}$ , produced no Degree of Salivation, nor did it make his Gums sore. However, it brought on his *Gonorrhœa* again: I then ordered him once and again 8 or 10 Grains of *Turbit Mineral*, which scarce puked him, and gave him only 2 or 3 Stools. I now found, indeed, that *Mercury* and he, as well as *Venus*, had been old Acquaintance; so I greatly augmented the Dose of the *Mercurials*, ordering immense Quantities of thin watery Diluents: Notwithstanding this, there was very little Operation by Stool, and scarce any by Salivation. Though his Gums and *Fauces* were very sore and swoln, he scarce spit one Pint in 24 Hours, and that excessively tough and fetid. Even under this strong *mercurial* Course, the pustular and leprous Eruptions increased daily, so as to cover almost his whole Body, nay his very Face. His Hands and Feet were vastly swoln, as in an *Elephantiasis*, with horrid Fissures, from whence issued a very stinking ichorose Matter.

I was quite confounded at this dreadful Face of Things, and seriously bethought me what further Method could be taken against so terrible an Enemy. I had recourse to a warm emollient Bath, in which his whole Body was emerged; after which he was well anointed with a strong *mercurial* Ointment. This was done for 3 Days successively: Notwithstanding which, though his Chaps grew exceeding sore, and his Throat so much inflamed and pained, that he swallowed with extreme Difficulty what he sucked through a Pipe or Quill, yet the Spitting was very little increased, and as tough as ever: Nor did the fistulous Ulcers seem in the least disposed to heal up, but vented a vast deal of stinking, oily, sanious Matter; nay, even new ones broke out under each *Axilla*, and a very large *Phyma* rose on the *Coccyx*, which soon discharged the same kind of virulent Matter; though we found the Bone, and even the *Periosteum*, quite sound and untouched.

The Scales were now grown so hard and stiff, that he could scarce bend a Limb, or Finger: Moreover, Abundance of Ulcers, from whence flowed great Quantities of greasy, purulent, and somewhat bloody Matter, were broke out in his Thighs and Buttocks. A very large Tumour was also risen in his right Breast, and soon after on the left, voiding prodigious Quantities of the same kind of Matter.

It



It was observable, that where-ever any of these Ulcers appeared, they ran only under the Skin, being entirely seated in, and feeding on, the *Membrana adiposa*; so that the Muscles and Tendons underneath appeared as fair and florid as in the most healthy Constitution.

I now unfortunately found, though too late, there was nothing to be done by *Mercury* in any Form; and therefore determined to run it off, and try the *Guaiacum* Method and Sweating, so much recommended of old (and in some Cases so justly) by Sir *Ulric Hutton*, and others; at the same time keeping up a most plentiful Dilution, attempting withal to detach the scaly *Cuticle* by continued emollient Baths, which at the same time also would partly act by Dilution. By this means the Scales came off apace, just in the manner usual in the confluent *Small-pox*; only the *Exuvia* were here much larger, several being above 4 or 5 Inches over. In about a Week's time, this Coat of Mail was pretty well cleared off, and his Breath, from the most horribly nauseous I ever smelt, became as sweet as that of an Infant. Nor was the Matter spit, though still very viscid, any way fetid: For the *Mercury* was pretty well run down by lenient Cathartics, and the Sloughs of his Mouth cast off.

He was now become exceedingly emaciated: Wherefore I ordered him plentiful liquid Nourishment with Vipers, and large Dilution, avoiding every thing that was in the least gross or fatty. But with all this he still kept to his 3 Pints of strong Decoction of *Guaiacum* every 24 Hours, sweating at least 2 or 3 of them.

Under this Method I conceived some Hopes of his Recovery, as he seemed now to gain some small Degree of Strength and Spirit; but still his Ulcers rather increased than abated, and continually discharged a vast Quantity of Matter, though by no means so thick, putrid, or bloody; and, indeed, in a most profuse Manner from under each *Axilla*.

But, what is vastly surprising, notwithstanding all the past Method and Medicines, two very large Chancres now appeared on the *Glans Penis*, and a very considerable *Bubo* in the left Groin. A troublesome Cough soon also seized him, with Shortness of Breath; and he began to expectorate a purulent, and sometimes bloody kind of Matter. As the whole *Membrana adiposa* without, had been consumed by the Disease, it was now falling on that Part of it that invested the more vital Parts. But Nature could support no longer. He died in the extremest Degree of a pocky Consumption. But not one single Bone of any Part of his Body appeared to be touched, though he died with near 40 Ulcers upon him.

The Case of a  
Cataleptick  
Woman, by  
Richard Rey-  
nell, Apothe-  
cary, London.

XI. *Ann Bullard*, a Servant, about 21 Years of Age, had been for some time irregular in her *Menses*, and very much afflicted for the Loss of a Friend. July 10, 1730, she complained of a Pain in her Head, Sickness in her Stomach, with a general Disorder, and took *Gascoign's* Powder for a Sweat: Next Morning, July 11, about 9, she was found



No. 437 p.  
49. Apr. &c.  
1735.

in Bed, senseless, stiff, and void of Feeling, with her Eyes shut; and upon the first Surprize, it was thought she was dead. When I came, I found her in a true *Cataleptick Fit*, senseless, without Motion, her Limbs very stiff, but warm, and not easy to be bent; but in whatever Posture any Limb was put, it continued in the same, whether erect, or reclined: Her Respiration was good, but her Pulse low, and irregular; she had no Catchings, or convulsive Motions, but could not, by any Means used, be brought to herself (in any respect). A Vein was opened in the Arm, and  $\xi xij$  of Blood taken away; she bled freely, and came a little to herself, but could not speak. I then gave her this Draught:  $\mathcal{R}$  *Aq. Mentb.*, *Rutæ.* *Bryon.*  $\overline{a}$ .  $\mathcal{Z}vj$ . *Sal. volat.* *Corn. C.*  $\mathcal{Z}\mathcal{S}$ . *Sacchar. Albiss.*  $\mathcal{Z}ij$ . *f. haust.* and 5 Spoonfuls at pleasure of the following Julep:  $\mathcal{R}$  *Aq. Puleg.* *Rutæ.* *Mentb.*  $\overline{a}$ .  $\mathcal{Z}ij$ . *Aq. Bryon.* *Co. Nephrit.*  $\overline{a}$ .  $\mathcal{Z}i\mathcal{S}\mathcal{S}$  *Tinct. Castor.*  $\mathcal{Z}ij$ . *Sacch. Albiss.*  $q. s.$  In a few Hours she came to herself: I then asked her, whether she knew how she was taken? She replied, that she had been restless and uneasy till about 4 in the Morning, when she believed she fell into the Disorder she was found in; but remembered nothing that had happened besides. She complained of a Dizziness in her Head, with a violent Pain in the Fore-part of it and Sickness in her Stomach, and was a little feverish. I gave her the following Vomit at 4 in the Afternoon:  $\mathcal{R}$  *Aq. Card. bened.*  $\mathcal{Z}j$  *Pulv. Ipecac.*  $\mathcal{Z}\mathcal{S}$ . *Vitriol. alb. depurat.*  $gr. vj$ . *Oxym. Scillit.*  $\mathcal{Z}i\mathcal{S}\mathcal{S}$  *f. haust.* The Vomit worked kindly, and she seemed relieved by it: About 6 in the Evening another Fit returned, much in the same manner as before; but she soon came out of it, and then took the Draught with the volatile Salt of Harts-horn, as before; and I applied a large Blister to her Back, and 2 more to her Arms: About 9 the same Evening she had a strong Convulsion-Fit, with Catchings, Grinding of the Teeth, and a great Tremor, neither of which she had had before; she had a Stool the preceding Night, but none that Day. I gave her the Draught as follows, at Night going to Rest:  $\mathcal{R}$  *Tinct. Hier. cum Vino fact.*  $\mathcal{Z}ij$ . *Aq. Mentb.*  $\mathcal{Z}vj$ , *Spt. Lavend. Co.*  $\mathcal{Z}\mathcal{S}$ , and she continued taking the Draught, with the volatile Salt, &c. every 4 Hours. July 12, she had been light-headed all Night, with little or no Rest; the Blisters were dressed, which discharged plentifully, and the Tincture had given her 3 Stools in the Night, which had made her a little faint; her Pulse was low, and her Water pale. I saw her in the Evening, when she had slept pretty well, with which she was refreshed; the Pain in her Head but little, her Stomach easy, and I found her in every Respect better. The Draughts were continued every 6 Hours, and she took of the Julep before-mentioned, when faint or ill. July 13 in the Morning, I found her Head easy, her Water higher coloured; she was allowed Broth, and Food of easy Digestion, which agreed very well with her: She sate up in the Afternoon, but was faint, and her Head giddy; but when in Bed, she was better: She had no Stool that Day. I gave her a Draught with the volatile Salt, &c. at Night going



to Rest, and the following Purge the next Morning. ℞ *Tinct. Hier. cum Vino fact.* ℥ij. *Syr. è Spina Cerv. Aq. Puleg.* ṽ. ℥vj. *Spt. Lavend. Co.* ℥j. July 14, the Purge worked 5 times; she eat a light Dinner, and was easy; but upon walking about the Room, her Head was giddy, and she trembled very much, but when in Bed, she was better. I gave her the following Draught at Night going to Rest: ℞ *Aq. Rutæ Puleg. Bryon. Co.* ṽ. ℥vj. *Spt. Corn. C. opt. gutt.* 40. *Tinct. Castor.* ℥j. *Sacchar. Albiſſ. paululum.* July 15, she complained, when up, of a Numbness in her Legs, and a Pricking in them, like to what happens when the Legs are what we commonly call asleep: Her Appetite was better, and she was in every respect amended. She took the following Medicines: ℞ *Pul. Rad. Valer. Sylv.* ℥ij. *P. Castor. Russ.* ℥j. *Aſæ fætid.* ℥j. *Tinct. Castor.* q. s. *f. Massa Pilul. cujus formentur Pilul. No. 40.* of which she took 4 twice a Day with a small Draught of this Julep: ℞ *Aq. Ceraſ. Nigr.* ℥vj. *Aq. Rutæ. Pæon. Co.* ṽ. ℥ij. *Spt. Lavend. Co.* ℥vj. *Syrup. Caryoph.* q. s. of which she took likewise 5 Spoonfuls at pleasure. The Blisters were kept running as long as we could; and when they were dried up, July 19, I gave her the same Purge as before. July 22, she had continued very well, without any Return of a Fit; but upon cutting an Issue in her Arm, she fell into a third Fit, in which she continued near 2 Hours, but then came to herself, and was well that Evening. July 29, the Purge was repeated. Aug. 6, she complained of a Pain in her Head, Sickness in her Stomach, and some Days before, she had a Shew of the *Menses*, and had vomited near a Pint of Blood, and was costive: I then advised her to take 2 Spoonfuls of *Tinctura Sacra*, every or every other Night going to Bed, as she found it necessary, and 40 of the following Drops: ℞ *Spt. C. C. opt.* ℥ij. *Tinct. Helleb. Nigr.* ℥v. to be taken twice a Day in Chamomile-Tea. She took these Medicines about three Weeks, which answered Expectation, and I left her well. I saw her about 12 Months after, and she told me, she had continued very well ever since.

Experiments  
made upon Mad  
Dogs with  
Mercury, by  
Dr Robert  
James of Lich-  
field. No. 441.  
p. 244. Apr.  
1736.

XII. About Mich. 1731, I waited on Mr Floyer, of Hints, a Gentleman who is very curious in Fox-Hounds. He complained that he was afraid of a Madness amongst his Hounds; for that Morning one had run mad in the Kennel, and he was apprehensive that most of the rest were bit by him: I took this Opportunity of telling him, that I had long believed that *Mercury* would, if tried, prove the best Remedy against this Infection; and that if the Idea I had formed of this Poison was just, I was pretty sure the Medicine would answer, notwithstanding the Difficulty there is of determining the Effects of a Medicine *à priori*; and that it was, at least, worth while to try. Mr Floyer neglected this Advice till the February following. Mean time he tried the Medicine in *Bates*, commonly known by the Name of the Pewter-Medicine; as also every thing else which was recommended to him by other Sportsmen, but to no Purpose; for some of his Hounds run mad almost every Day after Hunting. Upon this he took his Hounds to the Sea,



Sea, and had every one of them dipt in the Salt-water; and at his Return, brought his Pack to another Gentleman's Kennel, 6 Miles distant from his own. But, notwithstanding this Precaution, he lost 6 or 7 Couple of his Dogs in a Fortnight's Time. About this time, which was in *Feb.* I waited on him at his new Habitation, and found him in that Distress not unusual with Sportsmen upon these Occasions. I asked him if he had tried the Experiment I recommended. He said he had not, but that two of his Hounds were then mad, and he would that Night do it. He shewed me the Dogs, and they were both as far gone as I ever have seen any. They refused Food of all Sorts, particularly Fluids, flavered much, and had all the Symptoms of a *Hydrophobia* to a great Degree. He sent immediately to *Lichfield* for all the *Turpeth Mineral* he could get, and that Night gave gr. xij a-piece to the two Dogs, which vomited and purged them gently. 24 Hours after this, he gave to each 24 Grains, and after the same Interval he gave 48 more to each. The Dogs salivated considerably, and soon after lapped warm Milk. At the End of 24 Hours more, he repeated to one Dog 24 Grains more, and omitted it to the other. The Dog that took this last Dose, lay upon the Ground salivated extreamly, was in great Agonies, and had all the Symptoms of a Salivation raised too quick; but got through it, and is at this Time alive. The other relapsed and died.

To all the rest of the Pack, he gave gr. vij of the *Turpeth* for the first Dose; the second 12, at 24 Hours distance, which was repeated every other Day for some little time. The Method was repeated at the two or three succeeding Fulls and Changes of the Moon. From this time he lost not another Hound; and though several have since been bit by strange Dogs, the *Turpeth* has always prevented any ill Consequences.

I and my Friends have tried the same Thing since upon a Multitude of Dogs, and it has never failed in any one Instance, though Dogs bit at the same time, and by the same Dogs, have run mad after most other Methods had been tried.

As to the Experiments made upon Mankind, I have had Opportunities of making but 3.

The first was about 2½ Years ago, upon a Girl about 14 Years old. The Calf of her Leg was so torn by a mad Dog, that the Surgeon was obliged to use Means to prevent a Mortification from the Bite. She was vomited by the *Turpeth*. Three Days before the next Change of the Moon, the Vomit was repeated, and again the very Day of it's changing. The same Method was pursued the next Full Moon. The Girl is very well.

The second was a Boy of about 10 Years of Age. He had 4 Holes in one of his Legs, made by a mad Dog in *November* last. The *Turpeth* was given as above, and the Wounds dressed with Digestives, and



and he continues well. These two lived near *Burton upon Trent*, and *Mr Towndrow*, of that Place was Apothecary.

The third Case was that of a young Man near *Tamworth*, of about 18. The Bite was upon the Hand. A great Number of Dogs were bit at the same Time, in the Town where he lived. About 6 Days after the Mischief was done, several Dogs that had been wounded ran mad, upon which he applied himself to *Mr Wilson*, Apothecary in *Tamworth*, to whom I had communicated the Success of the *Turpeth* in this Case. The young Man was, at this Time, very melancholy and dejected, had Tremors, and slept very little for some Nights before, though he was not apprehensive that the Dog which bit him was mad. He had a dry Scab upon his Hand: He was, upon applying to *Mr Wilson*, vomited with *Vin. Benedict.* ℥ij.

The next Thing he took was made according to the following Prescription.

℞ *Turpeth.* Min. gr. xij. *Lap. Contrayerv.* ℥i. *Ther. Androm.* q. s. *M. F. Bol.* N<sup>o</sup>. 3, *sumat unum singulis noctibus hora decubitūs superbibendo Julap. seq. Cochl.* iv. ℞ *Aq. Rut.* ℥vj. *Theriac.* ℥ij. *Syr. Pæon.* c. ℥i℥ *Tinct. Castor* ℥ij *M. F. Julap.*

Upon taking these he sweat very much, and had two loose Stools every Day after them: His Tremors went off, and slept better. After this he went into the Cold-Bath, and continues perfectly well.

But what is remarkable in this Case is, that the Wound ran a thick digested Matter after this Method, and threw off the Scab like an *Escar*; after which it healed of itself.

Give me leave to make an Observation or two upon the Antiquity of this Disease, which I the rather choose to do, because *Cælius Aurelianus*, in his Account of it, does not seem to build so much upon the Authority of *Homer* as, in my humble Opinion, he might have done. Indeed he quotes a Passage out of the eighth *Iliad*, where *Teucer* calls *Hector* *κυνὰ λυσσητήρα*, but does not seem to think this sufficient to prove that *Homer* was acquainted with this Madness. But he omits two more Passages in the same Author, which joined with this, amount to a Demonstration that *Homer* was by no means ignorant of it. The first is in the ninth *Iliad*, where *Ulysses* is upon his Embassy to *Achilles*. He describes to the last mentioned Hero, the Distress the Grecian Army was in through his Absence; and when he has painted *Hector* as terrible as he can, he compares his Fury to the Rage of a mad Dog. *Iliad* Lib. ix. l. 237.

————— “*Ἐκτωρ δὲ μέγα δένοι βλεμεαίνων*  
*Μαίνεται ἐκπάγλως, πῖσυνθ’ Διὶ, ἔδέ τι τίει*  
*Ἄνερας ἔδε Θεός· κρατερὴ δὲ ἔ λύσσα δέδυκεν.*

If *Homer* had designed to describe a mad Dog as a Physician, he could not have expressed his Looks by a more proper Word than *βλεμεαίνων*. It must also be considered, that this Discourse is directed to *Achilles*,



*Achilles*, who, having studied Physick under *Chiron*, was consequently more capable of receiving an Idea of the Mischief *Heëtor* did to his Countrymen by this Metaphor.

In the thirteenth *Iliad*, *Heëtor* is again called *Λυσσώδης*, by *Neptune*.

It must be observed, that *λύσσα*, *λυσσήτης*, and *λυσσώδης*, can properly, and in their natural Signification, be applied to no other Madness than that which is peculiar to a Dog, though metaphorically it may, as in the Instances I have given, as also in *Sophocles* and *Euripides*. The Word *λύσσα* or *λύττα*, is used to signify the Madness of Dogs by *Aristotle*, *Galen*, and *Dioscorides*. And *Λυσσίδειος* is used by the last-mentioned Author to signify a Man bit by a mad Dog. *Λυσσάω* is used by *Aretæus* in this Sense, and *Λυττώσαις* by *Plutarch*, to express the same Thing.

