Nothing was found in the Bladder of Urine, but divers Stones of unuſual Figures, as if they had been Pieces of a large Stone broken to Bits, in whoſe Center a Nucleus had been lodg'd.

The Gall-bladder was fill'd with Gall-ſtones.

Nor was the Stomach, which he complain'd of, (*i. e.* in Want of Appetite) any other ways diſorder'd; but a little redder, having more Blood in it's Veſſels than is uſual; it's Muſcular Fibres being ſtronger than we generally find them in the Stomachs of healthful Perſons.

The Cavity of the *Thorax*, or Cheſt, was filled with Water on both Sides, inſomuch that the Lungs were not above a third Part of their natural Magnitude.

The *Pleura*, or Membrane that lines the two Cavities of the *Thorax*, was very much thicken'd by the *Serum* or Water; from whence it deſcended by the Muſcles of the Back into his Legs.

The Valves of the Left Ventricle of the Heart were petrified in ſeveral Places, eſpecially thoſe call'd *Mitrales*.

There were ſome ſtoney Bodies found on the *Bronchiæ*, at and near their Riſe from the Lungs.

An Account of an Apoſtemation *of the* Lungs *cured*; *by Dr* J. Wright. *n.* 285 *p.* 1372.

IX. 1. Mrs *Jane Terry* fell ill of the Small-Pox in *May* 1701. She was about 18 Years old, of a freſh Complexion, and pretty fleſhy. Her Relations apprehending ſhe might have the Small-Pox, remov'd her to a Nurſe's Houſe, where ſhe had the diſtinct Sort very kindly; her Caſe proceeded ſo very well, (as they conceiv'd) that no Phyſician was called to her, 'till they began to ſhell, only for ſome days before ſhe had a little Difficulty in her Breathing, which gradually increaſed, 'till ſhe began to raiſe Blood, which was about the 7th Day from their firſt appearing. This raiſing of Blood was accompanied with theſe Circumſtances; it had increaſed every Day for three Days before I ſaw her; ſhe cough'd and brought up a viſcous Phelgm, ſuch as People vomit when their Stomachs are very foul; only as meer Phlegm is white, this was all of it as red as Blood; it was not ſtreak'd with Blood, nor had it a Mixture of white Phlegm with it, but was ſo deeply colour'd, that it ſeemed to be all Blood, only it would not flow as Blood does whilſt it is hot, nor did coagulate as Blood does when it is cold, but hung from the Baſons, when it was pour'd out, as vomited Phlegm does; and in this it differ'd from all the bloody Expectorations I have ſeen, excepting in one Mr *Jones*, who cough'd the ſame bloody colour'd *Pituita*, but in much leſs Quantity; for Mrs *Terry* raiſed above a Pint in 24 Hours, for ſome Days, and tho' a leſs, yet a conſiderable Quantity afterwards; Mrs *Terry*'s afforded a very ſtrong Smell, but Mr *Jones*'s had no Odour. After ſome Weeks ſhe recover'd, regain'd her Fleſh, which was waſted in her Illneſs; the Menſes return'd, and ſhe continu'd very well from *July* 'till near *Chriſtmas*.

In *Jan.* I was carried to ſee her, and ſhe gave this Account of herſelf.

That

That about three Weeks before *Chriſtmas* ſhe perceiv'd herſelf a little ſhort-breath'd, which increas'd daily, with a Fulneſs and Weight in her Left Side; that ſhe lay well on the Left Side, but when ſhe turn'd to lie on her Right, ſhe felt as if a Weight fell from the Left to the Right Side, which gave her a Shortneſs of Breath, and made her cough: Thus it continu'd increaſing 'till *Chriſtmas*, when ſhe began to raiſe a conſiderable Quantity of ſtrong ſtinking *Pus*; ſhe ſaid ſhe eat her Victuals well enough all this Time, and was not Feveriſh. When I ſaw her, which was towards the Middle of *January* 1701, ſhe raiſed a conſiderable Quantity, and often, of ſtinking offenſive *Pus*, which was as fluid as the *Pus* of other Parts; her Fleſh was a little abated, but ſhe was at no time Feveriſh; ſhe eat and ſlept prettywell, and had the *Catamenia* duly. I preſcrib'd ſuch Medicines as abated that purulent Expectoration ſeveral times, and ſhe often gave me Hopes of her Recovery, ſhe continuing to have the Menſes regularly, and being ſtill free from an Hectick; but upon every little Cold, ſhe again raiſed that fœtid *Pus* in a conſiderable Quantity. She generally continued pretty free from coughing ſeveral Hours together, 'till ſhe perceiv'd ſomething of a Fullneſs in her Breaſt, which would oblige her to cough; and after ſhe had once begun to raiſe, ſhe could not ceaſe, 'till ſhe had brought up two Spoonfuls or more of that fœtid *Pus*. This ſhe did chiefly in the Morning, Afternoon, and at Night; I did apprehend ſhe had an Abſceſs in the left Lobe of her Lungs, and made her lie upon the Bed, with her Head reaching to the ChamberFloor, leaning upon her left Arm. In this Poſture ſhe could at any time, after a little Cough, ſet the *Pus* a running out of her Mouth, 'till the whole which was therein contain'd was diſcharg'd.