What I would infer from this is, that *Homer* was certainly acquainted with the Madness of Dogs; and if Dogs in his Days ran mad, 'tis probable they would bite Men, and if so, to be sure, an *Hydrophobia* would be the Consequence; notwithstanding that *Plutarch* will have it, that it was first taken Notice of in the Days of *Asclepiades*, who was famous for his Practice in *Rome* before the Death of *Mithridates*.

Another strong Evidence of it's Antiquity is that Instinct which directs every Dog to avoid him that is mad, upon smelling, seeing, or even hearing him. If this is not Instinct, it is Reason; and that in a higher Degree than we ourselves can pretend to. Now Instinct must be coeval with the Creation, or at least the Fall; and therefore Madness must not be much younger.

XIII. I. The famous DAMPIER'S POWDER against the BITE of a MAD DOG, was first published by Sir *Hans Sloane*, Bart. when *Secr. R. S.* in Numb. 237. of these *Transactions*, Anno 1698\*. which afterwards, when he was President of the Royal College of Physicians *London*, by his Proposal, was introduced into the *London Pharmacopœia*, under the Name of *Pulvis Antilyffus*, Anno 1720. The Composition of which is, *Ash-coloured Ground Liver-wort* and *black Pepper*: The Manner of giving it, not only to Men, but to Dogs and Cattle, is accurately set down in the above-mentioned *Transactions* †.

*Of curing the Bite of a mad Dog, by C. Mortimer, R. S. Sec. No. 443. p. 319. Oct. 1736.*

I shall only beg leave to add a Proposal of my own, which I made in my *Thes. Inaugur. de Ingressu Humorum in Corpus Humanum*, *Ludg. Bat.* 1724. That the Use of the hot Bath, for Persons bit by a *Mad Dog*, or hot Fomentations, might be of greater Service than cold Applications: For a cold Bath shuts the Pores, as a warm one opens them; therefore the Blood being allowed to be greatly inflamed in this Case, and *Dampier's Powder* being a very hot Medicine, it is reasonable to think, that

\* The *Lichen cinereus terrestris* is mentioned as being said to be exceedingly efficacious in curing Dogs bitten by Mad Dogs; in a Letter of Mr *Oldenburg's*, *Secr. R. S. Lond.* July 6. 1672. See *Derham's Collection of Philosoph. Letters* between Mr *Ray* and his Correspondents, p. 110. printed at *London*, 1718. 8vo.

† See Vol. III. Chap. V. §. xxix. 3.

when



when a Patient takes it, the setting him up to the Chin in hot Water for some Hours, would help the Operation of the *Powders*, by diluting the Blood, and relaxing the Pores.

An Addition to the foregoing Article, by the same. Ibid. p. 360.

2. I thought it proper to add the following Passage, taken out of the Journal-Book of the *Royal Society*, supposing it to be what Mr *Oldenburgh* hints at in his Letter.

“ Nov. 16, 1671. [Sir Robert Moray] exhibited a certain Plant, (which was by Mr Ray called *Lichen terrestris cinereus*) said by Sir Robert Moray to be very good to cure Dogs bitten by mad Dogs: His Royal Highness having caused it to be given to a whole Kennel of Dogs, bitten by a mad one, which were all cured, except one of them, to whom none of it was given.”

The Specimen was kept in the Repository.

The same Virtue is likewise ascribed to this Plant, in the *Third Part of Morison's Plantar. Hist. Oxon.* where the Author, speaking of the *Lichen terrestris cinereus*, *Raii Hist. & Synops.* says, *Adversus morsum canis rabidi egregium est Medicamentum.*

*Dampier*, and the *College of Physicians*, in their *Pulv. Antilyssus*, prescribe equal Quantities of the, *Lichen* and *Pepper*: But Dr *Mead*, in a single *Quarto Leaf*, published by him *Anno 1735*, hath altered the Proportions of the Composition, prescribing double the Quantity of *Lichen* to that of the *Pepper*. This Difference in the Proportions must be left to the Judgment of Practitioners; but upon the Authority of another Minute in the Society's Journal-Books, it may not be improper to make an Addition to the above-mentioned *Dampier's Powder*.

“ March 7, 1671-2. Sir Robert Moray mentioned, that a whole Kennel of Dogs, belonging to his Royal Highness, were bitten by a mad Dog, and had been lately cured by a certain Herb called *Stel-laria*, or *Star of the Earth*.”

This Plant is the *Lychnis viscosa*, *flore muscosa Casp. Baubin.* in English *Spanish Catch-fly*. See these *Transactions*, N<sup>o</sup> 187 \*, where is a *Receipt to cure mad Dogs*, &c. wherein this Plant is a principal Ingredient; which Receipt, communicated by Sir Robert Gourdon, was there published by his MAJESTY'S [special] Command, *Anno 1687*.

Wherefore, suppose the Composition were to be thus:

Take Ash-coloured Ground-Liver-wort, black Pepper, and the Herb Spanish Catch-fly, all finely powdered, of each  $\text{ʒij}$ , for 4 Doses, to be taken as *Dampier* prescribes in his Letter.

The Case of a Lad bitten by a Mad-Dog, by Mr Edward Nourse, F. R. S. and Chirurgeon to St. Barth. Hospital. No. 445. P. 5. Jan. &c. 1737

XIV. Stephen Bellass, aged about 16, some time in June 1735, was bit by a mad Dog through the Nail of his right Thumb: I was called immediately upon the Accident, when I proposed to make a Ligature above, and to cauterize the wounded Part; but that not being complied with, I desired Mr *Garnum* the Apothecary, who was present, to make up the Remedy mentioned by *Dampier* †, (viz.)  $\text{℞}$  *Lichen. ciner.*

\* Vol. III. Chap. V. §. xxxix. 1.

† See the preceding Section.

*terrestris,*



*terrestris, Piper. niger. ꝑ̄ ʒi. f. Pulvis.* Of this Powder he took a Dram, within an Hour after he was bit; repeated it the next Morning before he set out for *Gravesend*, where he was 10 Days, and dipt in the salt Water every Day; during which time he repeated the Medicine Night and Morning, and continued so to do for 40 Days. This Boy was without the least Sign of being affected by the Poison, till *Jan. 1736-7*, when in the Evening he complained of a Numbness in 3 of the Fingers of the Hand that was not bit. The next Morning he was sick, had great Pain across his Stomach, and in all his Bones; in the Evening I was sent for to bleed him, the People about him supposing he had got cold. When I came, I found him feverish, with a hard full Pulse: I asked what Complaints he had? He told me those above-mentioned. I enquired what Nourishment he had taken that Day? The Answer was, None, for he could not swallow; whereupon I looked into his Mouth, but there was no Inflammation; neither did any thing occur to me that could possibly produce the Difficulty of swallowing, he said, he had: I offered him some Sack-whey in a Bason, but he started at the Sight of it, neither would he suffer it to come near him; I then offered him a Spoonful, which I prevailed upon him to swallow: The Moment it was down, he was convulsed, and a remarkable Horror appeared in his Countenance, which was succeeded by a profuse Sweat all over his Face and Head. He afterwards took another Spoonful; the Consequence was as before, but in somewhat a higher Degree: I was now convinced, that this was the *ὑδροφοβία*, and that it arose from his having been bit 19 Months ago; for after the most strict Inquiry, it does not appear that he has been bit by any Animal since; and if he had, it is very probable I should have known it, his Master living next Door to me, and the Boy knowing how much Danger we thought him in, when he was bit: I acquainted his Friends with my Apprehensions, and desired farther Advice; upon which Dr *Monro* was sent for, who ordered him to be let Blood, a Repetition of the above-mentioned Medicine in a Bolus every four Hours, and a Clyster: He was blooded, and the Clyster was injected; but he was prevailed upon to take but one of the Bolusses. This Night was spent with great Inquietude, and without any Sleep: On the 13th in the Morning he was generally convulsed, and had frequent Reachings and Yawnings alternately; about Noon his Mind (which till then continued sound) left him, and he raved and foamed at the Mouth till 5 in the Afternoon; at which Time Nature seemed quite spent, and he lay very quiet till 7 when he died.

I cut this Boy for the Stone last Summer, about a Year after he had been bit; I never saw a Wound more disposed to heal, and he was well and abroad in 5 Weeks.

XV. I imagined the Use of the *Lichen cinereus terrestris* with black Pepper, had been so infallible a Remedy for the Bite of a mad Dog, that there needed no Proofs of it's Virtue: I myself have used it upon Dogs, and always with Success; and it is strong in my Memory, that

Concerning the Effects of Dampier's Powder, in curing the Bite

some



of a mad Dog,  
by Joh. Fuller,  
Esq; jun.  
F. R. S. No.  
448. p. 272.  
June, &c.  
1738.

some Years ago, a *Mad Dog* or *Cat* (I forget which) had bit some Children and the Mother, at *Battle*; the Chirurgeon came over to my Brother, Dr *Rose Fuller*, and we all went out in a Snow, with a Broom, and found some of it, and mixed it as the Account of *Dampier* directed. They all took it, as well as a Dog or two that were bit, and none of them had any bad Effects from the Bite.

This last *Christmas* 1737, my next Neighbour's Servant imprudently going to search whether a Dog suspected to be mad, had been wormed, (which Dog died mad in 3 or 4 Days afterwards) was bit very much in both his Hands: He went to a Person near me, who has had such Success, as to be applied to far and near, and who told me he would venture his Life against a Crown-Piece, if a Man, or any Animal, was brought to him within 3 or 4 Days after the Bite, that he cured him. I saw the Man that was bit every Morning, and he told me his Doctor went into the Fields, and gathered an Herb that grew very near the Ground, like a dried Leaf, and mixed it with *Pepper*. I shewed him some *Lichen cinereus terrestris*, and he said he believed it to be the same. Every Day he took his Medicine, about 10 or 11 of the Clock, he complained of a violent Heat, and Pain in his Head, which I was afraid was the Effect of the Bite, and not the Medicine: But after he had taken it for such a stated Number of Days, he grew better, and has continued well ever since. He had tied his Fingers with *Shoe-maker's* Ends, which are often used for a Cut; and they were all very much inflamed, and very sore. I made him take them off, and all his Plasters, and wash his Hands with Salt and Water, and in a Fortnight's Time they were quite well.

*A Case of a Person bit by a mad Dog, drawn up by David Hartley, M. A. and Mr Fr. Sandys. Ibid. P. 274.*

XVI. About the latter End of *Nov.* 1732, Mr *Soame's* Groom was bit in the Hand by a *Mad Dog*, so as to fetch Blood. It was not known in the Family for 3 Days. On the 4th Day, when *Fr. Sandys* first saw it, the Wound was healed; but it was opened again by him, and kept so for some time, but at last healed sooner than was intended, by the Neglect of the Servant. He was bled, took a Purge, after that half an Ounce of *Pulvis Antilyssus* every Morning for 3 Mornings, and was ordered to go into cold Water every Day for some time; but he neglected it after the 3d Day. Besides this, *Fr. Sandys* ordered him to forbear all Meats, and drink nothing but Water. He continued in this Regimen for about 5 Weeks; then finding himself well, would confine himself no longer to it.

*Jan.* 7. following, he was seized with a Sickness, Vertigo, and faltering in his Speech and Memory; and at last his Vertigo increased to such a Degree, that he fell down twice in the Space of  $\frac{1}{2}$  an Hour; and the last time did not recover his Senses, till he was put to Bed, and blooded by a Person in the Neighbourhood, to the Quantity of 18 or 20 Ounces, by his Master's Order. *Fr. Sandys* was sent for, but could not come. He continued all Night restless and sullen, and in the Morning was blooded again, to the Quantity of 15 Ounces. *D. Hartley* was



was sent for, and came about 8 at Night, and found him very fullen, thirsty, but averse to drinking, and his Pulse quick and hard. He ordered him to be put into the cold Bath; but he refused to comply with it, till he saw that Force would be used. About Midnight his Pulse rising, he ordered him to be bled to the Quantity of 16 or 18 Ounces: He continued all Night restless. About 8 in the Morning he went into the cold Bath again: About 10 *D. Hartley* went away, leaving it as his Opinion, that the cold Bath and Bleeding should be freely repeated, as the Circumstances should require. About Noon *Fr. Sandys*, being hitherto detained by Business, came, and bled him immediately, to the Quantity of 18 or 20 Ounces: He continued all this Night restless. Upon *Fr. Sandys's* asking him whether his Aversion to drinking proceeded from any Pain in swallowing, or some other Cause? He said, it was from a Pain in swallowing. The next Morning his Strength not being at all diminished, and his Pulse continuing full as vigorous as ever, *Fr. Sandys* bled him again to the Quantity of 15 or 16 Ounces; yet he still remained the same, and took the same Care of his Horses as usual. *Fr. Sandys* went away, leaving Orders that as long as these Symptoms, *viz.* Restlessness, Strength, and Aversion to drinking continued, he should be bled freely, and put into the cold Bath. He was bled twice more within the Week, so that the whole Quantity which he lost in that time was about 120 Ounces. After the last bleeding his Symptoms disappeared, and he grew weak, low-spirited and sleepy: Then he went 8 times into the cold Bath. He did not take any Medicines during his whole Illness.

*N. B.* This Person has continued well ever since, *Anno* 1738.

*Windsor, May 22, 1734.*

XVII. 1. *Bartholomew Collins*, a Labourer in the King's Works at *Windsor*, of low Stature, pale Complexion, slender and active, aged about 36, temperate in his manner of living, had, for some Years, been afflicted at different times with wandering arthritic, colic, and nephritic Pains, none of which were periodical or constant. During this Term, when in best Health, he was usually costive, and his Urine, as soon as made, deposited a *calculous* Sediment.

*Two Histories of Internal Cancers, and of what appeared upon Dissection, by William Burton, M. D. No. 464. p. 99. Read May 13, 1742.*

In *March* 1733, he received a violent Blow by a ponderous and obtuse Instrument on his Loins, together with the Spine of the *Oss Innommatum*, towards the left Side, which disabled him for that Day; on the next, the Pain abating, he continued so well for 6 Months after, as not even to recollect this Accident, till about a Month before his Death, although he was often asked by the Physician, Whether that Part had ever suffered a Contusion?

In *Jan.* following, he complained of an excruciating Pain, extending from the aforesaid Spine to the spurious Ribs on the left Side, which sometimes attacked also the Intestines; whence he became continually restless, especially in the Night, and, tossing the Bedcloaths off, frequently lay naked. He could not lie upon his Back or left, *viz.* the



affected Side, but lay always on his right Side, leaning on his right Elbow. In *April* 1734, his left Knee, from a Contraction of the Muscles elevating it, was always drawn up towards the *Abdomen*, inso-much that he could not stand upright. His left *Testicle*, formerly less than the right, was now become scirrhus, and increased to double the Magnitude of this, and the left spermatic Vessels felt like a knotty Chord. A sort of hectic Fever attended him, the Exacerbation of which, as well as of his Pains, was generally about Noon, and 6 in the Evening. He had no Sleep of Nights without a Paregoric. Though his Appetite failed him, he had no Propensity to vomit, nor complained of Thirst. His Respiration and Urine were not amiss. His Pains were always exasperated by the Use of heating Medicines; and whenever the Pain seized the Intestines, terebinthinate Clysters increased them, whereas emollient and refrigerating ones mitigated them; by the Use of which he had daily one or two Stools. The Fœces were of a middling Consistence, lightly tinged with Bile. The Blood frequently taken away by *V. S.* in small Quantities, had always a thick, tough, sily Buff-like pleuritic Coat; and at first, from each several Bleeding, he found Relief.

*Jan.* 4, 1733-4, the Apothecary first administered to him, for the Colic, *Elect. Lenitiv. & Pulv. Diasen. Ol. Junip.* and emollient Clysters. Three Days after, Pains seizing his left Side, and the *Sphincter Vesicæ*, they were removed by repeated Bleedings, and *Decoct. Hord. & Lap. Prunel.* and *Syr. Althææ*. On the 12th, he complained of a Heat about the *Regio Pubis*, with Costiveness; but by the Use of *Sal. Mirab. Glaub. Lap. Prunel. Manna*, emollient Decoctions with *Sp. Nitr. d. & Elect. Lenitiv. pro re nata*, continued tolerably easy till the 24th, when the erratic Pains returning, and not yielding to the aforesaid Apozems, on the 26th the Physician first consulted gave him *Sperm. Cet. Sal. C. C. & pulv. e Chel.* and *Sp. C. C.* but these not availing, the *Lap. Prunel.* was sometimes interposed, and a *Calomel* Bolus, taken at Night, was worked off by a Sena Potion next Day: This Method, and afterwards Powders of *Lap. Prunel.* and *Cinnab. Antim.* taken in Honey, mitigated those Pains. But from *Feb.* 3, to *April* 4, sometimes nephritic Pains, intermitting Fever, pleuritic Pains, and Strangury, inordinately afflicted him, notwithstanding the Use, according to the said Indications of carminative, terebinthinate and saponaceous Clysters, Purges, *Sal. Absinth.* Draughts, repeated Bleedings, Vesicatories, the Powders and Electuary above-mentioned, Opiats, *Cort. Peruv.* in an Electuary, and infused in Wine, *Lac Sulph.* with Asses Milk, *Cinnab. Antim. Millep. Gum Guaiac.* and *Pulv. e Chel.* with *Vinum Milleped.* and *Sp. Nitr. d.* On *March* 20th, *Calomel. gr. v.* were given for 4 Nights successively, and afterwards purged off with a Sena Potion, and then continued again till the 28th, when he took another Potion. Paregorics were used now-and-then at Night, and *Ung. Opedeldoc* was applied to the *Testicle*.

*April*



April 4th, I first attended him in Consultation, when he complained of an intolerable Pain, upon any Pressure about the Region of the left Kidney; whereupon a maturing Cataplasm was applied in the Day-time, and a Plaster at Night. Emulsions, Whey, and such-like, were the chief Internals he used till April 8th, when crude Mercury was recommended to him, of which he took an Ounce Night and Morning, which gave so much Relief as to encourage the Continuance of that Medicine only to the 17th, when the Pains returning, he was bled once in 2 or 3 Days, to 4 or 5 Ounces, and treated with the subacid, cooling Regimen, and Paregorics, till April 29th, when he first mentioned a scirrhus Tumour, as big as a Hen's Egg, situated on the left Mastoid Muscle of the Neck. Upon comparing this with the *Testicle*, (neither of which Tumours were in the least diminished after Applications for that Purpose) it was conjectured, that either the Pancreas or Mesenteric Glands were cancerated. An Emetic of *Oxym. Scillit. farinaceous* Decoctions with Nitre, crude *Sal Armoniac*, *Oxym. Simp.* and *Diacod.* were of little or no Effect. Afterwards continuing the Use of Electuaries of *Conf. Ros. r. Elef. Lenitiv. Bals. Locatel. Æthiop. Min. Sperm. Cet. Ol. Amygd. d.* and the same with *Mercur. Alcalizat.* he became more and more emaciated, till May 21st, the Day of his Death.

It was remarkable, that every new Medicine, except it was very heating, afforded some Relief for 2 or 3 Days.

May 22d, on removing the Integuments of the *Abdomen*, the *Musculi Recti* appeared livid. The *Omentum* was destitute of Fat. The *Intestine* contiguous to the left *Os Innominatum* was tinged with Green. Nothing besides appeared morbid in the *Viscera in Situ* at first View. The Situation of the *Pylorus* seemed lower than usual. The Colour or Texture of the Liver were not remarkably preternatural. The Spleen was of the larger Size, and adhered in it's hinder Part so strongly to the *Peritonæum*, that it could not be separated without Laceration. Whereupon there remained in the Place of Adhesion, a thick, callous, and almost horny Membrane, as big as an Half-crown. The *Pancreas* was very small, and seemed composed of small *Scirrhi*. The left Kidney was twice as big as the right, or as it's own natural Magnitude: It's Substance about the *Pelvis* was corroded by a semipurulent cancerous *Sanies*, that was in part collected between the Surface of the Kidney and it's containing Bag. The internal Structure of it was not much amiss: But the *Fomes Morbi*, the most singular and surprising *Phænomenon* in this Subject, was a Number of large conglobate, steatomatous, cancerated Glands, reaching from the *Receptaculum Chyli* to the lowest *Vertebræ* of the Loins, so connected together as to represent a *Pancreas* affixed to the *Vertebræ* of the Loins, and upper anterior Part of the left *Psoas* Muscle: It was 4 times as large as his *Pancreas*, and as big as the right or sound Kidney. The *Aorta descendens* pervaded the Middle of this preternatural Substance Lengthways. From this Mass, as a Fountain, flowed that cancerous *Sanies*, which had made it's way to the



the left Kidney, and also corroded the superior carneous Part of the left *Psoas major*, and *Iliacus internus*, so that one might easily rend their gangrened Flesh like rotten Linnen. Some of this green *Ichor* collected near the *Os Innominatum* had laid the Spine of it quite bare. The left spermatic Vessels were knotty, tumefied, and livid. The mesenteric Glands were scirrhus. The descending Trunk of the *Aorta* was smaller than usual; and, dividing it, we extracted a small *Polypus*. The Examination of the other Cavities was not permitted.

Jan. 11, 1735.6.

2. *Thomas Trinder*, a Taylor, living at *Windsor*, in his 29th Year, was of a pale Complexion, with red Hair, of a middle Stature, and thin Habit, addicted to smoaking from Morning to Night, and now-and-then to hard drinking. Eight Years before his Death, he was thrown in Wrestling, so as to pitch the Small of his Back upon the Corner of a Chair, by which at first he was much hurt in that Part; but upon the Abatement of his Pain, he became from that time subject to Fits of the Colic, in which he said his Bowels seemed to be drawn to his Backbone, and usually received Ease by binding his Waist as tight as he could. He had also frequent Recourse to Geneva and such Liquors for Relief, but seldom found any, till a Swelling, as big as a Hen's Egg, appeared like a Rupture in his right Groin. These Fits were not of above 24 Hours Duration, but the inguinal Tumour lasted 2 or 3 Days. He was often afflicted with Stitches under his left Breast, which were removed by Bleeding.

But in the Middle of *Nov. 1735*, his Cholic became so violent, that he could not lie in his Bed, nor sleep without Opiats. *Nov. 21*, I found him in the Use of some carminative Pills sent by an Apothecary. He had frequent Reachings to vomit, and was very costive. His Pains seemed confined to the intestinal Region, and were most acute in the Evening, continuing to harrass him till 5 or 6 in the Morning. His Pulse beat seldom under 100 in a Minute, at Night generally above. He was not very hot, nor thirsty. His Urine at this time was rather defective in Quantity, than amiss in respect of Colour or Separation. His Tongue was foul towards the Root, but not very white. Upon his taking *Ipecacuan. ℥ss.* and after it's Operation a *Sal. Absinth. Draught*, with *Syr.* and *Tinct. Rhabarb. ʒij*, and the plentiful Use of *Infus. Sem. Lini*, Barley-water, Broths, and Clysters of Whey, Oil, and Honey, his Reachings ceased, and the Pains descended from the *Epigastrium* to the *Hypogastrium*. On *Nov. 24th*, a Potion of *Tinct. Rhabarb. cum Vino ʒij. Elix. pp. Helm. ʒj. Sal. Absinth. ℥ss.* and two purgative Clysters, one of which had *Terebinth. ℥ss cum Vitel. Ov.* not procuring a Stool, he took a Bolus of *Calomel ℥ss & Camphor. gr. xij. b. s.* and the next Day his Pains continued, though he had several Dejections from the Cathartic. Bleeding was omitted hitherto, because he had ʒx. of Blood taken away a Week before this Paroxysm; but now,  
upon



upon losing so much Blood more, he found immediate Relief. His Blood was very fizy.

After this, his Disorder resembled a nephritic One, his chief Complaint being of Pain about the Region of the Kidnies, and along the Descent of the Ureters. From *Nov. 26th*, upon the Use of an oily *Linctus* and *Manna*, *Sal. Absinth.* Draughts and Nitre, Clysters as well as Drinks of Whey and Honey, with Paregorics, and repeated Bleeding, the Pain, removing from the Loins, fixed itself at the *Os Pubis*, and in the Thighs, *November 29*, but by the Use of Emulsions with Gum Arabic and Nitre, the Pain about the *Pubis* abated, and mostly afflicted the left Thigh and Hip. From this time he generally sat up in his Bed, leaning forward to the left, and for the most part cross-legged, finding himself easiest in this Posture. He could not lie any time on his right Side. The Quantity, Colour, and Sediment of his Urine, were much the same now as when he was in Health. It was made without the Pain, which, soon after the nephritic Symptoms commenced, he complained of at the Root of the *Penis*. And now his Disorder resembled the *Lumbago* and *Sciatica*, affecting the left Side mostly: Whereupon *Dec. 2*, he was put in the Use of a diuretic and aperient Electuary, with *Terebinthinate* Clysters. To this Time he had very few Stools without Clysters, and those generally very small and fetid. *Dec. 5*, the Fever and Pain increasing, a cooling aperient Apozem, with a paregoric Draught *pro re nata*, were continued till *Dec. 9*, when examining the Thigh where the Pain now afflicted him most, I found some small *Scirrbi* in the Groin, which were sensible enough to the Touch, though not to the Sight; and from that Time, apprehending him of a scrophulous Habit, prescribed as follows: *℞ Myrrh. Milleped. Suc. Glycyrrhiz. Terebinth. Venet. Pil. Matth. ʒj. Bals. Gilead. ℥ss Diacod. q. s. f. Pilule N<sup>o</sup> xx. Capiat ij tertiis horis cum Sero Lactis*, which giving Relief, were repeated, only exchanging *Pil. Matth. gr. viij.* for *Ol. Anis. gr<sup>ss</sup> v.* and continued to *Dec 12*, when his Pains returned violently, and he coughed up clotted Matter, not unlike the *Parenchyma* of the Lungs abraded, with a little Blood. His Breath became fetid, his Respiration troubled, and he complained of Thirst. He used oily paregoric Draughts to the 15th, about which Time he was seized with so violent a pleuritic Pain in the Middle of the Night, that it was thought he must have expired, had not about ʒx of Blood been taken away immediately, upon which the Pain soon removed from the Side, and attacked him there but for a few Minutes afterwards. The Blood continued as fizy as ever. In the Evenings, when his Pains were most vehement, he had been sometimes delirious.

*Dec. 18*, he first told me of a Tumour he had discovered near the Navel, since I saw him on the 15th. It appeared not as he sat, but when laid on his Back, there was a Protuberance bigger than a Turkey's Egg, 4 Finger's Breadth on the left Side of the Navel, extending 2 above it, and 4 below it. By it's Situation, Resistance to Pressure, and



and the Unevenness that from under the Skin was communicated to the Touch, it's disappearing when he was in an erect Posture, and it's not being diminished by discutient Fomentations, it was judged to be a scirrhus Tumour, which had long existed there unobserved by the Patient, till it increased too much to be longer undiscovered. The *Emplastr. de Ran. & cum Mercur.* was applied outwardly; and concluding there was an internal Cancer, I was encouraged, from the preceding Case, to order him *Hydrargyr. ℥j* every Morning. Whereupon there was such a Remission of his Pains, that during almost a Fortnight, he got more Rest without Opiats than before with them; insomuch that being greatly revived, and regaining some Appetite, he got down Stairs 2 or 3 times. Thinking the Plaster increased his Pain, Indigo blue Linnen was applied in it's room. The Mercury came away by Stool, and he had now one almost every Day, and sometimes twice a Day, without a Clyster. His chief Drink was Milk and warm Water. His grand Complaint now was of a most troublesome *Cardialgia*, especially when he lay down, which was somewhat mitigated by Powders of *Cret. Britan. cum pauxillo Sal. Absinth.* From the first Use of the Mercury he seemed on the mending Hand, till after about 12 Days, when omitting it for a few Days, he relapsed into his former or a worse Condition; and though he was somewhat easier on the Repetition of it, the good Effects lasted not long. He drooped daily from *Jan. 4*, and on the 13th died, emaciated and almost *exanguis*.

Upon Dissection, nothing preternatural appeared in the Integuments, abdominal Muscles, or *Peritonæum* immediately under them. But under all these, where the Protuberance had been observed, and immediately under the *Omentum*, (which was destitute of Fat, and it's lower Part was mortified) there came in View an anomalous Substance *in Situ*, seemingly as big as a very large Potatoe; which, when the circumambient *Viscera* were removed, was found to be a scirrhus, fungous, cancerated Excrescence, rooted, as it were, to the left Side of the *Vertebrae*, quite from the *Diaphragm* down to the *Pelvis*, of a monstrous Bulk, occupying near  $\frac{1}{2}$  of the *Abdomen*, lying like a Tortoise with it's Head towards the *Pelvis*, and it's Back to the *Umbilicus*. It was in the upper Part covered by and firmly cohered with the *Colon*, which in the whole Contiguity was black and mortified. It was strongly attached to the *Peritonæum* on the left Side of the *Lumbal Vertebrae*, having displaced the left Kidney, and brought it forwards to the left Side of the Navel, so that it came in View as soon as the *Omentum* was removed. It likewise removed the *Aorta descendens*, the left Emulgent, and Meseraic Vessels, quite out of their natural Situation; all of which were found pervading the Centre, nearly, of this Excrescence, and smaller than natural. It adhered to the Kidney strongly where the emulgent Vessels enter it, and it had detrued most of the small Guts into the *Pelvis*. Nothing was preternatural in the Stomach or Spleen, excepting that the latter, as well as the left Kidney, seemed paler than usual,



usual, and this Kidney also more flaccid: The Gall-Bladder was shrunk to the Size of a Nutmeg, and empty. The Liver had a preternatural Lobule, as big as a Hazel-nut, adhering to it by a small Pedicle. But otherwise all these *Viscera*, as well as the right Kidney, Bladder, &c. discovered nothing morbid.

This cancerated Excrecence could not be eradicated without Laceration, and upon the Removal of it, 2 or 3 large Trunks of Nerves appeared naked, passing over the *Iliacus internus* to the Thigh, which had been compressed by this Tumour. The Weight of this Excrecence was  $\text{℥iv} + \text{℥xiv}$ ; and allowing for what remained upon Laceration, and the Effusion upon cutting into it, it doubtless exceeded  $\text{℥v}$ . Upon Bisection, it appeared to the Depth  $\frac{1}{2}$  Inch from it's Surface black and gangrened, and, below that, it was all spongy, with Cavities as large as those of an Honeycomb; and from it had issued a cancerous Sanies, draining to the *Pelvis*.

Upon opening the *Thorax*, the right Lobe of the Lungs was full of scirrhus cancerated Tubercles, from whence a Sanies had flowed betwixt it and the *Pleura*: The left Lobe was much smaller than the right, firmly attached to the *Pleura* and *Mediastinum*, and inseparable without Dilaceration. It had some Tubercles also. The Heart appeared sound, but a large *Polypus* was taken out of it's right Ventricle, at the Orifice of the *Arteria Pulmonalis*.

Another Case occurred to me contemporary with the first of these, and so like to both of them in the antecedent Cause and Symptoms, that, could I have obtained Leave to inspect the Corpse, I am persuaded some such immediate Cause would have discovered itself. Crude Mercury was the only Medicine in this Case also, that palliated for about 10 Days successively.

The Diagnostics of a Cancer within the *Abdomen*, deduced from the preceding Histories, seem to be as follows:

A naturally slender Habit of Body, accompanied with some scrophulous or scirrhus Tumour, together with a pale Complexion, and costive Disposition: If such an one, at an Age above 20, has received a violent Contusion on the Loins, and, neglecting all Remedies, is some time afterwards attacked with excessive Pains, afflicting now the *Colon*, then the urinary Passages, Spine of the *Os Innominatum*, and *Pubes*, at various times, always increased by all Internals or Externals, by which the Heat of the Body is increased, especially *Terebinthinate* Clysters; but mitigated by some Singularity of Posture, in which the Patient constantly abides; if these be attended with an hectic Fever, without the usual Degree of Heat in the Skin, of Whiteness or Dryness of Tongue, or Complaint of Thirst, and also without Cough, high-coloured Urine, or vitiated Respiration; if accompanied likewise with an Affection of the spermatic Vessels of the Thighs, and frequent pleuritic Pains; the Blood always abounding with tough Size; if Opiats soon lose their Effect, and only (as all other new Remedies not heating) seem



seem to give Relief for 2 or 3 Days ; if Cathartics take place, and by frequent Repetition do not produce a colliquative *Diarrhœa*, and the most palliative Remedies are nitrous Salts and Mercurial ; may it not be concluded with much Probability, that such a Case is owing to some such Cause ? May it not be pronounced an internal Cancer ?

*Various Medico-Chirurgical Observations, by Jo. Dan. Schlichting, Med. & Chir. Doct. Acad. Cæsareo-Leopold, &c. No. 466. p. 270. Read Dec. 23. 1642.*

*Some late Discoveries concerning the Spina Ventosa.*

XVIII. I have observed the *Spina Ventosa* to be very like the Venereal Disease, and to corrupt the Humours and Vessels of the Body. It does not always first affect the Bones or Marrow ; but sometimes the Fat, Membranes, and at last the Bones themselves. The *Periosteum*, and other ambient Parts, sometimes only appear tumefied, and upon their being cut away, the Bone does not seem infected. In some the Bone swells first in the *Epiphysis* ; and sometimes one or more of the Bones of the Fingers swell all over. When I have found a Bone carious, I have also perceived Ulcers, Fistulas, Knots in the Buttocks and under the Arm-pits, and the Eyes, and other Parts, either inflamed or exulcerated. These Symptoms yield only to Mercury, which is the peculiar Remedy, for this and the Venereal Disease.

Abscesses and Ulcers have sometimes penetrated to the very *Periosteum* and Ligament, and yet no *Caries* could be seen. Sometimes the Bone appears naked, without any *Caries* ; sometimes with a *Caries*, but without any *Exostosis* ; and sometimes there is an *Exostosis*, without either Nakedness or *Caries*. After a Suppuration, the *Exostosis* is afterwards much resolved, by the Use of a proper Remedy. Nay upon a Separation of some Particles of the Bones, the rest of the osseous Tumour is gradually dissolved.

Patients may have a Joint or two taken off, and yet be not quite freed from the Disease : The subtile venemous Matter remains, and afterwards shews itself in it's former Shape in other Places. Therefore in such a populous City as this of *Amsterdam*, it is very wrong to leave such miserable Objects to Nature alone, for 10 Years or more, in vain Hopes of spontaneous Relief : For instead of being cured, they waste away in a most miserable Manner.

Having in vain tormented these Wretches for a long time with Decoctions of the Woods, Catharticks, Sudorificks, Diureticks, Earths, Æthiops Mineral, and Steel, I tried Mercury, and found it to answer my Purpose, especially when applied externally to the Part affected ; tho' I have often found it efficacious, when given by the Mouth. In whatsoever Condition the Swelling is, whether covered with Skin or exulcerated, either with or without a Nakedness or *Caries* of the Bone, I order it to be anointed with a *Neapolitan* Ointment : ℞ *Ung. Ros. ʒj Merc. viv ʒss. Terebinth. clar. ʒj M. F. Ung.* to be used thrice every Day, for 8, 10, or 14 Days, according to the Age of the Patient, laying a defensive Plaster over it. It may be afterwards continued once or twice a Day, for 2 or 3 Months or longer, giving a purging Medicine between whiles, to keep off a Salivation, which cannot be continued long enough to subdue this, as it does the Venereal Disease.



Disease. The Inunction must sometimes be suspended also, because the Cure of this Disease is slow, and it must be proceeded with at times, till all the Ulcers are healed, and the osseous Tumours in a great Measure disappear.

By this Method alone I have generally seen Tumours resolved; and even deep Ulcers, so putrid and fungous, as to be like Fistulas, quite consolidated, without any cutting. But when I have found this Method continued without Success for some Weeks, when Pus, Ichor, or Lymph is pent up, or some Fragment of a corrupted Bone cannot be separated, I have ordered the Part to be cut, and dilated with Sponge or Lint, applying afterwards to the Wound Tincture of Myrrh or Euphorbium, *Aq. dir. Fernel. Ung. fus. Fel. W.* Alum, either crude or burnt, *Merc. præcip. & dulc.* Spirit of Turpentine, and such like Medicines, to cleanse the fordid Ulcers, eat down the fungous Flesh, and heal that which is wounded, not omitting the Use of a Bandage. As for the Tumour of the consolidated Part, I generally leave it to Nature to discuss, or only apply a gummous Plaster to it.

A Girl 3 Years old had a Pleurisy, which turned to an internal Abscess, attended by an Asthma for some Months. But on a sudden a Discharge of Matter flowed thro' the *Vulva*, which continued almost without Interruption, Day and Night, for almost 4 Months, so that her Thighs were quite raw. After this, she perfectly recovered; and tho' it is 5 Years ago, she has hitherto enjoyed a perfect State of Health.