This made it apparent that there was an Ulcer in her Lungs, and Dr *Torleſſe* and Dr *Pitt* approv'd of what I had propoſed, of making an Apertion in her Side, where we could apprehend the Lungs grew to it, for that ſeem'd unqueſtionable from the Poſture of diſcharging it; and ſome little Pain ſhe felt in her Side. About a Week before Mr *Cowper* was ſent for to perform the Operation, the *Pus* had begun again to increaſe, and theDay before theſe Gentlemen ſaw her, ſhe was taken in the Afternoon with a Chilneſs, after which her Pulſe became a little quicker, and ſhe was a little Feveriſh when Mr *Cowper* applied the Cauſtick; this Feveriſh State increaſed every Day, and after ſome Days a Raſh appear'd, which laſted about 14 Days before it was quite got off, and left her in a Hectick, with Redneſs in her Cheeks; towards Evening, Night Sweats, continual Looſeneſs, extreme waſting of her Fleſh, and at Length a Swelling in her Legs, tho' ſhe kept her Bed. We felt ſome little Knots between the *ſeventh* and *eighth* Rib; which, with other Circumſtances, made us conclude the Adheſion was in that Part, and would have laid the Cauſtick there, but that it would certainly have ſpread to the Glands of her Left Breaſt, which made us lay it between the *ſixth* and *ſeventh* Rib (*ſurſum numerando*): Mr *Cowper*, as

ſoon as he could, took it off, and with his Knife gently paſs'd thro' into the Cavity of her Breaſt, whence iſſued a bloodyiſh Water, but no *Pus*; by bending his Probe, he found the Adheſion reach to the lower Edge of the *ſeventh* Rib; and before the Eſcar was ſeparated, the *Pus* began to flow at every Dreſſing, and ſo continu'd, gradually abating, 'till the Ulcer was cured; during which, a Part of the Inſide of that Rib, above an Inch long, exfoliated, and after that another leſſer Piece of the Outſide of the Rib. Towards the latter End of the Cure, ſhe complain'd very much of a Pain at the *Cartilago Enſiformis*, ſo great, that ſhe ſometimes pluck'd out the hollow Tent, which we conceiv'd was occaſion'd by preſſing upon the Nerve. During the firſt ſeven or eight Days of her Raſh, ſhe raiſed very little, if any, of that *Pus*, nor did it diſcharge itſelf then by the Orifice, nor was there a Collection of it in her Breaſt, which made me apprehend, that the Fever did ſo alter the State of her Blood, as not to permit it to ſeparate it's Impurities into the Abſceſs. I muſt obſerve, that for ſix Days before the Fever began, ſhe had the *Catamenia* very orderly; by *Auguſt* ſhe was cur'd, her Side heal'd up, and ſhe would not endure it to be converted into an Iſſue; by *October* ſhe recover'd her Fleſh, and the *Catamenia* return'd, which had been wanting ever ſince *May*, and now ſhe is plump, fleſhy, clear, and freſh complexion'd, has little or no Cough, and no fœtid or tabid Expectorations, and ſeems, and I believe is, perfectly cured, having for many Months taken no Medicine.

On this Caſe I obſerve, that there was an Ulcer in the Lungs, and that it has admitted of a Cure, contrary to the general Opinion of Phyſicians. That this Ulcer did contain at leaſt two Spoonfuls, and muſt have been as large as a Hen's Egg. That this Abſceſs aroſe from a Collection, with an indiſcernable (if any) Fever, and ſo continu'd from *Chriſtmas* to about the 10th of *May*. The tender membranous or veſiculary Compoſition of the Lungs ſeem to juſtify this Opinion, that it is almoſt impoſſible for them to heal, when there is a conſiderable Diminution of them, the continual and indiſpenſable Neceſſity of their Motion, very much hindring the Coalition of the *Veſiculæ*.