*A suppurated Pleurisy discharged thro' the Vulva of a Girl.*

A young married Woman had a Tumour in her Spleen 6 Years ago, upon the disappearing of which, she had a plentiful Discharge of Matter by the *Vulva*, upon which she perfectly recovered, and has continued in a perfect State of Health ever since.

*An Abscess of the Spleen cured by a Discharge of Matter thro' the Vulva.*

A young Man of 26, had a virulent *Gonorrhœa* 4 Years ago, for which he used not only purging Medicines, but also very strong Diureticks, for the Space of a Year; and at last began to emit Blood instead of *Semen*. It was of a blackish red, and he had no Flux from the *Urethra*, but in the time of Coition or Pollution. Nay tho' he totally abstained from this Evacuation for a Week, or even for several Months, yet after this Abstinence he constantly discharged Blood. To this very time he has never discharged any pure *Semen*, and very seldom any thing white, like Seed, mixt with the red. I prescribed him very strong astringent and attemperating Medicines, both internally and externally, which have brought the dark red Discharge to be a little whitish. Afterwards I put him into a Salivation for a pretty long time, and gave him other Medicines, but all to no Purpose. He was therefore declared incurable, and to be left wholly to Nature. It may deserve to be inquired, whether any Blood-vessel is bursten, and not yet consolidated, in the *Prostatæ*, or one of the *Vesiculæ Seminales*.

*A Discharge of Blood in Coitu, instead of Semen.*



*A Suppuration of the Joint of the Hip, with a coming away of the Head of the Femur, consolidated.*

A young Country Girl of 14, in 1730, had a painful Swelling on the Joint of her Hip, which suppurated and burst. The Surgeon dilated the Opening made by Nature, and extracted the whole Head of the *Os Femoris*. He put Tincture of Myrrh into the Cavity, and *Ung. fuscum fel. W.* He made a very tight Bandage, which he seldom took off; and in 6 Weeks time it was consolidated, and the Girl was able to walk, tho' not without halting.

Fig. 114.

Fig. 114. 1. represents the *Acetabulum* of the *Os Innominatum*. 2. The Head of the Bone extracted from the Ulcer. 3. The Neck of the Bone, &c.

*A false Aneurism, without Pulsation, containing liquid Blood.*

In 1741, I had a Consultation with the Surgeons about a Woman, whose right Arm was swoln about the Elbow to the Thickness of 32 Inches, occasioned by a Bleeding a Year before. It was now inflamed, red, and full of Pain. The Tumour was extended from the lower Part of the *Humerus* almost to the Wrist. On the inner Side there appeared a small, livid, gangrenous Ulcer. It felt like a Bladder full of Liquor, tight, without any Pulsation, and so hard and dense, as not to yield in the least to any Pressure. There was no Pulsation to be felt in the Wrist. Some thought an adipose *Fungus* was inclosed; but others agreed with me, that it was an Aneurism without Pulsation. We therefore agreed to make convenient Bandages about the Arm, and wait for it's bursting, which happened on the third Day afterwards; when upon loosening the Ligature, the liquid Blood, in the Quantity of above a Pound, burst out in a moment, with very great Violence. The Surgeon immediately stopped the Hæmorrhage with Powder of Puff balls and Bandages. Two Hours afterwards we all agreed, that either the Arm must be taken off, or the Artery tied up. We chose the latter, and having first applied the Turniquet, we cut the Skin, Fat, and Belly of the *Biceps*, above the Aneurism, in the sound Part, almost in the Middle of the Arm, and passing a Needle and Thread under the Artery tied it fast. Then, upon opening the Aneurism both upwards and downwards, clear red liquid Blood flowed out on a sudden, to the Quantity of 4 Pound. Here was no Bag found in the Artery, as in a true Aneurism, nor any *Polypus* or grumous Blood, as in a false one, but quite another Cavity formed between the Skin and the Muscles, and between the Muscles themselves; and all the Muscles of the lower Part of the Arm were separated, as if it had been done by Art; but they were pale and flabby, with a little Gelly, like a soft *Mucus*, sticking to them, which I wiped off with my Fingers, and upon washing found it to be white. In the above-mentioned Cavity, we were all surpris'd to see the Blood burst out copiously, in 6 or 7 Places, above, below, and from the Sides, as from so many Channels. We applied very strong Stypticks to them, with Puff-balls, Vitriol, Spirit of Turpentine, *Alcohol Vini*, &c. with which being laid upon Lint, we filled the whole Cavity, applying adhesive Plasters, and tight Bandages. The Flux of Blood was thus soon stopped, but other bad Symptoms

Symptoms



Symptoms increased toward Evening, such as Fever, Eructations, Nausca, Vomiting, Hiccups, Faintings, Catchings of the Tendons, &c. The next Day the Symptoms increased, and she grew delirious. On the 3d, notwithstanding a plentiful Use of Attemperants, Anodynes, and Cordials, she died.

Fig. 115. 1. represents the inner Side of the right Arm, with the Aneurism. 2. The Place where the Blood burst out spontaneously. 3. The outer Side of the same Arm.

XIX. Whatsoever obstructs the lymphatic Vessels, in such a manner, as to obstruct the Passage of the Lymph to the Heart, may cause a Dropsy. Thus when the Head is too much pressed in a difficult Birth, or when the Head is already born, if the *Os Uteri* presses the Neck and jugular Vessels, so as to hinder the Return of the Blood thro' the vertebral Arteries, a *Hydrocephalus* may be formed.

Thus *Lower* tied the Jugulars of a Dog, leaving the Arteries free, and found the Head to swell gradually, and the Dog himself to grow hydropical: And I have often observed myself, in the Dissection of several executed Bodies, that, the Return of the Blood from the Head being obstructed by the Halter, the Cavities of the Brain are filled with an aqueous Moisture, and the *Plexus Choroïdes* abounds with Hydatids.

A *Hydrocephalus* also arises, when Children are born with their Necks bent, or are too roughly handled by Midwives, or pitch their Heads downwards in the Womb before the due Time. It is also much forwarded by a phlegmatic Constitution of the Mother, and her feeding on a crude Diet, or difficult of Digestion.

Since in every Point of the Body there are Veins, which carry a Lymph thinner than the Blood, a Dropsy may arise in any Part of the Body; if it is universal, it is called an *Anasarca*; if particular, it obtains it's Name from the Parts affected; as a *Hydrocephalus*, or Dropsy of the Head, a Dropsy of the Breast, Womb, Ovary, *Scrotum*, &c.

But as I have this Year had an Opportunity of observing in my Practice a very rare Instance of a *Hydrocephalus*, and a *Saccular Dropsy*, if I may be allowed the Expression, I shall desire leave to offer an exact Description of them to the Royal Society.

The first Case was of a Male Infant, that had a Bag rising on the *Os Sacrum*, and hanging down to the Heels, a true Production of the Skin, seeming to the Touch as if full of an aqueous Humour. This Infant, tho' his fresh Colour pronounced him to be in a good State of Health, lived but a few Days. I was not allowed to open him, but I had his Picture taken, with an exact Mensuration of all his Parts, by an accurate Painter.

The other Child was 2½ Years old the very Day he died, in all which time he took no other Sustenance than his Mother's Milk. His Father was a very healthy Man; but his Mother was a sickly Woman. He was born with a Head somewhat larger than usual, which gradually in-

Fig. 115.  
*Two Anatomico-practical Observations, by Job Baister, M. D. F. R. S. No. 466. p. 277. Read Dec. 23, 1742.*

*Of a Child born with a Bag full of Water, reaching from the Os Sacrum down to the Heels.*

*A remarkable Hydrocephalus.*



creased to an extraordinary Bigness, tho' his Parents had consulted several Physicians and Surgeons, and had tried various Remedies, but in vain; so that he had not Strength to support this monstrous Head, but was always forced to lie down.

The Head being measured after Death, was found to be 20½ *Rhinland* Inches, from the right *Meatus Auditorius* over the *Ossa Bregmatis* to the left *Meatus*; 20 Inches from the Root of the Nose to the first Vertebrae of the Back; and above 25 from the Root of the Nose round the Bones of the *Occiput*, Forehead, and Temples. Thus the Bones of this Head were stretcht from one another; and yet no *Serum* or Water was found between the common Integuments.

Upon opening the Skull and carefully raising the *Dura Mater*, the *Pia Mater* appeared, but very tender and transparent, and filled with an aqueous Liquor, without Smell or Taste, but so clear, that we could see through it to the Bottom of the Skull: For the Substance of the Brain was so compressed, that it seemed to be nothing less than a Brain, but only a strong Membrane, thicker in some Places and thinner in others.

The 3 Cavities of the Brain formed but one Cavity, in which were the *Medulla Oblongata* and *Cerebellum*, but incredibly small. Neither the *Nates*, *Testes*, *Anus*, or *Vulva* of the Brain, nor any of its Protuberances could be found, or the least Traces of them.

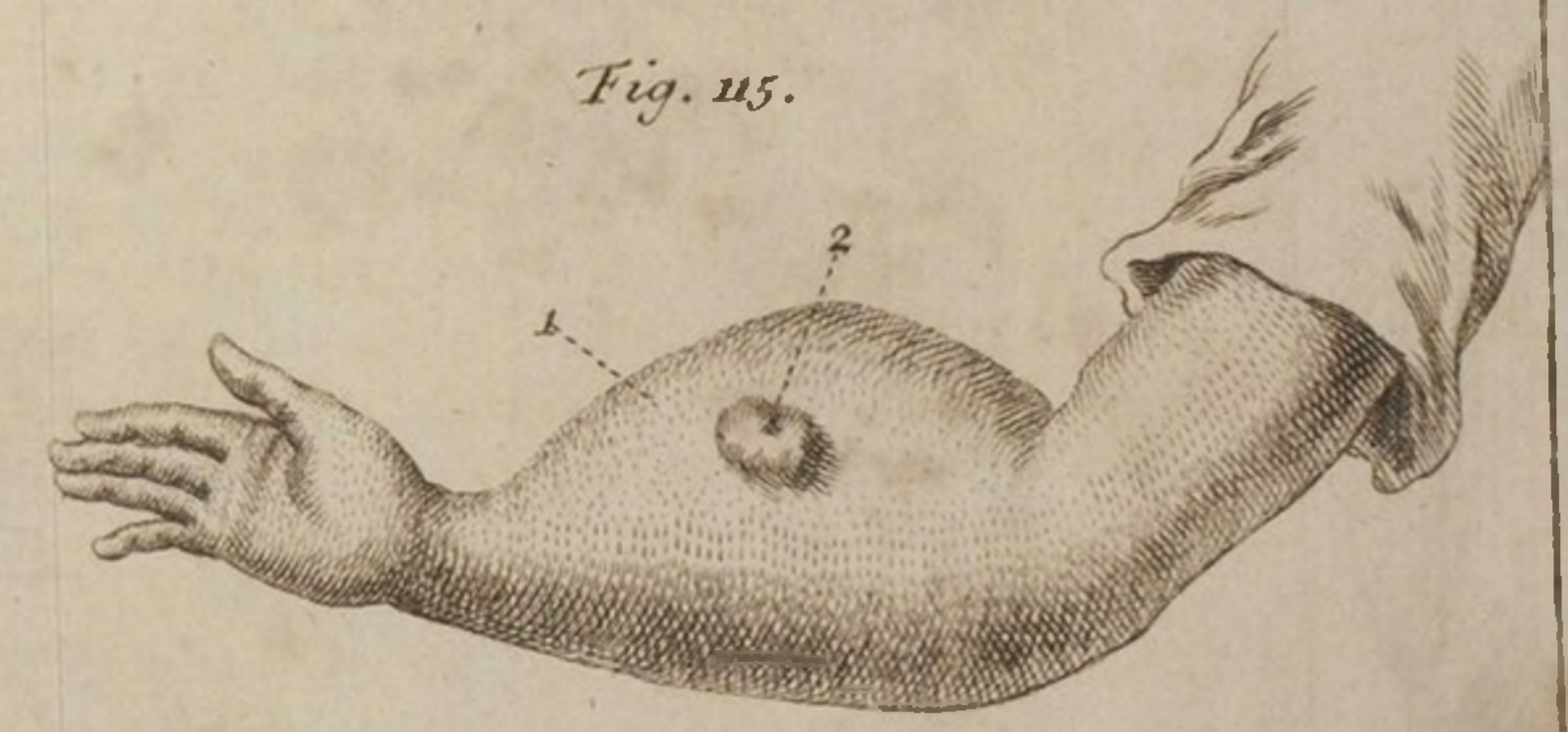
The Liquor contained being carefully poured out filled 5 Pints, and weighed ℥vj. ʒxj.

This Child did not discover any animal Actions, but only vital: He was very quiet, never cried, seemed as if always asleep, and died without any Convulsion, or sensible Motion.

An extraordinary Tumour on the Thigh, by Mr Mizacl Malfalguerat, Surgeon, at St Edmund's-Bury. No. 456. p. 365. Jan. &c. 1740.

XX. *Grace Lowdell*, a poor Woman, 60 Years of Age, of the Parish of *St James*, in *Bury St Edmund's*, *Suffolk*, being naturally of a gross, fat, and relaxed Constitution, and constantly given to the drinking of strong Liquors; and consequently labouring for many Years under an ill Habit of Body, such as the Rheumatism, which had caused Contraction of some of her Fingers, with some nervous Affections in her Head, often causing some little Fits of Vertigo, &c. And though she had formerly a *Procidencia Uteri*, yet there could not be found any other scrophulous Symptoms, than that she observed, when about 30 Years of Age, soon after her Delivery of a Son, a little hard Swelling on the Muscle *Biceps*, and posterior, inferior, and external lateral Part of the Thigh, a little above the Ham, without her knowing any manifest Occasion for it; which at first went on slowly, but after proceeding more quickly, and the older it grew, it still came on the faster, until it increased to the Bulk of near a Foot in Circumference, being somewhat of a globulous and a little longish Figure from its Basis, which was lax, like a Peduncle, or Stalk, and about half the Circumference of the Tumour, like a Neck to the Head of a Child hanging down.











From the first Appearance of this Tumour to the Excision of it, there were more than 30 Years: She had excessive Pains and Uneasiness in it, and at last it's Bulk and Weight had in some measure intercepted the Nourishment to it, so that an Ulcer had affected the inferior Part of it, very putrid and sinuous, of about 6 Months standing.

This Excrecence was of the natural Colour of the Skin, and was for the most Part of a pinguedinous Substance; the Centre and Basis being an *Atheroma*, but more scirrhus than common.

This Excrecence, having grown so big, was not contained in a manifest *Cystis*, but had some large Circumvolutions of Fat adherent to it's common Teguments, as was observed after the Excision of it, when it was soon conveyed away; so that, through Inadvertency, we did not weigh it.

My Design in this Case was to have made a total Extirpation of this Excrecence; but by reason of it's lying with large Vessels, and amongst the Tendons of the Muscles, I was content (as Dr *Turner* advises in such Cases) " To level it, the best we can, by Escharotics, " still repeated as the Sloughs throw off; till we have consumed as " much of the Gland or Substance, and gone as deep, as may be safely " adventured; when probably some powerful desiccative may induce a " *Cicatrix*, which may so tie the Remains, as to create no farther " Trouble."

This Tumour had been shewn to most of the Physicians and Surgeons hereabouts, some of no less Skill than Note, who seemed to approve of the Operation: Therefore, *July 7, 1735*, I made a Ligature about the Basis of it, with a Slip-knot, by which I gradually constricted it once or twice a Day, as the Patient could suffer it, without causing any ill Symptoms, till the 17th of the same Month, when she was taken with strong Convulsions, a slow Fever, Syncope, her Teeth set in her Head, and a Loss of her Senses, which lasted that whole Day, and the Night following; from which time I did no more constrict the Tumour, prescribed Cordials, volatile Drops, a purging *Enema*, and a paregoric Draught at Night, which had so good an Effect, that by the next Day she was much recovered, and came to her Senses. The Ligature began to make a Separation in the Neck of this preternatural sprouting Excrecence; and on the 20th, in the Presence only of one in the Profession, having all my Apparatus before me, I extirpated the whole outward Tumour without any great *Hæmorrhage*. I was induced to use the Ligature, in order to prevent the too great Effusion of Blood, which might otherwise happen; thinking it not very safe to make a Ligature of the Body of so large an Artery as in the Ham, for fear of intercepting afterwards the Nourishment to the Leg, as happens often after the Operation of the *Aneurisma*.

The Remains, though fordid at first, by a peculiar Method of Dressing, and proper Applications of strong Digestives, Detersives, &c. cleansed, and the Ulcer soon digested, the Substance came even to the Skin,



*The Case of  
Mary Howell,  
who had a  
Needle run into  
her Arm, and  
came out at  
her Breast.  
No. 461. P.  
767. Aug.  
Æc. 1741.*

Skin, and, Sept. 21, it was all perfectly cured, without any Hardness or any Inconvenience to her walking, and is like to remain always so.

XXI. *Mary Howell*, late of *Oswaldestry* in *Shropshire*, Spinster, *March 3, 1732*, had stuck a small Needle upon the Sleeve of her Gown, which by her accidentally running against a Door, she drove, with some Thread twisted about it, into her left Arm, about 6 Inches below her Shoulder; and a young Woman, endeavouring to draw out the said Needle, broke off the Eye thereof, and left the Needle in her Arm: Upon which she directly applied to *Mr Tomkins*, a Surgeon, in the same Town, who endeavoured to extract it, but could not, without laying her Arm open, which she would not suffer. About a Month after which she felt a gnawing Pain above the Place where the Needle ran in, and up to her left Shoulder, which lasted her 3 or 4 Days, and so returned by Fits, till at length (about 17 Weeks ago) she felt a gnawing Pain (she thought) at her Stomach, which made her very sick, and reaching to Vomit, and continued to afflict her (especially in the Mornings) till about the *Sunday* after *Easter* last; in the Evening of which Day she fancied a Pin was got into her right Breast, in the under Part; and 2 Days after applied to *Mr Robert Nanney*, Surgeon, in *Fetter-lane*, who the same Day lanced her Breast, and extracted the same Needle, as she verily believes, as having no Eye, but the Thread still twisted round it. This Needle, about an Inch long, without an Eye, and with Thread still twisted about it, she produced before several; and she saith, that from the Time of the said Needle being so drawn forth, she never had any Return of Pain in her Breast, Stomach, Shoulder, or Arm. *London, June 2, 1739.*

*Concerning a  
Man who  
lived eighteen  
Years on Wa-  
ter, by Mr  
Robert Camp-  
bell of Ker-  
nan. No. 466.  
p. 240. Read  
Dec. 9, 1742.*

XXII. *John Ferguison*, a Native of the Paroch of *Killmellfoord*, in the Shire of *Argyle*, about 18 Years ago happened to overheat himself on the Mountains, in Pursuit of Cattle, and in that Condition drank excessively of cold Water from a Rivulet, near by which he fell asleep; he awaked about 24 Hours after in a high Fever: During the *Paroxysm* of the Fever, and ever since that time, his Stomach loaths, and can retain, no kind of Aliment, except Water, or clarified Whey, which last he uses but seldom, there being no such thing to be had by Persons of his Condition in that Country for many Months in the Year.

*Archibald Campbell* of *Ineverliver*, to whom this Man's Father is Tenant, carried him to his own House, and locked him up in a Chamber for 20 Days, and supplied him himself with fresh Water, to no greater Quantity in a Day, than an ordinary Man would use for common Drink; and at the same time took particular Care, that it should not be possible for his Guest to supply himself with any other kind of Food without his Knowledge; yet after that Space of time, he found no Alteration in his Vigour or Visage.

He is now about 36 Years of Age, middle Stature, a fair and fresh Complexion, with a healthy (though not seemingly robust) fresh  
Com-



Complexion ; his Habit of Body is meagre, but in no remarkable Degree ; his ordinary Employ is looking after Cattle, by which means he needs must travel 4 or 5 Miles a Day in that mountainous Country.

He uses no *Tobacco* ; yet seems to discharge as much *Saliva* as others, who do not use *Stimulus's* to provoke that Evacuation.

If we may judge of his insensible Perspiration by the Softness and Freshness of Skin, he is in that respect like other Men, and like them sweats with violent Exercise ; as to the grosser Excrements, it did not occur to me to inquire about them, but I conclude he discharges none ; because the Country People, who strongly fancy him supported by supernatural Means, would not forget to object this to him, if he evacuated any Quantity of gross *Fæces*, with which Water is not charged.

This History of this abstemious Person I had from Mr *Campbell* of *Ineverliver*, my Neighbour in that Country, who is a Gentleman of great Candour and Ingenuity, neither credulous himself, nor any ways inclined to impose upon the Credulity of others. I had the same Account from several others, and confirmed by the Belief of the whole Country. The Man himself I never saw, but the Bearer, Mr *Charles Campbell*, Preacher, has conversed with him, on whose Veracity you may depend.

The Case appears extraordinary singular, and worth the Notice of Men of Letters, is one Instance to convince us, that a great Part of the gross Meats which we greedily destroy, is not necessary for the Support of Animal Life ; and that there must be some other Qualities in the pure Element of Water, than what have fallen under common Observation, since they have supported this Man in Health and Vigour for so many Years, and supplied the Evacuations necessary in the Animal Economy.

Dec. 1, 1742.

XXIII. 1. I have transcribed a Case, which I received from a young Clergyman, who some time studied Physic, and knows the Woman : I shall probably see her at *Clogher*, where she now lives. The Case happened within these two Years, but I cannot learn the exact Date at present.

*Concerning the Cæsarian Operation performed by an ignorant Butcher, by the Rev. Dean Copping, F. R. S. No. 461. p. 114.*

*Sarah M<sup>r</sup> Kinna*, who now lives at *Brentram*, 2 Miles from the City of *Clogher*, in the County of *Tyrone*, was married at the Age of 16 Years. Before her Marriage she never had the Appearance peculiar to Women ; but, in a Month after her Marriage, those Appearances shewed themselves properly. Ten Months after her Marriage, she found the Symptoms of Pregnancy, and bore a Child at the Expiration of the usual Time. Ten Months after, she was delivered of another ; and each Time had a speedy and easy Delivery.

Two Months after her second Lying in, Symptoms of Pregnancy appeared again, and increased in Proportion to the Time ; but at the End of 9 Months those Symptoms began to dwindle, and in a little time she had no other Reason for thinking she was with Child, but an absolute Stoppage of her *Catamenia* : Nor had she, during the Space of  
6 Years



*Of the Cæſarian Operation performed by an ignorant Butcher.*

6 Years and ſome Months, any one Return of them; but for the greateſt Part of that Time, eſpecially the 4 firſt Years, ſhe was perpetually afflicted with moſt violent Pains in the middle Region of the *Abdomen*.

Some time in the 7th Year after her laſt Pregnancy, which ended in ſuch an unuſual Manner, a Swelling in her Belly, and other Symptoms, made her conclude ſhe was again pregnant.

About 7 Months after this uncertain Account, a Boil, as ſhe thought, appeared about  $1\frac{1}{2}$  Inch higher than her Navel.

During this Time of her Pregnancy ſhe often found the Symptoms of her being quick with Child, till about 6 Weeks before this Boil (as ſhe calls it) appeared. It was attended with very great Pain.

She ſent for one *Turlogh* [*Terence*] *O Neill*, a Butcher, who then did, and does now live with *Capt. George Gledſtanes*, about a Mile from *Clogher*. This Man came to her the *Sunday* after her Meſſage, and found her in an expiring Condition. By this time the Impoſtumatation (which ſhe apprehended to be a Boil) had broken, and an Elbow of the Child had forced itſelf through it, and appeared in View. At the Requeſt of herſelf and Friends, he undertook to adminiſter Relief to her, and made ſo large an Inciſion above and below the Navel, as enabled him, by fixing his Fingers under the Jaw of the *Fætuſ*, to extract it; in which Operation he met not with the leaſt Impediment. He afterwards looked into her Belly, and ſeeing ſomething black, he put in his Hand, and extracted, by Pieces, a perfect Skeleton of a Child, and ſeveral Pieces of black putrefied Fleſh. After the Operation, he ſwathed her up; and in 6 Weeks ſhe purſued her domeſtic Buſineſs.

She has been in good Health ever ſince this wonderful Accident happened; only ſhe has a Navel-Rupture, owing to the Ignorance of the Man in not applying a proper Bandage.

*A further Account, by the ſame. Ibid. p. 816.*

2. I have ſeen the Woman, of whom I ſent you the ſurpriſing Account, with her Huſband, and inquired more particularly into the Fact; but hope to be ſtill a little more particular, when I ſee the Man who extracted the Child. They are ſo ignorant, that, with their bad Language, I could not make myſelf quite Maſter of what they ſaid; but, if they ſpeak true, there is ſomething more ſurpriſing than the former Account mentioned: For the ſeveral Parts of the latter, or rather the former, *Fætuſ*, were extracting by Degrees, from *July* to *Chriſtmas*.

She had, by their Account, been married about 8 or 10 Years before her firſt Pregnancy.

As well as I could apprehend them, ſhe had a Midwife at the proper Time, in her firſt Pregnancy, for 8 Days, Day and Night: When the Symptoms diſappeared, the Swelling decreased, and the People concluded there was no Child.

This Child was carried for 7 Years, till ſhe had been again pregnant for 9 Months; about which Time there was a Swelling in her Navel about



about the Bigness of a Goose-egg, which broke in a small Orifice, of itself, and discharged a watry Humour.

She had a Midwife, and 3 or 4 Physicians, who gave her over, and left her as a dying Woman. From this Orifice started the Elbow of a Child, which hung some Days by the Skin, visible to abundance: At length she cut it off for her own Relief.

When *O Neile* came, (whom I have not yet seen, but shall soon) she begged him to help her. The Man was frightened, and went to sleep; but, when he got up, gave her a large Draught of Sack, and, I suppose, took one himself; when he opened the Place, and made such a Hole as the Man describes to be as large as his Hat. He put in his Hand, took hold of the second Bone of the Child, and, pulling it backward and forward to loosen it, in a little time extracted the Child. After this, looking into the Hole, and seeing something black, he put in his Hand, and extracted other Bones. Some Bones still remained, which, as I said, were extracted at different times, it seems too in different ways; for some came by the Navel, others from the Womb the natural Way. She had great Pain at each time.

The former Account says, she pursued her domestic Business: She might be about the House, but she was 15 Months confined to the House. I have examined the Rupture, and can put a Finger a pretty Way up into the Body. Mr *Dobbs*, I hear, an eminent Surgeon at *Dublin*, thinks there may be Relief, and that the Rupture may be much helped, and the Guts reduced. I question whether he will think so, when he sees her.

XXIV. The inclosed is what I received this Day from a Gentleman who lives on the Spot. The Reason of the Child's being able to abide so long under Water is pretty evident: The Child, most likely, was infirm, weak, and sickly, from the Time of her Birth, so that the *Foramen Ovale* was not grown up. I remember about 3 Years ago to have seen a Subject, an old Woman 80 Years old, who had the *Foramen Ovale* so large, that you might easily thrust your middle Finger through it; but she was attended with the above-mentioned Circumstance, that is, she never enjoyed a Moment's Health in her Life.

May 16, 1737, *Rebecca Yates*, of *Billson* near *Market-Bosworth* in *Leicestershire*, had a Daughter about three Years of Age, that fell into the Mill-dam at the Head, near to the Mill-wheel; and, by the Force of the Stream, was drawn under the Water to the said Wheel, with her Legs forwards; one of her Legs went under the Mill wheel, and by reason of the Nearness of the Wheel to the Floor of it's Water-way, the Bulk of the Child's Leg stopped the said Wheel from moving at all. The sudden stopping of the Mill so much surprised the Miller, that he went immediately, and let down the Shuttle; but finding it would not go quite down, he came up again into the Mill, and looked both above and below, to see if he could not find out the Cause; then went and drew up the Shuttle, and let it down again; but as the Gate would not

*Of a Girl three Years old, who remained a Quarter of an Hour under Water without drowning, by John Green, M. D. No. 454. p. 166. July, &c. 1739. Dated S. alding, Feb. 18. 1737-8.*



shut quite down, he could not as yet find out the Cause of his Mill standing still, for which Reason he went backwards and forwards betwixt the said Shuttle and Mill-room, as nigh as he can guess, 8 or 10 times, before he found out the Cause; but at last he drew the Shuttle quite up, by which means the Force of the Water drove the Child from under the Shuttle; then he put the Shuttle quite down, and thereby discovered the Child with her Leg under the Wheel, and lying upon her Face. The first Word she spoke was, *Help me*, which she repeated three times; the Miller left her Arm for some other Person to hold her, whilst he endeavoured to remove the Wheel, so as to get out her Leg; and then she said again, *For God's Sake help me out, if you can.* She spoke very briskly, after she was put to Bed. But the Mill-wheel had tore away all the Skin, Muscles, Sinews, and Tendons, of her Leg, quite to the Bone, and stript them down to her Heel; besides, the Shuttle was drawn up and let down upon the Small of her Back several times. The Child lived from *Monday* till *Friday*, and then died of her Wounds and Bruises; otherwise, in all Appearance, she might have lived to have made a fine Woman. The whole Time of her being under Water (and that at the Depth of 4½ Feet,) was near 15 Minutes.

Attested by

John Bailey, *Miller.*

Rebecca Yates, *the Mother.*

The Mark + of Grace Cooper,  
*the Miller's Maid.*

An Account of  
a Treatise in-  
tituled, Opus-  
culum de Mor-  
bo Colico  
Danmonio-  
rum, eoque  
maximè Epi-  
demico, an-  
nexed to a  
Book intituled,  
Observationes  
de Aëre, &c.  
Auctore Jo-  
anne Hux-  
ham, M. D.  
by T. Stack,  
M. D. F. R. S.  
No. 451. P.  
439. Dec.  
1738.

XXV. The Subject of this Treatise is a very severe Colic, attended with bilious Vomitings excessively sharp, Constipation, excruciating Pains in the Abdomen, and several other Parts of the Body, a Palsy of the upper Extremities chiefly, and other dreadful Symptoms.

It was extremely epidemic among the poorer sort of People, from *Autumn* 1724, to the next ensuing Spring, which Year there was a vast Quantity of Apples, and consequently of Cyder; and it returns more or less every Year that Fruit abounds: Wherefore Dr *Huxham* ascribes it's Cause to the excessive Use of Apples and new Cyder.

In this Treatise, besides an accurate Description of the Distemper in it's several Stages, with the best Methods of Cure the learned Author could devise from long and large Experience, the Reader will find curious Disquisitions on the Nature of Apples, new Cyder, and Wine, their good and bad Effects, the Benefit of good ripe Cyder: Useful Observations on the Bile, especially when it becomes porraceous or black, acid or alkaline, and the prodigious Acrimony it sometimes acquires: On the good Effects of the continued Use of *Eccoprotics* in proper Cases; with several others equally valuable, which are much better set down in the Treatise, than can possibly be done in any Abstract.

An Account of  
a Book intituled,  
Diff. Epi-  
ditolica de

XXVI. There are, according to Dr *Trew*, two remarkable Observations, which animal Bodies suggest, 1st, That the same general Ends are accomplished in different Animals by all the possible Varieties of

of



of Means. *2dly.* That Animal Bodies are Machines, which produce in themselves all those Changes, that are necessary for their Preservation and Well-being. Thus the same general Ends of Chylification, Circulation, Secretion of Bile, &c. are accomplished in different Animals by Organs that differ considerably from each other; and in the same Animal the Body of the *Fœtus* is very different in its Structure from that of the Adult, at the same time that this Difference is effected by the Body itself, each subsequent Variation, the natural and mechanical Consequence of that which immediately preceded, and the whole conducted in the best possible Manner for the Welfare and Happiness of the Animal.

The Author's Design in this Dissertation is to consider those Differences of a Human Body before and after Birth, which affect the Circulation of the Blood. And for this Purpose he has given us 78 very curious and accurate Figures of the Parts relating thereto, such as the Heart, and Trunks of the great Blood-vessels, the Liver, the *Vena Portarum*, the Umbilical Chord, &c. subjoining to them a very minute and precise Explanation of each. Some of these Figures represent the Parts as they appeared immediately upon Dissection, others as inflated and dried, others again as injected with Wax; and lastly, others as having been first injected, and well dried, then cleared of the Injection, and laid open, in order to shew the several Cavities and Valves in their natural Dimensions and Positions. This last Method he prefers to all the rest, and observes, with relation to it, that the Injection must not be thrown in too hot, and that the internal Parts of the Preparation must be perfectly dry before we attempt to evacuate it; inasmuch as a Neglect of either of these Cautions would make the Valves, and their Membranes, shrivel up and contract themselves from their natural Sizes and Positions. The Manner of doing it is to suspend the Preparation in a proper Vessel placed in a gentle Heat, having first made an Aperture in the most depending Part, for the Injection to run out at.

From these Figures, with their Explanations, our Author draws the following Anatomical and Physiological Conclusions.

*1st.* That, contrary to *Casseri*'s Figure, the umbilical Vein enters the Liver towards the left Part of it.

*2dly,* That the Sulcus of the Liver, through which the Umbilical Vein passes, is not always the same. In some Subjects it furrounds the Vein along its whole Passage, in others only in Part of its Passage, and in others it is an imperfect Channel, which merely receives the Vein.

*3dly,* There is but one Umbilical Vein, it empties itself into the left Extremity of the *Sinus Vene Portarum*, and sends no Branches to the Liver.

*4thly,* The Communication between the Umbilical Vein, and the *Sinus Vene Portarum*, is so free, that the Blood has no Obstacle in passing

*differentiis quibusdam inter hominem natum & nascendum intervenientibus, deque vestigiis Divini Numinis inde colligendis.*  
Autore *Christ. Jacobo Trew,* Noribergicæ, 1736. 4to. by David Hartley, M. B. F. R. S. No. 457. p. 436.



passing either Way. Our Author asks therefore, What is the Cause of the Blood's Motion from the Umbilical Vein into the Liver, and whether the Pulsation of the Umbilical Arteries be one sufficient to produce this Effect?

5<sup>thly</sup>, The *Vena Portarum* sends no Branches to the Liver, but opens into a particular *Sinus*, called *Sinus Venæ Portarum*; and this Opening is nearer to the right Extremity of the *Sinus* than to the left.

6<sup>thly</sup>, The Diameter of the *Vena Portarum* is much less than that of the Umbilical Vein. The Diameter of the left Part of the *Sinus Venæ Portarum* is generally larger than both these together, never much less than that of the Umbilical Vein; and the Diameter of the *Canalis Venosus* is least of all. The Blood therefore of the *Vena Portarum* mixes with that of the Umbilical Vein in the *Sinus*. And since the Blood of the Umbilical Vein, which abounds with chylous Particles, does thus mix with that of the *Vena Portarum* in the *Fœtus*, it may be asked, Whether in Adults the Branches of the *Vena Portarum*, which arise from the Stomach and Intestines, do not suck up some chylous Parts from the Aliment? And whether both in the *Fœtus*, and in the Adult, Chyle be not a necessary Ingredient in the Composition of Bile? It is certain, that the Chyle passes into the *Vena Portarum* in Birds.

7<sup>thly</sup>, The *Canalis Venosus* empties itself into the *Cava Inferior*, where the three Veins arising from the Liver empty themselves.

8<sup>thly</sup>, The *Valves* which are placed at the two Extremities of the *Canalis Venosus*, facilitate the Ascent of the Blood in it, and also contribute to close it after Birth.

9<sup>thly</sup>, The *Valve* of the Coronary Vein is nothing else but it's external Coat, something elongated within the Cavity of the right *Auricle*; and it's Use is to close the Orifice of this Vein when the *Auricle* is distended with Blood, just as the nervous Coat of the Bladder closes the Orifices of the Ureters when the Bladder is distended with Urine.

10<sup>thly</sup>, *Eustachius's Valve* is found both in the *Fœtus*, and in the Adult; and it's Use seems to be, to direct the Blood's Motion variously, according to the various Circumstances of the right *Auricle*, during it's *Diastole* and *Systole*; and principally to hinder the Regress of the Blood into the *Cava Inferior*, when the *Auricle* is contracted.

11<sup>thly</sup>, The Use of the *Foramen Ovale* and *Canalis Arteriosus*, seems to be, to intercept Part of the venal Blood, and transmit it to the left *Auricle* and *Aorta*, that so the whole be not forced upon the Lungs during their State of Inactivity in the *Fœtus*; of the Membrane, which is placed before the *Foramen Ovale*, to direct the Communication of the *Auricles* before Birth, and prevent it afterwards; and lastly, of the valvulous Productions at the two Extremities of the *Canalis Arteriosus*, in like manner to direct the Blood in it's Motion through this Canal before Birth, and to exclude it afterwards. Here our Author enters into a very minute Examination of Monsieur *Mery's* Hypothesis, but does not agree to it; affirming, that the Membrane of the *Foramen Ovale*



*Ovale* is so placed as to permit the Blood to pass freely from the right *Auricle* to the left, during the *Diastole* of the *Auricles*, but never from the left *Auricle* to the right.