Several Parts of the Body afford a proper Cement to unite and repair them, when hurt or diminiſh'd. Carious and broken Bones ſend forth a *Callus*; when the Skin is conſum'd by Ulcers or Burns, the Parts afford a *Cicatrix*, which pretty well ſupplies the Defect of the Skin. The Lungs ſeparate a viſcid *Pituita*, which will be expanded into Fleaks like a Membrane; Mr *Stringer*, *Sarah Deeping*, and ſome other Patients have brought up great Quantities of them, and a little Boy at Mr *Tolley*'s at *Kenſington*, cough'd up ſeveral Pipes, form'd exactly like the *Bronchiæ*, and it's Divarications, and at firſt View ſeem'd to be the internal Membrane. Mr *Buſſiere* mentions this Inſtance, but his Haſte would not permit him to obſerve the Caſe ſo exactly as it deſerv'd: This Child two Years before had an Ulcer in the right Side of his Lungs, and they adher'd to his Back; when I ſepa-

Vid. Supra, V. iii. C. iii. S. vii.

rated them, I found a Cicatrix near three Inches long, but very little (if any) Defect in his Lungs; I am of Opinion this *Pituita*, or *Mucus*, doth ſerve to re-unite the Parts of the Lungs, when there is a Solution by an Ulcer.

Conſumptive People generally flatter themſelves, that they have no Ulcer in the Lungs, becauſe they do not feel a Soreneſs, as in the Ulcers of other Parts. This Opinion keeps them from making a timely Application, whilſt they might receive a ſpeedy and eaſy Cure. When Mr *Cowper* touch'd the ſound or ulcerated Parts of her Lungs with his Probe or Finger, ſhe diſcover'd no Senſe of Feeling, which may confirm the Opinion of Anatomiſts, that the Lungs have little, if any, Senſation. When he touch'd her Heart with his Finger, though I believe for not the twentieth Part of a Minute, ſhe grew very much diſorder'd, pale, and ready to faint; which ſhews Nature cannot ſuffer the leaſt Alteration in it's Pulſation, without great Prejudice and Inconveniency.

It is the Opinion of ſome Phyſicians, that the Fever which attends conſumptive Patients, ariſes from ſome Particles of the *Pus*, which being receiv'd into the Blood, and circulating with it, cauſe that Effervеſcence which we call an Hectick. This Patient had no Fever from *Chriſtmas* to *May*, and then came a continued Fever, with a Raſh, which left Febricitation every Afternoon, with thoſe Symptoms which attend a Hectick.

I have obſerv'd for many Years, that if I could preſerve my conſumptive Patients from that Hectick Fever, or relieve them who already labour'd under it, I could cure them, tho' their Expectoration was very plentiful and foul.

I do not doubt but ſome Part of her Lungs do adhere to her Side, and 'tis probable a little Part of them do not receive the Air in Inſpiration, but I believe that Defect is very inconſiderable, becauſe ſhe can run up Stairs, and is no more diſorder'd in her Breaſt than moſt other People.

The eaſy Diſcharge of the *Pus*, by her lying down in that Poſture, did undoubtedly very much preſerve her Lungs, and prevented it's breaking thro' the Abſcefs, into the Cavity of her Breaſt, and putrifying her Lungs to a greater Degree. *Pus generat Pus*, is a noted Aphoriſm, and the Air-Bladders of the Lungs are ſo very tender, that they muſt have yielded to the Preſſure of the *Pus*, had it lain long in the Abſcefs, and been only diſcharg'd by violent coughing. By lying in a proper Poſture, Sir *Thomas Proby*, *Sarah Deeping*, and other Perſons, have prevented a greater Solution in their Lungs, and either prolong'd their Lives many Years, or recover'd their Healths by proper Medicines.

This and other Inſtances, make me eaſily concur with ſome Phyſicians in an Opinion, that in ſome Families the Lungs have originally a more tender Conſtitution than in others. Mrs *Terry*'s Aunts are ſubject to great Coughs and Phthiſick. Her Aunt *Fowke*'s little Daughter, of about 7 Years old, having a little Fever, with ſome Symptoms of the Small-Pox, but a great Difficulty in Breathing, I adviſ'd her bleeding at the Arm, but ſhe was ſo fat, that a Vein could not be found

that

Plate IX.