12<sup>thly</sup>, The Use of the *Urachus* in the human *Fœtus* is not yet discovered. Our Author here supposes, according to the Determination of the best Anatomists, that the human *Fœtus* has no *Allantois*.

13<sup>thly</sup>, The Situation of the Stomach in the *Fœtus* is such, as makes up for the want of Action in the *Diaphragm*, as far as relates to Digestion. For as in the Adult, the Action of the *Diaphragm* facilitates the Descent of the Aliment, so in the *Fœtus* the *Cardia* is made to rise above the *Pylorus* more than in the Adult, from it's Connexion with the *Diaphragm*, for the same Purpose.

14<sup>thly</sup>, The Smallness of the Stomach in new-born Children shews, that it ought not to be oppressed either with much Aliment at once, or with such as is gross.

15<sup>thly</sup>, The Descent of the *Testicles* into the *Scrotum* does not always happen at the same time.

16<sup>thly</sup>, The recurrent Nerve seems to be some way subservient to the *Canalis Arteriosus*. This our Author conjectures from it's passing round the *Aorta* just where this receives the *Canalis Arteriosus*; but observes, that the Knowledge of the Use and Action of the Nervous System is much more imperfect than any other Branch of the Animal *Œconomy*.

*There is a short Dissertation (with 4 Figures of the Tongue, it's Vessels, Glands, Muscles, and Nerves annexed) by the same Author, whose principal Intent is to shew, that the Vessels called salival Duets by Coschwitzius, are not salival Duets, but Veins.*

## C H A P. VII.

*The Bones, Joints, and Muscles.*

I. 1. **I**T is the Skeleton of a Man, whose Bones, during his Life-time, were almost all grown into one entire Bone; so that now his Flesh is taken from them, he is, without further Trouble, one entire Skeleton. The only Bones he could move before his Death, were the Wrist of his right Hand, and the Bones of his Knees, so that he could move his Legs a little; and, when set upright, could in about  $\frac{1}{4}$  of an Hour get a Foot forward.

For many Years before his Death, he could not alter his Posture in the least. His Name was *William Clarke*. He was maintained till his Death by one Mr *Aldworth* in this County. He was valued by his Master on account of his Honesty. The only Use he was capable of being

*Concerning an extraordinary Skeleton, by the R. R. Robert Lord Bishop of Corke. No. 461. p. 810. Aug. &c. 1741. Dated Corke, Aug. 8, 1738.*



being put to, was that of watching the Workmen ; for, when he was once fixed in his Station, it was impossible for him to desert it.

At about 18 Years of Age, he began to be unwieldy, and so continued growing more stiff, till he lost all Use of his Limbs, and died in in the 61st Year of his Age. The Posture into which he fixed at last, is somewhat like that of the *Venus of Medicis*, only that his right Hand is the lowest, and the left Hand does not rise higher than the Elbow of the right. He was originally deformed, his left Shoulder rising higher than his right ; the *Vertebrae* of his Back are exceedingly bent inwards towards the lower Part, with an Inclination towards the left Hip. The *Os Sacrum* is so bent outwards, that you have no Sight of it at all, as you view the Skeleton in Front. His left Knee does not come down so low as the right by 3 or 4 Inches. There is hardly one Bone in his Body in the Figure it ought naturally to be, except the Bones of his Legs, which are not much distorted.

He is one entire Bone from the Top of his Head to his Knees. His Head seems regular, and the Sutures pretty distinct, though more united than in common Skulls. His Jaw-bones seem entirely fixed, and grown together, as are also the Teeth in the hind Part of the Jaw. His fore Teeth are very irregular, which left a Vacancy for him to suck in his Food at. Out of the Back of his Head there grows a Bone, which shoots down towards his Back, and passes by the *Vertebrae* of the Neck at about an Inch Distance : This Bone unites to the *Vertebrae* of the Back, and the *Scapula* of the left Shoulder, from whence it disengages itself again, and continues distinct, till it divides into two towards the Small of the Back, and fixes itself into both the Hip-bones behind. The *Vertebrae* of the Neck and Back are one continued Bone.

In the fleshy Part of his Thighs and Buttocks, Nature seems to have sported herself, in sending out various Ramifications of Bones from his *Coxendix* and Thigh-bones, not unlike the Shoots of white Coral, but infinitely more irregular ; some behind, and some before ; some in Clumps and Clusters, and others in irregular Shoots, of 8 or 9 Inches in length. You cannot pass your Hand between his two Knees, which incline much towards the right, his left Shoulder having been the highest. One of the Bones of his left Arm was once broken by a Fall, and Nature has shot out another Bone a little above the Bending of the Arm, which unites to the broken Bone, and makes it much stronger than it was before, though the Bone seems more liable to decay about the Place where it was formerly broken. All the Cartilages of his Breast, four only excepted, were turned to Bone. These four served to move his Breast in Respiration.

Out of his Heels there frequently grew Bones like the Spurs of a Cock, two or three Inches long, which he shed as a Deer does his Horns. When he was dissected, there was a Bone found in the fleshy Part of his Arm, quite distinct and disengaged from any other Bone ;  
it



it is very thin, about 4 Inches long, and  $\frac{1}{4}$  of an Inch broad, with several Ramifications. What is very odd, is, that while these Bones were growing, he never complained of any Pain in his Muscles.

2. *William Clarke*, a poor Man of the County of *Corke*, about 18 Years of Age, complained of a Stiffness in his Joints, which by Degrees increased till it came to an universal *Anchylosis*; that is, all his Joints were immoveable or ossified. He lived in this Condition 38 Years, and Dr *Barry*, the Physician at *Corke*, has made a Skeleton of him; and his Account of it is this: Not one Bone in his Body has the natural Form; for all his Joints are immoveable and ossified; and such a luxuriant Disposition had all the Humours of his Body to turn into Bone, that many little Branches of Bone, like Coral, spring from the Joints and several Parts of the Body. The whole Spine is ossified, and one intire Arch of Bone there is from the *Occiput* down to the *Os Sacrum*; out of which arises a very protuberant Bone. which serves as a fine Handle to the Skeleton. A sharp Horn, like a Cock's Spur, grew out of his Heel every Year.

Fig. 116. *The Front of the Skeleton.*

Fig. 117. *The Back-side of it.*

—by the Rev.  
Dean Cop-  
ping, F. R. S.  
Ibid. p. 819.

Fig. 116, 117.

3. The Man died in the County of *Corke*, 20 Miles from that City: When I was there, he was Steward to Mr *Allworth*, his Name *Clarke*; the Account I am going to give, I had from the Lady he lived with. Twenty Years before he died, he got a violent Fever, by being very warm, and sleeping on the Grass, most Part of the Night. After he recovered from that Disorder, he was never free from great Pains in his Bones, and in four Years lost the Use of all his Limbs, even the moving his Jaws, that they were obliged to take out many of his Teeth, in the Front of his Mouth, to give him Sustenance, Spoon-meats, and Ale, on which he lived 16 Years: In those Years he could neither sit or lie down, but slept in a Sentry-box, with a small Board which ran in a Groove, and against that he leaned his Stomach: He could never move his Head, by a Bone that grew from his Scull to his Back-bone. I wrote you before, that he slept in the Box, but should have let you know, he did not live in it; for whenever the Weather would permit, he got into the Air: He could move himself on even Ground, with a little kind of Jump, and stand many Hours in the Garden, leaning his Back against a Tree, or Wall: They think his moving with that Motion, and being so much in the Air, kept him alive so long.

—by Mrs —  
Ibid. p. 820.

II. In *Nov. 1737*, a Gentleman, aged 27, complained to me of a Swelling in the Inside of his right Thigh (being in every other respect in perfect Health). Upon Examination, it appeared to be an encysted Tumour of the steatomatous Kind, lying loose between the *Sartorius* and *Vastus Internus* Muscles. I told him, I could propose no way of curing it, but by taking it out; which was accordingly done, and he very well in 6 Weeks.

*An Account of  
Tumours,  
which render-  
ed the Bones  
soft, by Mr  
Pott, Surgeon.  
No. 459. p.  
622. Jan. 1741.*

After



After this he continued well for near a Year (except that he now and then complained of a slight Pain in the Joint of that Hip, which went off and returned at different times); and then fell into such a Disposition to sleep, that no Company or Diversion, nor his own Endeavours to the contrary, could keep him awake after 8 or 9 o'Clock in the Evening, if he sat down.

This continued on him for 3 or 4 Months, and then the Pain in his Hip grew worse; for which he used the Cold bath, Flesh-brush, and riding on Horseback, but without any Effect.

Hereupon he asked the Advice of Dr *Beaufort*, who put him into a Course of the *Æthiops Mineral*, *Cinnabar of Antimony*, and *Gum Guaiacum*, with the *Spa-water*, and purging with *Calomel*, by Intervals: This Method he pursued for a considerable time, but without any Benefit.

After this, by the Advice of some Acquaintance, he took ʒss of *Salt of Hartshorn* Night and Morning, in a Draught of warm *Whey*, for some time; but without any sensible Effect, even by Perspiration.

Some little time after this, he began to complain of a slight periodical Heat and Thirst, which returned every Night, with a quick hard Pulse, but which was not so great as to make him uneasy.

It was now *Sept. 1739*, when, having an Opportunity of going with some Friends, he determined to try what the *Bath* would do for him: In his Journey thither, the nocturnal Heat and Thirst increased so much, as to prevent his sleeping; but in the few Days that he spent in recovering from the Fatigue of the Journey, they seemed to go off again.

He then began to use the Waters both internally and externally; upon which the last-mentioned Symptoms again appeared, and he was obliged to desist, and use cooling Medicines.

His Physicians then advised him to bathe the affected Limb only; upon which they returned again, and with such Violence, that the farther Use of the Waters was thought highly improper, and he left them off.

During this time the Sight of his left Eye grew dim, which Dimness increased gradually for some little time, till he became quite blind of that Eye; the Bulb of it being considerably enlarged, and thrust forward out of the Orbit.

For the most part of the time he had been at *Bath*, he had generally been very costive; and, upon leaving off the Water, had no Stool for some Days; for which Reason a common Clyster was given, and produced so profuse a Discharge of serous Matter, and continued for so many Hours, (almost incessantly) that he was reduced as low as possible.

For some time past, several small Tumours had appeared in different Parts of him, *viz.* 5 or 6 on his Head, 2 or 3 on his Back, and one in the Neck, all lying just under the Skin, and sensibly increasing every Day, till they came to a considerable Size.



Dec. 2, 1739, he returned to London.

His chief Complaints now were an excessive Languor, an Inability to move his right Hip (and when moved by another Person, a very acute Pain in it); an Incapacity of sleeping when in Bed, and an intense Thirst in the Night, with a quick hard Pulse.

He now took the Advice of Dr *Hartley* and Dr *Shaw*, who prescribed him the *Cinnabar* of *Antimony* three times a Day, to drink the *Sellers* Water, and keep to a cooling Regimen: and allowed him a moderate Dose of the Pill *Matthæi* every Night; by means of which he got some Sleep, of which he had for some time been absolutely deprived.

When he had taken the *Cinnabar* 5 or 6 Days, and during that time had no Stool, it was thought proper to give him a Clyster; which brought away all the Medicine, without the least Alteration; nor was there ever after this Time any Appearance of any *Mucus* being secreted by the Intestinal Glands, he never going to Stool above once in a Week (and then there came away a few Lumps of Excrement as hard as Pieces of Wood); which were expelled with such Labour and Fatigue, as can hardly be imagined; though he generally took an oily Clyster to render it more easy, and washed down his Medicines with a soapy Draught.

The Joint of the Hip was now become quite stiff, all the Inguinal Glands being loaded with the same kind of Matter of which the other Tumours seemed to be composed; and a large Cluster more of them might be felt under the *Glutei Muscles*, and behind the *Trochanter*.

The *Cinnabar* was now left off, and mercurial Unction proposed and consented to; and accordingly a proper Quantity was rubbed in every Night, stopping now-and-then to see what Turn it would take; and in this Course he continued for more than a Month, but without any Benefit; nor did the *Mercury* produce any visible Effect on him.

Sir *Edward Hulse*, being called in, directed the burnt Sponge, which he took for some time, till, growing worse and weaker, he determined to try Mr *Ward*.

He took his sweating and purging Medicines 2 or 3 times, but found no Sort of Effect from them; and being now quite tired of Physic, and reduced extremely low, he determined to pass the rest of his Time as easily as he could, by gradually increasing his Opiate; and in this manner languished, incapable of stirring or helping himself, till *May 2*, 1740, and then died.

For a considerable Time before he died, he was nourished by Fluids only: Yet, as soon as ever they were received into the Stomach, in however small Quantity, they gave him an acute Pain at the Bottom of his Belly just above the *Pubis*.

For 2 Months, or more, before his Death, he could never make any Water while he was up, but always made a good deal at different times when in Bed.



Soon after his Return to *London*, I opened the Tumour I had taken out of his Thigh 2 Years before, and found the Inside of it ossified.

Upon Dissection, the first thing that offered itself was a large *Tumour* on the *Sternum*, which had been perceived about 3 Months before he died: It was as large as a *Turkey's Egg*, and so hard and immoveable, that I was in doubt whether it was upon or under the Bone.

Upon removing the Skin, it appeared covered by the Expansion of the Tendons of the intercostal Muscles, and the *Periosteum*: This Coat being taken off, it was of a suetty kind of Substance for about  $\frac{1}{2}$  an Inch deep; and below this was a kind of Cartilage intermixed with a great many bony Particles. I then shaved off all this diseased Body even with the Surface of the rest of the *Sternum*, but found no Bone, it being quite dissolved and confounded with the Mass of Matter that composed the *Tumour*, which was equally protuberant within the *Thorax*, and composed of the same Materials.

Part of the 5th and 7th Ribs were dissolved in the same manner, into a kind of Substance between Bone and Cartilage, with a thick Coat of steatomatous Matter.

Within the Cavity of the *Thorax* were 37 of these diseased Bodies, most of them attached either to the *Vertebrae* or the Ribs; and wherever they were attached, the *Cortex* of the Bone was destroyed, and it's internal cellular Part filled with the diseased Matter.

Immediately above the *Diaphragm* was a large scirrhous Body, lying a-cross the Spine and the *Aorta*, the latter of which lay in a *Sinus* formed in it's lower Part; it had no Attachment to any other Part, and weighed  $13\frac{1}{2}$  Ounces; and from it's Situation, I think, must have taken it's Rise from some of the *Lymphatic Glands* lying about the *Thoracic Duct*.

From the Origin of the *Aorta*, from the Heart, quite up to the Basis of the *Cranium*, all the Blood-vessels were surrounded with these scirrhous Bodies, and the *Thyroid Gland* was diseased in like manner, and bony within.

On the left Side was another of these Bodies, made out of the *Glandula Renalis*, weighing  $9\frac{1}{2}$  Ounces.

On the right, the *Glandula Renalis* was in a natural State; but the *Cellular Membrane*, which surrounds the Kidney, was filled with a large Cluster of these Bodies of different Sizes, some of them entirely suetty, others intermixed with bony Particles: 3 or 4 of them were attached to the Body of the Kidney, and these were a sort of *Cartilage*, beginning to ossify.

The *Pancreas* was quite scirrhous, and very large.

One very large *Tumour* sprung from the spongy Body of the third *Vertebra* of the Loins, the bony Texture of which was so dissolved, and mixed with the Matter of the *Tumour*, that the Knife passed through it with great Ease.

The



The inner Side of the *Os Ilium*, all the *Ischium* and *Pubis*, were covered with these Appearances; and upon removing them, the Bone was found in the same State as the *Sternum* and Ribs.

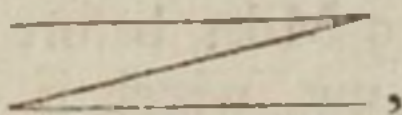
The Middle of the right *Os Femoris* was surrounded with a Mass of the same Matter, and the Bone underneath in the same State.

In the Bottom of the Orbit, surrounded by the *Recti Muscles*, was a pretty large *Steatoma*, which occasioned the Protrusion of the Eye; and, by pressing on the optic Nerve, (in all Probability) the Blindness.

III. The Wife of one B. S. in the Year 1738, was taken with a Diabetes, with the usual Symptoms, viz. A frequent and copious Discharge by Urine, a gradual Wasting of the Body, a hectic Fever, with a quick low Pulse, Thirst, great Pains in her Shoulders, Back, and Limbs, and Loss of Appetite. She continued in this manner 2 Years, (notwithstanding the Use of Medicines generally prescribed in such Cases) much emaciated; at which time she was attacked with an Intermittent, which soon left her; after which the Diabetes gradually decreased, so that in some few Months she was entirely free from that Disorder, but the Pains in her Limbs still continued. She recovered her Appetite very well, breathed free and easy, and her Hectic very much lessened, though she had some Appearance of it at times.

About 18 Months ago, she had such a Weakness and Pains in her Limbs, that it confined her to her Bed altogether; and in a few Months her Bones in her Legs and Arms felt somewhat soft to the Touch, and were so pliable, that they were bent into a Curve; but for several Months before her Death, they were as limber as a Rag, and would bend any way, with less Difficulty than the muscular Parts of a healthy Person's Leg, without the Interposition of the Bones.

The 12th of April 1742, after a long and tedious Illness, she died, near the Age of 40: And, having the Consent of her Friends, I had the Curiosity to examine more particularly into the several Matters before-mentioned. Upon raising the *Cutis*, I found the *Membrana Adiposa* much thicker than I expected in a Person so much emaciated: The *Sternum* and Ribs, with their Cartilages, were very soft; and all the cartilaginous Parts of the Ribs, at their Articulations, from the *Clavicle* downwards, were doubled over one another on the left Side, about an

Inch, in this Form  only flatter. Upon raising the

*Sternum*, I found the Lungs adhered very close to the Ribs, for 4 or 5 Inches on each Side; but were more loose and flaccid than usual, and much less in Size: Her Heart was of the common Bigness. Upon viewing her Liver, I found it at least  $\frac{1}{3}$  bigger than common; and her Spleen was about  $1\frac{1}{2}$  Inch in the longest Part, and a Quarter thick: The *Intestines* were very much inflated.