Fig. 124.

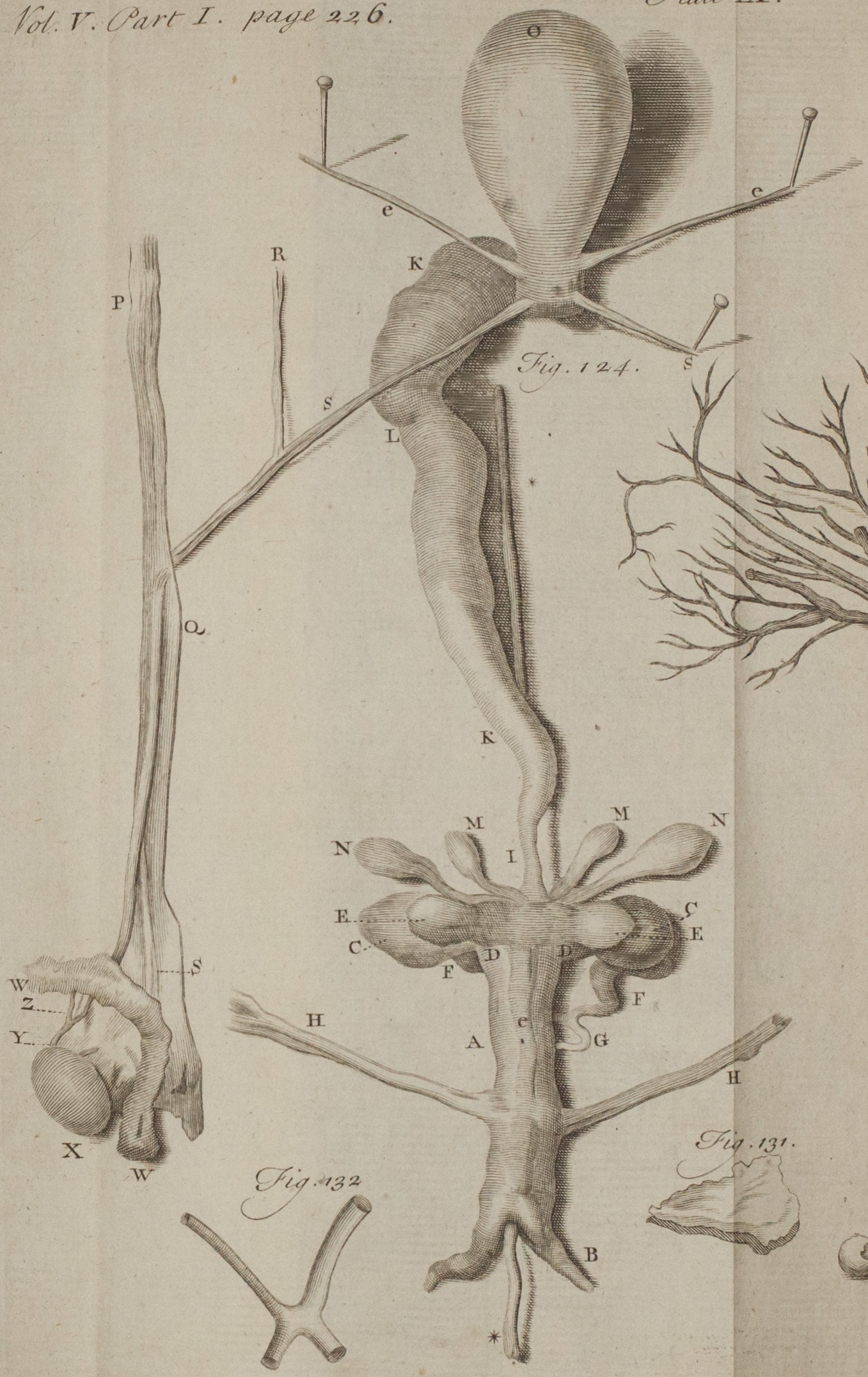


Fig. 127.

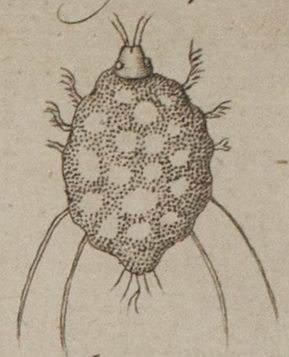


Fig. 128.

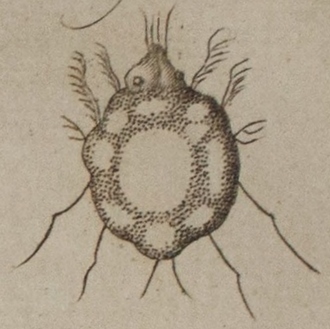


Fig. 129

Fig. 130

Fig. 135.

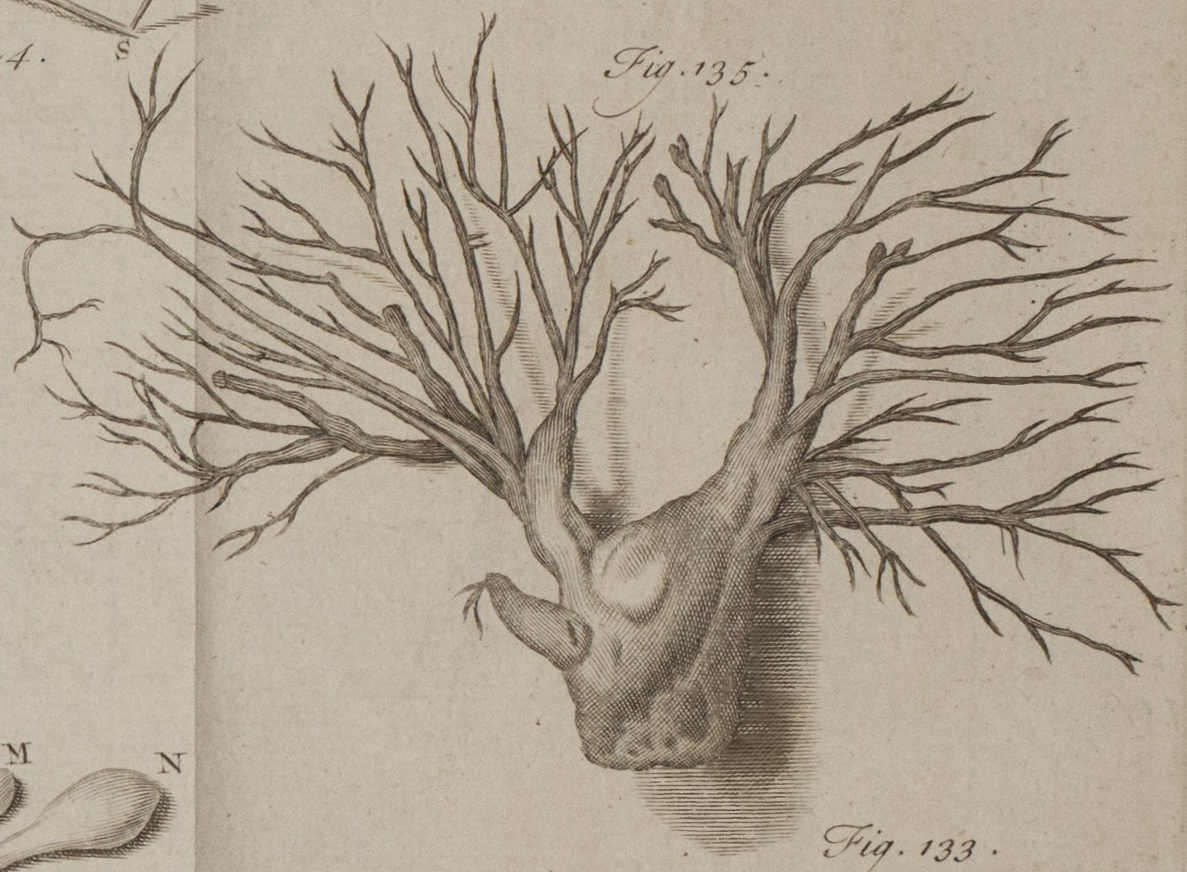
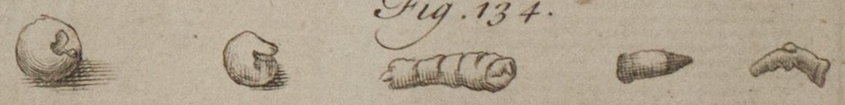


Fig. 133.

Fig. 131.

Fig. 132

Fig. 134.