She had Appearances of several *Anchyloses* formed in the small Joints, viz. carpal and metacarpal Bones; but, upon laying them open, I found them only like a thin Shell: The cartilaginous *Epiphyses* of the Bones

*The Bones of a Woman growing soft and flexible, by Mr Sylvanus Bevan, F. R. S. No. 470. p. 48ll. Read May 5, 1743.*



*A Case of extraordinary Exostoses on the Back of a Boy.*

were entirely dissolved, and no Parts of the Heads of the Bones remaining, but an Outside, not thicker than an Egg-shell.

Upon making Incisions in her Legs and Arms, 5 or 6 Inches long, I found the outer *Laminæ* of the Bones soft, and become perfectly membranous, about the Thickness of the *Peritoneum*, containing (instead of a bony Substance) a Fluid of the Consistence of Honey, when it is thick, of a reddish Colour, not at all disagreeable to the Smell: There was no Appearance of any Bones in her Leg and Arms, except near the Joints, which were in part dissolved, and what remained were very soft, and full of Holes, like a Honey comb: Also the Bones of the Head would easily give way to the Pressure of the Finger.

It is remarkable, that those Parts of the Bones that are the most compact and hard, were first dissolved, while their Heads, which are more spongy and soft, had not so entirely lost their Substance.

When she was in Health, she was 5 Feet high, as I am informed by her Husband: I measured her after her Death, and she was but 3 Feet 7 Inches in length, though all her Limbs were stretched out strait, which is 17 Inches shorter than she was in her Health: The Bones, which serve as Levers for the Muscles to act upon, being dissolved, these had nothing to keep them extended in their usual Position.

The Person was under the Care of Dr *Cadwallader* of *Pensilvania*.

*A Case of extraordinary Exostoses on the Back of a Boy, by Mr John Freke, F. R. S. Surgeon to St Barth. Hosp. No. 456. p. 369. Jan. &c. 1740.*

IV. *April* 14, 1736, there came a Boy of a healthy Look, and about 14 Years of Age, to ask of us at the Hospital, what should be done to cure him of many large Swellings on his Back, which began about 3 Years since, and have continued to grow as large on many Parts as a Penny-loaf, particularly on the left Side: They arise from all the *Vertebrae* of the Neck, and reach down to the *Os Sacrum*; they likewise arise from every Rib of his Body, and joining together in all Parts of his Back, as the Ramifications of Coral do, they make, as it were, a fixed bony Pair of Bodice.

It is to be observed, that he had no other Symptom of the Rickets on any Joint of his Limbs.

*A large Piece of the Thigh-bone, which was taken out, and it's Place supplied by a Callus, by R. Richardson M. D. F. R. S. No. 461. p. 761. Aug. &c. 1741. Fig. 118.*

V. 1. The following Case was drawn up by Mr *Wright*, a Surgeon, in *Bradford*, in the West-Riding of *Yorkshire*, who performed the Cure; and a few Days ago, for my Satisfaction, brought the Person hither, who that Day had walked 9 Miles before Noon. I examined the Part where the Bone was taken out, which is on the Inside of the Thigh, about 4 Inches above the Knee; and found the Thigh quite strait, but rather thicker than the other, where the *Callus* supplies the Defect of the Bone taken out. He appears to be very well and healthy, and makes no Complaint of any Weakness, or Uneasiness, in the Part; neither is he in the least lame. He brought the Bone, which I herewith send, some time ago, and, at my Request, drew up the Case: I really believe the Contents to be true. I find a Case of this kind in *Ruyseh's Museum Anatomicum*, pag. 172, but he gives no Account of the Cure; neither is it so extraordinary in itself, as it is only Part of the



*Os Tibiæ* which is separated; and this which I send you, appears to be the whole Substance of the Bone, except what was eat away before it was taken out.

2. This Bone is Part of the *Os Femoris*, taken out of a young Man's Thigh, 20 Years old, about the latter End of *March* 1738. His Name is *Hird Ramsden*, he lives at a Place called *Braithwait*, near *Kighley*. His Lameness was occasioned by a Fever, which was translated into his Thigh, where it impostumated, and was afterwards opened; but, not healing again, left 3 or 4 carious or fistulous Ulcers, which discharged a great Quantity of *Sanies*, and fetid Matter. In this Condition he had been 6 or 7 Years, before I was concerned for him, and was looked on as incurable; this continual Discharge had reduced him almost to a Skeleton. I examined his Ulcers with my Probe, and found in one of them, which was on the Inside of his Thigh, a rotten Bone: I dilated the Orifice with *Gentian* and *Sponge-Tents*, and afterwards laid it open about 3 or 4 Inches: I then dressed it with *Tincture of Myrrh*, and Dossils of dry Lint; and at every Dressing, over the carious Bone the Powder of *Rad. Aristol. Myrrh*, and *Euphorb.* in order to promote Exfoliation: With these Applications the Bone began to loosen, which looked much larger than I expected. I was afraid of making another Incision, because of the crural Artery, which lay very near the Place where the Bone was taken out: I therefore chose rather to do it gradually by dilating the Orifice, than run the risque of another Incision. The same Dressing was continued, and the spongy Flesh kept down with the Powder of *Merc. præcip. rub. & Alum. Ust. aa.* At every Dressing I raised the Bone with a hooked Instrument, and in about 4 Months time I got it quite out. The Cavity was afterwards kept open for some time, with Dossils of dry Lint, to make way for some loose Pieces that were left behind. The Ulcer, after it was well digested, healed up in a little time. During this time his Knee was very much contracted, which was afterwards extended by the Use of emollient Fomentations. He now is perfectly sound, and in a good State of Health, walks strait, and his Thigh is not any shorter than the other.

*The Case, by Mr Wm. Wright, Surgeon. Ibid. p. 762.*

VI. 1. *Samuel Bush*, of the Parish of *Wickham-Bishops*, in September 1704, being on the Top of a very high Timber-Tree, in order to shake down the Acorns, he let go his Hold; and by falling from one Bough of the Tree upon another, he broke his Thigh-bone; and one End of it, by the Force of the Fall, stuck fast in the Ground, which fractured the Bone in another Place, about 2½ Inches above the former. This entire Piece of the *Os Femoris* was taken out, notwithstanding which, so large a *Callus* united the two Ends of the Bone, that his Thigh (when cured) was very little more than a Quarter of an Inch shorter than the other Thigh. The Surgeon, who had the Care of him, used his greatest Endeavours, during the Cure, to preserve the Extension; but he imputed the Largeness of the *Callus* to a very great Quantity

*Two extraordinary Cases in Surgery, by Bezaleel Sherman, Surgeon, at Kelvedon in Essex, communicated in Nov. 1738. No 453. p. 138. Apr. &c. 1739.*





Quantity of *Lap. Osteocolla*, which he made him take for 6 Weeks or 2 Months, in Powder with Milk, in an Electuary, in his Bread, and in his Pudding; in short, in almost all the Food he took.

2. ——— *Fitch*, of the Parish of *Kelvedon*, had a foul Ulcer in his Mouth, with a *Caries* in the lower Jaw-bone, one Part of which, from the Suture at the Chin to the End of it under the Ear, in Process of Time entirely came out, with 3 Teeth in it. This was also owing to a great Quantity of *Osteocolla* internally given, which was thought not only to expedite this large Exfoliation, but at the same time to generate so large and firm a *Callus*, that he can chew an hard Crust, or any other Food, on that Side as well as on the other.

*The Description and Draught of a Machine for reducing Fractures of the Thigh, by Mr Henry Ettrick, Surgeon. No. 459. p. 562. Jan. Ec. 1741. Fig. 119.*

VII. It consists of no more than a Wheel and Pinion, with their Axles; the Roch, or snagged Wheel, being herein accounted as Part of the great Wheel, fixed in a light Frame of about 2 Feet long, the whole not exceeding the Weight of 15 Pounds; and when taken to pieces, by unscrewing the Frame-pieces, may be packed up in a common Rush-basket, belted to the Side, and conveyed to any Distance. Again, the Room it takes up in working is not a full Yard, and may be set up and fixed for Use in a few Minutes. In using this Machine, the Surgeon needs but one Assistant; whereas, in most other Methods, their Number is most troublesome and inconvenient: The Business of this Assistant is no farther than to mind the Surgeon's Orders, and move the Winch according to his Direction. When the Extension is sufficient, the Engine stays itself, and continues the Tension of the Limb, by the Assistance of this Roch, or toothed Wheel, whose Teeth are cut fine enough to stay the Engine at every Line of an Inch, and which is fixed on the Back of the aforesaid great Wheel, both to the Cross by the Help of Screws, and on it's Arbor by having it's Centre squared out, so as to fix tight thereon, and so near the Frame as only to allow a bare Clearidge: It's Teeth, standing counter to the former, admit the Spring or Catch fixed on the Inside of the Frame, to slip over the Vertex thereof, without Interruption; but in a reverse Rotation, or when the Engine is about to come up, flies into the Spaces thereof, and stays the same: The upper Part thereof projects about an Inch from the Frame, so that being pressed upon by the Finger of one Hand, the inferior Part is elevated above the Range of the Teeth, to admit the coming up of the Engine, which is to be directed by the other Hand being applied to the Winch in any Degree. This Engine has it's Power so commanded, that it may be used without Restriction, from the most robust to the most tender Frame, seeing it acts and exerts it's Power in Proportion to the Resistance made. Farther, as hinted at before, it is enriched with all those Properties, which Authors affirm necessary to a successful Operation; for this Extension, according to their Observation, is made deliberately, steady, equally, and in one continued Line, without the least Variation. And further, in oblique Fractures of the Thigh, where the Bones are apt to ride, (and therefore,



therefore, on that Account, require a continued Extension in a certain Degree, to prevent the Limbs shortening after the Cure) such a Machine must be of excellent Service; having the Property of increasing or decreasing the Extension at Pleasure, and to be perfected without the least Jar or Tremor.

The necessary Appendages are Bands, by which the Engine extends the Limb, and deserve the following Observations: Immediately from the Axle of the great Wheel comes a Girt, at the other End of which Girt is a Hook, which links into a Swivel-ring at the Bottom of a Sole-plate: This Sole-plate answers the Shape of the Foot, and is made of well-hammered Brass, the Inside of which is padded, to fit easy to the Foot: The upper Part hath a Strop fixed thereto, which clasps over the upper Part of the Metatarsal Bones; and to keep the Stropps ending in the Sole-plate from galling or pressing the Sides of the Foot and Ankle, there project 2 Arms from the Sides of this Sole-plate, to which the Stropps coming from the Ankle-band are fastened. That the whole Limb may be kept in a Line with the Machine, the Leg is suspended by Bands, one of which is placed at the Ankle, from the Sides of which pass two Stropps, to join the inferior Knee band: From this Band pass two Stropps to the superior Knee band: All these Stropps are designed to divide the Extension, so that all Parts may equally bear alike, and so to secure the Joints of the Limb from the Violence of the Extension. The Insides of these Stropps are lined; the Bands incircling the Limb are contrived in the same manner as the Bow or Spring of a Truss, having strong Clasps at the Ends, after the manner of those for Pocket-books, to fit any Dimensions. The Band embracing the Part above the Fracture, and from which pass two Stropps to the Head of the Bed, to make the Counter-Extension, is of the same kind as the former, and is to be kept on, the whole Time of Decumbiture, to prevent the Patient's Body sinking on the Fracture, and thereby contracting the Limb. The exterior of the two last-mentioned Stropps presses just beneath the great *Trochanter* on it's Outside; the other comes from the anterior Part of the same Band, and in such a Scite as to give the Patient Liberty to raise himself at Discretion. To preserve the natural Curvity of the Thigh, it would be necessary to have a large broad Band arising from the Bedside, to encompass the fractured Part, and keep it steady.

Explanation of Figure 119. A. A. Represents the Bed. B. The Patient. C. The Machine at the Feet of the Bed. D. D. The Frame. E. The great Wheel. F. The Rock wheel, with a Catch and Spring, to prevent the Wheel going back. G. The Pinion. H. The Winch. I. The Arbor of the great Wheel, whereon the Girt K is fixed: The Diameter of the Barrel thereon is 2 Inches. L. The End of the Girt fixed by the Ring M, to the Sole-board N. O. The Band which passes over the Instep. P. The Ankle-band. Q. The Strop which passes from the Sole-plate to the Ankle. R. The Strop continued from the Ankle to the Knee. S. The Knee-



*Knee-band.* T. The superior Knee-band, with the Strop continued as before. V. The Band embracing the Part above the Fracture. W. W. The Counter-strops passing to the Bead's-head. X. The lateral Band to preserve the Curvity of the Thigh-bone.

P. S. I thought it would not be improper, if I should attempt to demonstrate to what great Exactness Machines of this Nature may be made to operate.

A Specimen of which I beg leave to present as follows: Admit the Barrel 4 Inches Diameter, the Roch-wheel to be cut with 48 Teeth, the great Wheel to have 32, answerable to a Pinion with 8. The Reason of pitching on a Barrel of this Dimension is, that it may be more precisely judged what Extension has been made; for repeated Revolutions of the Girt upon the Cylinder, in extending, would, by it's uncertain Increase, subject the Judgment to err; whereas the utmost Extension required comes within one Revolution of this Barrel. The Teeth of the Roch to be numbered at every  $\frac{1}{4}$ , which will be at every Inch, and equals in one Revolution the Periphery of the Barrel; consequently every Tooth of this Roch will stretch the Limb  $\frac{1}{4}$  of an Inch: So though the Spring or Catch to the said Roch should pass the capital Numbers, and stop in the Interspaces thereof, it is only counting from the last capital Number to the Place where the Spring is, and that gives the Parts of the Inch: By the same Rule the Winch, every Turn it makes, will gain  $\frac{1}{4}$  of this Wheel, which will be 3 Inches, or 12 Teeth; and 4 Revolutions thereof will answer to the Periphery of the Barrel: So by measuring the sound Limb, and comparing the fractured therewith, the Extension required may be nearly demonstrated. With the Use of this Machine, I should recommend the 18 Tail Bandage to the circular Rollers of *Hippocrates*, since they are both less troublesome to the Surgeon, and less painful to the Patient; nor yet so liable to wreath the Muscles, and distort the Ends of the fractured Bones.

And to render this Machine of the like Service at Sea, where we are in the greatest need of Helps of this Nature; I have designed a Bed to swing and yield to the Ship's Motion, whereon the Patient is to be laid, with the Engine thereto fixed, that the frequent Discomposure and Disturbance given to the fractured Part by the Ship's rolling and working at Sea, may be prevented.

*The Amble of Hippocrates for reducing Luxations of the Arm with the Shoulder, rectified, by M. le Cat, M. D. F. R. S. Surgeon to the Hôtel Dieu at*

VIII. 1. It is known to consist of an horizontal Lever A, and of a fixed Point B, made of a Piece of Wood standing vertically, to the Extremity of which the Lever is joined by a Hinge. The Patient sitting, and his Arm, that is hurt, being raised, the Machine is pushed forward under the Arm-pit, so that the vertical Piece of Wood is applied along the Ribs, where the Lever enters into the Arm-pit up to the End of the luxated Bone, or even farther. This Circumstance is essential, and even recommended by *Hippocrates*: "In the first Place," says he, care must be taken, that the Top of the Piece of Wood "must



“ must go above the Head of the Arm, quite into the Arm-pit.” The Arm is tied to this horizontal Piece, and then an Assistant bears upon the *Scapula* and the *Clavicula*, as is seen in the Figures of *Scultetus*, Plate 21, whilst another presses down the Lever, and thus makes the Bone come into it's Place again.

*Hippocrates*, giving the Description of this Invention, and of it's Use, acknowledges, that this Method of reducing the Luxations of the Arm is incomparably better than all the others; for, says he, the working of it is sufficiently powerful; and provided Care be taken to push the Lever farther on under the Arm-pit than where the Bone of the Arm lies, the Extensions and Counter-Extensions are equal, and the Bone of the Arm is safe: He adds, That by this Method fresh Luxations are reduced sooner than one thinks, and even before the Extension appears to have been made; and that, as for old Luxations, they can only be reduced by this Method; unless, by their being too old, the Cavity of the Articulation be filled up, and that the Head of the Bone has formed to itself an Articulation in the Place where it fell: He even believes, that such a Luxation may be reduced; for, says he, What is there that cannot be moved by sufficient Forces? But at the same time he thinks, that the reduced Bone will not remain in it's Place, but luxate itself again, and fall back into the new-formed Articulation, which it has formed to itself.

M. *Petit*, in his Treatise of the Diseases of the Bones, was sensible of all the Perfections of the *Ambe* of *Hippocrates*: He acknowledges, with that Father of Surgery, that this Machine has a *sufficient Force*, and is more than sufficient; that it makes an *Extension and a Counter-Extension equally strong*; he even adds, that *the Arm is placed there as it ought to be, in order to relax the Muscles, or at least stretch them equally*, which is the fourth Rule the Author proposes to be observed, in making the Extension and Counter-Extension. But at the same time M. *Petit* does not dissemble some essential Defects he finds in this Invention, and which, without doubt, were unknown to *Hippocrates*.

The capital Defect in this *Ambe* is, that *it pushes the Head of the Bone into it's Cavity, before the Extension and Counter-extension are made*. The dangerous Consequences of this Defect, are, according to M. *Petit*, 1<sup>st</sup>, That the Reduction is very difficult, because the Bone is not conducted by the same way it took in luxating itself, and that one meets with Obstacles from the Parts that surround it, even the *Scapula* itself, on which it articulates. 2<sup>dly</sup>, In making those Efforts for surmounting those Obstacles, one runs the risque of turning inwards the cartilaginous Edge of the Cavity of the *Scapula*, or the *Capsula Ligamentosa*. The second Defect of the *Ambe* of *Hippocrates* is, that *it cannot move the luxated Bone but from below upwards*; consequently, this Machine is only proper in Luxations directly downwards; and yet it is certain, that the Arm luxates itself both outwards and inwards; and even it is known to all Practitioners, that Luxations forward are very frequent. Here you

Rouen. Ex-  
tracted from  
the French, by  
P. H. Z.  
F. R. S. No-  
469. p. 327.  
Read Feb. 17,  
1742 3.  
Fig. 120.



have a great Number of Luxations of the Arm, where the *Ambe* becomes useless: Now, if the *Ambe* of *Hippocrates* is useless in all Luxations outwards, and in Luxations inwards, which are very frequent, if it is dangerous in Luxations downwards, the only ones it is fit for, one must own, that this Machine, so much cried up by *Hippocrates*, is yet very imperfect.