M. V.dr Gucht Scul.

that Night; next Day the Small-Pox appear'd, which a little eas'd her Lungs; upon the ſixth Night after, ſhe rais'd at ſeveral times about 7 or 8 Ounces of clear Blood, by violent coughing: I was ſent for, and drew away about 6 Ounces of Blood by Leeches, which totally reliev'd her Breath, and ſtopt the raiſing Blood. This Inſtance I mention, being ſo like Mrs *Terry*'s; and to evince, that ſo great Loſs of Blood will not hinder the regular Proceeding of the Small-Pox, which ſhe went through very orderly, and recover'd perfectly. I have obſerv'd the ſame Effect in other Patients, in whom Bleeding, after Eruption, was indiſpenſible.

The continual Motion of the Breaſt in Breathing, made the Cauſtic ſpread farther than it was deſign'd, or could be prevented: I have prevail'd with ſome Patients to yield to an Apertion by Launcet, which I take (in ſome Caſes) to be the better way. That little Blood which may poſſibly get into the Cavity of the Breaſt, is eaſily thrown out again by the Lungs in Inſpiration, as Mrs *Terry* did the Injection every time it was uſed.

After the *Pus* began to flow at the Orifice, it leſſen'd the raiſing it at her Mouth, and, in no long time, the purulent Expectoration totally ceas'd.

I omit ſome other Remarks of leſs Conſequence, *viz.* on the Bloody-colour'd *Pituita*, the Fœtid Odour of the *Pus*, and the Raſh Fever, which came without any manifeſt Cauſe.

2.] The Matter or *Pus* which firſt flow'd from Mrs *Terry*'s Side, was ſo offenſive in it's Scent, as obliged the By-ſtanders to quit the Chamber, inſomuch that the Nurſe, uſually at the Time of Dreſſing, and afterwards, was wont to burn Roſemary, *&c.* to ſuppreſs the Stench. So putrid was the *Pus*, that it tarniſh'd that End of the Silver Probe I paſs'd into the Cavity of the Abſceſs, as it did the Top of a Silver Syringe in making Injections. There ſeems no room to doubt, that the *Pus*, which then flow'd from her Side, came from the ſame Cavity the *Pus* did ſhe before cough'd up, when the Liquor that was injected at her Side came into her Mouth; which ſhe frequently complain'd of, and particularly of the bitteriſh Taſte of the Tincture of Myrrh I ſometimes uſed in the Injections.

On the ſame, by Mr W. Cowper, *ibid. p.* 1386.

The Diſeaſes of the Lungs have been look'd on as very dangerous: And if Obſervations did not aſſure us of the Poſſibility of Succeſs, the commonly-known Structure of the Lungs would afford us but mean Arguments for the Shift Nature makes. I ſhall give a ſhort Account of ſome other Inſtances of the like Nature I have met with.

About two or three Years ſince, I ſaw a Boy, in the ninth or tenth Year of his Age, who (ſome time before) after a Continu'd Fever, was purſu'd with an Intermitting one; a Cough follow'd, in which he brought up (at ſhort Intervals) no ſmall Quantity of thick purulent ſtinking *Pus*, which Diſcharge (I think) continu'd on him no leſs than fourteen or fifteen Months before I ſaw him: His Phyſicians order'd him Iſſues in his Back. He had then a healthy Aſpect, his Cheeks

florid, and was very briſk and active: When he juſt came from Play, he was bid to take a Baſon in his Hand and cough as he was wont; which he did, wherein I ſaw him diſcharge at his Mouth, no leſs than 4 or 5 Ounces of the Sort of *Pus* above mentioned: This his Mother told me he had been wont to do twice every Day; nor did he appear any ways diſordered after, but return'd to play immediately. His Phyſicians ſent him into the Country whence he came, where, in about a Twelve Month, I heard he died, but was not acquainted with his Circumſtances after: What Succeſs the Operation we practiſed on Mrs *Terry* would have had on this Boy, I dare not determine; tho' I cannot but think it might have been ſafely done to him.

Another Inſtance in which a conſiderable Part of the Lungs was obſtructed, and conſequently became uſeleſs, (ſome time before Death) was in a Girl of ſixteen, who had been ſcrophulous not leſs than 9 Years; the Glands about her Neck and Throat being very much indurated as well as diſtended, her Lips and Noſe were alſo ſwoln: About a Year and a half before her Death, ſhe coughed up ſeven or eight Ounces of fœtid *Pus* in leſs than 24 Hours. On changing the Air of this Town for that in the Country, together with the uſe of Balſamick Pectorals, ſhe recover'd a healthful Appearance in her Face, but continued ſomething Aſthmatick. On taking Cold (as 'tis called) her Appetite as well as Digeſtion fail'd her, ſhe grew feveriſh, and died after a few Days Indiſpoſition.