These Imperfections are real ones; but the Advantages, which one cannot but own it has, are so constant, and so superior to those of any other Practice, that one naturally inclines not to part with it, but becomes desirous to remove those Defects it has, without which it would certainly be, as *Hippocrates* assures, the most perfect of all Machines made use of in reducing a luxated Arm: For supposing an *Ambe*, which makes a sufficient *Extension* and *Counter-Extension*, before it leads the Bone into the Cavity, or at the same time it does so, and which also might lead it from the right to the left, and from the left to the right, as well as from below upwards, it is certain, there can be no Method to be compared to this; because there is none in which concur at once so much Force and Expedition, joined to such Simplicity, Regularity, and Safety, that are quite singular. For that Method, in which a Surgeon only employs his own Strength, and that of his Assistants, is commonly insufficient; and the other, in which he helps himself with the Pulley, is perplexed with a great *Apparatus*, is long, and still very much wants the Hands of the Surgeon, and of his Assistants: All which are Circumstances which render the Method more complicated, and less sure.

These are the Motives that have engaged me to contrive the new *Ambe*, I herewith have the Honour to lay before the SOCIETY, in which I have endeavoured to rectify all the Defects before-mentioned.

*A Description  
of the new  
Ambe.*

The Basis of the whole Machine is an Elbow-chair all of solid Wood, higher than others usually are, in order to give room to the Lever to play the more freely, which cannot be lowered any farther than to the Floor on which the Elbow-chair stands: To prevent any Uneasiness to the Patient from that Height of the Chair, it has a Foot-stool that makes Part of the Chair, and brings the Seat to it's usual Height.

Each Arm of the Chair is pierced with a round Hole, to receive the *Stem* or *Foot* of the *Ambe*. If the Luxation is on the right Side, the Foot is run through on the same Side, and *vice versa*. The Patient is tied partly to the Back of the Chair, partly to a Piece joined to the Chair on that Side where the *Ambe* is placed. This solid Union of all the Pieces of the Machine between themselves, and with regard to the Patient, furnish it's Action with all the Force and Certainty possible. The *Ambe* of *Hippocrates* can play but to a small Extent: It is separate from the Chair in which the Patient sits, and he is left to the Care of the Assistants; all disadvantageous Circumstances, which are remedied by my Machine.

In



In that of *Hippocrates*, the Body of the Patient has no other Support against the Extension of the Lever than the very vertical Piece B, on which the Lever rests; this Piece is narrow, has no Proportion, or, if one may say so, no Union with the Figure of the Body to which it is applied, and consequently must change his Position on that Piece upon the least Effort the Patient makes. Fig. 120.

The Foot of my Lever has no Connexion with the Patient's Body: There is between the Foot and his Body a particular Piece, which I call *the Bodice*. One will see there, that it is made to fit itself to the Body; and, in order to render that Application easy, that Part which touches the Body, is quilted. This Bodice is fixed to the Arm of the Chair between 2 large Iron Checks, *a, b*, by 2 strong Iron Pins, which run through them, and are stopped at their Extremities with Nuts skrewed on. The concave Part of this Piece, where the Body enters, is placed perpendicularly under the End of the Lever, however so that the Lever be a little farther advanced towards the Patient, than the Bottom of the Bodice, to the end that the Lever may thrust itself the better in under the Arm-pit. As there are Cases where the Head of the Lever ought to be very short, or very near the Point it rests upon, and others again, on the contrary, where that Extremity of the Lever ought to be longer, and farther off the Point of it's Rest, the Bodice of course ought to be set backwarder or forwarder, as the End of the Lever is, the Direction of which it follows every where. For this Reason we have contrived 2 Rows of Holes along the Sides of the Bodice, and between these 2 Sides we got a Notch cut out, to make room not only for the Foot, or for the Point it rests upon, which may meet there, but also for a Part of the Lever, which I call it's Spur, which always moves towards that Notch when the Lever is lowered. The Figures and the Use of the Machine will shew the Necessity of this Construction much better than any Description. From the said Bodice come out 2 broad Straps of the strongest Leather with their Buckles. One of those Straps is to go about the Back of the Chair, and round the Body of the Patient; the other goes over the Shoulder, very near the Articulation, and keeps the *Scapula* and the *Clavicula* in their Situation against the Efforts of the Lever. Fig. 122.

That Part of my Machine, that may be called the *Ambe* properly said, is composed, like that of *Hippocrates*, of 2 Pieces; one vertical, which I call the Foot of the *Ambe*; and the other horizontal, which forms the Lever. It is chiefly in these two Pieces, that my *Ambe* differs from that of *Hippocrates*.

The Foot is a Piece made either of Wood, *Fig. 122*, or of Iron, *Fig. 124*. It's upper Extremity is split into a sort of Mortise, which receives the Spur or Tenant T of the Lever A, B. It is pierced by several Holes, which answer to as many others on the Spur. Below this Mortise, the Foot becomes more slender and cylindrical; by this Part it enters into a round Hole in the Arm of the Chair; this slender Part Fig. 122, 124.



Fig. 124.

of the Foot is pierced by several Holes, in order to run an Iron Pin through, which lies flat on the Arm of the Chair, and keeps the Foot raised to a Height proper for the Person that undergoes the Operation: For the greater Security one may run 2 Pins through; one which rests upon the Arm of the Chair, and the other on the Seat itself, through which the Foot passes also. The Iron Foot may be provided with a sort of large Ring C, under the Pin, which will render it's Rotation the easier. If one should prefer an Iron Foot, one may easily judge, that the Hole for it in the Arm of the Chair must be made narrower, either by filling up the old one with an Iron Box or Clout, which may be taken away, if one will use a wooden Foot; or one may even at first fit those Holes for the Iron Foot, setting the wooden one quite aside.

Fig. 121.

The Lever A, B, H, B, is the most compound Piece of all, and withal the most important. It is made of a real Lever A, B, and of a Piece fitted to it D, G. The Lever properly so called A, B, is made round in it's inferior Surface; the upper Surface is flat, and all along on the Middle of it there runs a Rod, forked at the End, which fits to a Groove of the same Figure in the inferior Surface of the Sliding-piece F, G. This Lever grows less and less towards the Extremity A, where the moving Power is to be applied; the other Extremity B, is somewhat rounded off at it's End, in order to insinuate itself the better under the Arm-pit. On this bigger Extremity is a sort of a *Spur* or *Tenant*, T, the upper Part of which is joined to the Lever by 2 Iron Pins, so that, upon taking out the Pins, the Spur comes out, and separates itself from the Lever. It was necessary to make this Spur moveable, and give it the Figure of a square Rule in which it appears, in order to bring it quite close to the End of the Lever, or set it back, according as it may be necessary. For this Reason the upper Part of this Spur *a, b*, slides along in a Mortise or Groove of the Length of one Foot contrived under the Lever, beginning from it's Extremity B, to which answers the Shoulder *b*, of the Spur.

Fig. 126.

Fig. 125.

Fig. 127.

Fig. 123, 124.

Fig. 125, 126.

The rest of the Tenant, or it's principal Part *c*, is fitted to enter into the Mortise *d*, which is the uppermost Part of the Foot. They are both of them pierced with a Row of Holes, through one of which one must run an Iron Pin, to unite them, and to form the Point of Rest, or the Hinge of the Lever. Towards the other Extremity A of the Lever, there is a Piece of Iron C, made Arch-wise, under which passes the elastic Tail D, *f*, of the Rod fastened to the Sliding-piece F, G, and into which catch Teeth made on the said Tail. This Iron Arch ought to be very solid, because it keeps down the Arm, and supports all the Effort of the Lever. I will give to the Sliding-piece F, G, which is fitted to the Lever, the Name of the *Bracer*; it is a Groove made of one Piece of Wood. This Piece is hollow in the upper Surface, as is just now said, to place the luxated Arm into; this Cavity is quilted, and has three Girts H, with Buckles, to tie the Arm fast and conveniently; they are made of strong Leather. It has on it's inferior



inferior Surface a Groove with a Dove-tail K, K, to lay hold of the Rod of the Lever, and to slide in it without being separated from it, unless it be in sliding beyond the Extremity B, of the Lever, where it pulls out like a Drawer, which is easily done, if the *Bracer* has nothing to stop it upon the Lever. The Extremity of the *Bracer*, which answers to the thick End of the Lever, is rounded, in order to enter jointly with it under the Arm-pit; the other gives hold to the Piece of Iron D, E, which I called above by the Name of *the elastic Tail of the Bracer*. This latter consists of four Parts; the Fork F, which attaches itself to the inferior lateral Surfaces of the *Bracer*; the Spring *f*, which is the Piece that follows next, the longest and slenderest of all; the Teeth E; and the Handle D.

The Patient, being undressed down to the Waist, is placed in the Arm-chair. Next, the Lever, furnished with it's *Bracer*, is raised and kept in a horizontal Position, taking great Care, as *Hippocrates* recommends, to push this *Bracer* as far as may be under the Arm-pit to the End of the Bone of the Arm, and even beyond if possible, to the end that the *Humerus*, supported by the *Bracer* in all it's Length, may be secure against all the Power of this Machine, and that it's Violence may only act upon those Muscles which keep this Bone out of it's Place. Besides the Quilting, which the *Bracer* is lined with, a small Cushion is put upon it's Extremity, in order to lodge still more conveniently the Head and the Neck of the *Humerus*, and to preserve the soft Parts from any Contusion, which the Impulse of the Machine might produce, by it's greatest Forces acting upon that Part.

*The Use of the  
new Ambe.  
Fig. 129.*

The Arm being thus placed and well stretched out upon the *Bracer*, you tie about it 2 Sliding-knots, one above the Elbow, and the other over the Wrist, after having guarded those Parts with a very thick and soft Compress; the 2 Sliding-knots are fastened to the Fork of the elastic Tail of the *Bracer*; after which you complete the fixing of the Arm with the 3 Girts of the *Bracer*, under which are also put Compresses like those just mentioned.

The Arm being thus well adjusted, you endeavour to give to the Body and to the Hollow of the Articulation of the luxated Bone the proper Situation and Steadiness necessary for the Success of the Operation which is easily executed with this Machine, by the Girts of the Bodice, of which the horizontal one keeps the Patient's Breast closely applied against this Piece, and the vertical Girt retains the *Scapula*, the *Clavicula*, in short, all the Parts where the Bone is to be pushed back, in a Situation proper for receiving it, and for not deviating by yielding to the Efforts of the Machine.

Every thing being thus disposed, the Surgeon places himself behind the Patient, mounted upon something that raises him high enough to inspect the Effects of the Process; to examine by the Touch where it operates; in short, to conduct the whole by Feeling and by the Eye. The Surgeon being placed, the Assistant who is to conduct the Extre-  
mity



mity of the Lever, works it according to his Directions, but perfectly slowly, that the Extensions may be made with less Pain, and more effectually.

fig. 130.

If the Luxation is below, it is sufficient for it's Reduction to lower the Extremity of the Lever, as is done with the *Ambe* of Hippocrates. But here appears a great Difference between the working or playing of these two Sorts of Levers. The *Ambe* of Hippocrates is a plain Lever A, B, the Motion of which is from A to a, and consequently has for it's Extension only the Space C, a, when it is brought to it's last Term of becoming perpendicular, a, b, whilst it has all A, C, or 1, a, for it's Elevation. The *Ambe* of Hippocrates therefore almost only raises the Bone of the Arm, without scarcely stretching it; and this is the Defect, which M. Petit with Reason blames it for; and which is still more sensible, if one takes the Action of the Lever in D, the Point whereabouts it must meet the Edge of the Cavity, and may cause those Mischiefs that are apprehended from it; but instead of placing the fixed Point of that Lever in 1, lower it to 2, by the means of the Tenant 1, 2; then the Direction of the End of the Lever becomes A, E; it's Elevation is but 1, b; and the Extension it produces is A, E, or D, E: If you lower still the Lever's Point of Rest, as in 3, by a longer Spur, the Elevation of it's Extremity is reduced to 1, k; and the Extension it produces, reaches from A to F, if one carries those Levers as far as they will go, which is never necessary. In short, it will be in your Power to give to this Lever an Extension as great as you please, joined to a very small Elevation. To this end you need only set backward the Lever's Point of Rest, along the Perpendicular. Now this is precisely what the Spur does, which we have added to our *Ambe*; the Holes it is pierced with, as well as the Mortise of the Foot, are placed in different Degrees, as the Points 1, 2, 3; and these Holes, as has been said, are the Places of the Pin which forms the Lever's Hinge or Point of Rest.

The Gradation of those Holes therefore enables you to augment at Will the Extension, whilst the Elevation diminishes in the same Proportion; but if you have a mind the Elevation should diminish more or less than in the foresaid Proportion, for Instance, you want to make a great Extension, and a very small Elevation, there is nothing easier for it than our Machine. You need only push the Spur 1, 3, which is moveable, as you know, towards the End of the Lever to L, and stop it there: Then the End of the Lever A, L, being very short, it has but little room to play; on the contrary, if you will have a great Elevation, you need only bring back the said Spur to M, or 1, or still farther; the farther you remove from the End of the Lever, the more it will have room to play, and the more considerable will be it's Elevation. It is true, the Power of the Lever will decrease in the same Proportion; but this Power is so great, that Losses like this ought to be reckoned for nothing.

You



You have it therefore in your Power with this sort of *Ambe* to make, as Occasion requires, such Extensions and Counter-Extensions as you please; and you may likewise vary all the Degrees of the Elevation, which shall be necessary to give to the Bone that is to be reduced; and these are the Perfections which have been hitherto required in this Machine.

Commonly, when the Bone of the Arm is sufficiently stretched and raised, so as to be on a Level with the Cavity of the Articulation, those Bones replace themselves as it were of themselves, because this Level is not always exact; on the contrary, the Extension and Counter-Extension being never regular enough to hinder the *Scapula*, which is a moveable Part, from following a little the Head of the Bone, or it's Extension, it happens almost always, that this Head bears pretty strongly against the Edge of the Cavity, and consequently does not fail to fall into the said Cavity, as soon as it has only passed it's Edge, and even before it has met the Level, or the Axis of the Hollow of the Articulation; but it is otherwise after an Extension, a Counter-Extension, and an Elevation so regular as those which may be performed by our Machine; it may happen, that after the 3 preceding Operations, the Head of the Bone, without having touched the Edge of the Cavity, will be placed over-against this Cavity, and upon a Level with it's Axis, without being able to enter into it, by Reason of the Firmness and Exactness of the Powers for retaining the opposite Parts in this State of regular Extension; and, in this Case, there will remain for you, in order to finish the Operation, to conduct the Head of the Bone into it's Cavity, or to let it go into it: But what will you do then? If you slacken the Extremity of the Lever, or if you lift the same up, you will bring the Head back to the same Place where you took it up; that is to say, you will bring the Luxation to it's former State. If you resolve to relax the running Knots, the Operation will be long, and your Patient will have time enough to cry out.

In order to avoid these Inconvenients, I mounted the Bracer on the Lever in a Groove, and I stopped it in this State by the Teeth of it's elastic Tail; by the means of this Construction, when the Surgeon perceives, that the Bone is over-against it's Cavity, he directs the Assistant who attends the Extremity of the Lever, to press upon the Handle D of the elastic Tail of the Bracer, to the end that the Teeth placed under the Arch C, near the said Handle, may quit their Hold, and that the whole Bracer, which is now no longer stopped, may slide on the Lever towards the Patient, and by this means let the Head of the Bone enter into it's Cavity. Fig. 129.

The Necessity of this Management with our *Ambe* is a Demonstration, that it is far from having that capital Fault with which M. *Petit* reproaches the *Ambe* of Hippocrates, viz. "That it pushes the Head of the Bone into it's Cavity, before the Extension and Counter-Extension are made." I hope the Machines, whereby I have prevented.



vented this Fault, and have procured to my *Ambe* the opposite Perfections, will appear sufficiently simple.

Fig. 123.

If any Body should be apprehensive, that the re-entering of the Head of the Bone might be too sudden, and occasion a Shock that might hurt the said Bones, it will be easy to remedy against it, by substituting to the Stop, into which catch the Teeth of the Bracer, a toothed Wheel A, having in it's Centre a Handle B, D; which Handle during the Operation will be stopped by the Piece of Iron C, fixed upon this Piece by the Skrew F; the said Handle will also stop the Teeth E, which catch into the toothed Wheel; and when the Bracer is to be loosened, the Assistant, who holds the Lever with one Hand, will take the Handle with the other, and having got the Skrew F taken off, he will remove from the Piece C, that stops it, the Part D, B, of the Handle, by the means of it's moveable Arbor D, so that the Handle will come at a right Angle, as it is represented by Dots: Then the Assistant's Hand, sustaining all the Effort of the Handle and of the Bracer, will moderate by the Handle the sliding of the Bracer, and the entering of the Head of the Bone into it's Cavity, with all the Slowness he shall think proper for this Operation.

Thus much concerning the Reduction of a Luxation of the Arm below; it is known, that this is the only sort of Luxation in which the *Ambe* of *Hippocrates* can be made use of (the second Defect observed by M. *Petit* in this Machine). I have succeeded in remedying against this Defect by the simplest thing in the World, *viz.* by giving to the Foot that enters into the Arm of the Chair a cylindrical Shape, by which means it is able to turn all manner of ways; so that if the Luxation is forwards, one only needs turn the Extremity of the Lever accordingly, lowering it at the same time enough to make the necessary Extension and Elevation; by this Turn of the Extremity of the Lever forwards, the Head of the Bone is of necessity carried backwards, and replaced into it's Cavity. One easily conceives, that one must go to work in the opposite way, when the Luxation is backwards, and so on as for the rest; all according to the Directions of the Surgeon placed at the Articulation, who is to be attentive to examine the State of the Parts, and to order in what Direction and how much is necessary to be done.

*The Description  
of an Instru-  
ment for reduc-  
ing a dislocated  
Shoulder, in-  
vented by Mr  
John Freke,  
Surgeon of St  
Barth. Hosp.  
and F. R. S.  
No. 470. p.  
556. Read  
June 23,  
1743.  
Fig. 131.*

2. I should not have presented this to you, but to shew in how small a Compass the whole Power which can be made use of in reducing a dislocated Shoulder can be contracted. If therefore a Machine for this Purpose be not portable, it matters but little to an afflicted Patient 10 Miles off, how good an Instrument is out of his Reach.

This Machine, which consists of two Boxes A, joined at the Ends by two Hinges, contains, when folded together, every thing that can possibly be wanted in the Operation before-mentioned; and it may so easily be made use of, without the Assistance of any other Operator than the Surgeon employed, that I may venture to affirm, a Patient may