On opening the *Thorax*, I found the Lungs cleaving to the *Pleura* of the Left-ſide, in ſuch Manner that they could not be ſeparated, without one of thoſe Parts borrowing from the other. A Portion of one of the Left *Lobes* of the Lungs being cut off, ſunk in Water; from which Part 'twas likely the Matter came which ſhe formerly coughed up, tho' the Ulcer was then cloſed, and no Appearance of Matter was to be ſeen in that or any other Part of the Lungs. The Lymphatick Glands at the Divarication of the Wine-pine had, by their Intumeſcence, ſo compreſs'd the Canal on the Left-ſide, that it wanted more than two Thirds of it's proper Paſſage for the Air.

In theſe, and ſome other Inſtances I could produce, 'tis evident that conſiderable Parts of the Lungs may be obſtructed, and the Perſon ſurvive: But Mrs *Terry*'s Caſe demonſtrates the Poſſibility of their Recovery, when Part of their Lungs are totally obſtructed, as muſt happen in ſuch large Abſceſſes. But how the remaining ſound Parts of ſuch diſeaſed Lungs become capable of tranſmitting the whole Maſs of Blood from the Right Ventricle of the Heart to the Left, in equal Time and Quantity with the Blood that circulates in the reſt of the Parts, ſeems not eaſily accounted for, when indeed it exacts our Wonder, that it is done in a natural State, when all the Paſſages of the Lungs are open and free. Since I had often found Water, injected by the *Arteria Pulmonalis*, return readily from the Lungs again by the *Vena Pulmonalis*, I was tempted to try if melted Wax, when very hot, would not do the like,

which

which ſucceeded in two young Cats Lungs; for after injecting the Wax (mixed with Oil of Turpentine, and tinged with Vermillion) by the *Arteria Pulmonalis*, I found it had filled the Pulmonic Vein with the left Auricle, inſomuch that ſome of the Wax had reach'd the left Ventricle of the Heart: I don't remember this Experiment ſucceeded, but that ſome of the Wax was extravaſated, and came into the *Bronchiæ* and Wind-pipe at the ſame time.

In preparing a human Heart, by filling it's Ventricles, Auricles, and Trunks of it's large Blood-Veſſels with Wax, I found on injecting the Pulmonick Arteries and Veins with Wax differently tinged, that the Wax paſs'd from the Veins to the Arteries without coming into the *Bronchiæ*, or being extravas'd, tho' the Wax was not injected with near ſo much Force as might be. I muſt confeſs I was never ſo fortunate to make Wax paſs from the Arteries to the Veins in human Bodies or Quadrupeds, unleſs in their Lungs, as above noted, and the *Spleen* and *Penis:* Nor do I remember it has happened in thoſe Parts, but when the Wax has been impell'd with great Force, tho' I have conſtantly obſerved the Communication of Arteries and Veins of the *Spleen* and *Penis* more open than in other Parts, except the Lungs. I wiſh Dr * *Morland* had told us in what Part of the Human Body Dr *Areſkin* had made Wax paſs from the Arteries to the Veins, ſo as to demonſtrate their Continuation to the naked Eye, becauſe I have hitherto found the naked Eye unable to diſcover the Extremities of the Arteries and Veins, when the Blood itſelf was moving in them, in the tranſparent Parts of the *Omentum* or *Meſentery* of Quadrupeds, or in the Lungs of Frogs or Lizards, when living; or after Death, when the Blood has been retained in their Lungs in the following Manner: On making Inciſion into the Bodies of theſe Creatures, their Lungs will ſtart out, and be diſtended with inſpired Air; on which, make what Haſte you can to paſs a Ligature (*i. e.* a wax'd Thread) and tie it firmly toward the upper Part of the Lobe, as near the Heart as you can: when the Lungs of Frogs and Lizards are dried, and thus diſtended, you may examine them with a Microſcope.

* *Vid.* Infra, Ch. V. §. 1.

It appears that the Communications between the Arteries and Veins of the Lungs are more open than thoſe of other Parts, at leaſt in the Feet of Frogs: And till it can be ſhewn that melted Wax can be as eaſily injected from the Arteries to the Veins of other Parts in an Human Body and Quadrupeds, I ſhall be inclin'd to think the Communications between the Pulmonic Arteries and Veins in general, are more open than the Arteries and Veins of other Parts, except the *Spleen* and *Penis*.

This patent Communication of the Arteries with the Veins of the Lungs, ſhews how thoſe Veſſels tranſmit the Blood in equal Time and Quantity with the Blood that moves in the reſt of the Blood-Veſſels of the whole Body in a healthful State.

Hence it is, when any of the Blood-Veſſels of the Lungs are ſtraitened or totally compreſs'd (either or both which Circumſtances muſt

muſt happen in Mrs *Terry*'s Caſe) the remaining unobſtructed Blood-Veſſels are forced to diſcharge more than they were wont; and in Time thoſe Veſſels become ſufficiently dilated to ſupply the Defect. The like happens in the communicant Branches of the Arteries of any Part, when ſome conſiderable Branch or Trunk is ty'd up, as in the Operation for curing of an * Aneuriſm.

* Vid. Infra, *cap.* VI. §. III.

Fig. 138. *Fig.* 138, repreſents that part of the 142d Figure at D ..... done by a larger Magnifying-Glaſs, *i. e.* by the 3d Glaſs of Mr *Wilſon*'s Microſcope.

A, The Arteries. B, The Veins of a Frog's Lungs prepared as above mentioned. C, Their Inoſculations with each other. D, ... The *Area* of the Microſcope, as it appears to the naked Eye.

Fig. 139. Part of the hinder *Foot* of the young *Frog* view'd with the ſame Microſcope when living; whereby the different Magnitude of the Extremities of the *Arteries* and *Veins* of the *Lungs* in *Fig.* 138, and in this expreſs'd at C C, is very evident; the former being capable of admitting at leaſt three Globules of Blood to paſs in a Breaſt, whereas the Extremities of the *Arteries* and *Veins* in the *Feet* admit of one Globule of the Blood only to paſs before the other.

A, A, The Trunks of the *Arteries*. B, B, Thoſe of the *Veins* lying by the Side of the *Toes*. C, C. Their *Extremities* continu'd with each other, in the tranſparent *Membrane* between the *Frog*'s *Toes*. *a*, *a*, Two of the *Frog*'s *Toes*.

Fig. 140, 141. The Extremities of the *Arteries* and *Veins* of a *Frog*'s *Lungs* view'd with the 4th Glaſs of the ſame Microſcope.

A, A, The *Arteries*. B, B, The *Veins*. C, C, Their *Conjunctions* with each other. D, The *Area* of the Microſcope.

Fig. 142. One of the *Hexagon Areæ* of a *Frog*'s *Lungs*, which were not ſo much diſtended by Inflation, as thoſe Parts of the *Lungs* repreſented in the two former *Figures*; whereby the little *Areæ* or Cells in the Interſtices of the Extremities of the *Veins* and *Arteries* appear cloſer and leſs than in the two foregoing *Figures*, tho' view'd by the ſame Microſcope.

A, The *Arteries*. B, The *Veins*. D, The *Area*, which is more magnify'd at *Fig.* 138.

Fig. 143. *Fig.* 143. The lower-part of one of the *Lobes* of a *Water Lizard*'s *Lungs*, as it appears by the Microſcope, when the Blood is retain'd in the Extremities of the Veſſels, as in the preceding *Figures*. A, A, The Trunk of the *Pulmonic Artery*. B, B, The *Vein*. C, C, .. Their *Branches* joyning with each other. D, D, The tranſparent ſmooth *Membrane*, which in this Creature is not veſiculated or full of Cells, as in the *Lungs* of *Frogs*, on which the *Blood-Veſſels* are expanded, nor does the Internal Surface of this Membrane differ from the External, as in *Frogs* and divers amphibious Creatures; the *Lungs* of the *Water Lizard*'s being veſicated, and not veſiculated.

N. B. The Microſcope uſed in drawing theſe *Figures*, is Mr *Wilſon*'s deſcrib'd before. [*Vid.* ſupra *Vol.* IV. *cap.* II. § VII.] The manner

ner of applying the dried Lungs here mentioned is thus. Take out the Glaſſes in the Slider or flat Piece of Ivory, [*Fig.* 73.] *e*, *e*, *f*, *f*, and paſte in the Holes, *f*, *f*, parts of the dry'd Lungs as mentioned, whether of Frogs, Toads, Snakes, Vipers, or the like Creatures, that have their Lungs veſicated as well as veſiculated; and by this means you may keep Objects of the Lungs of thoſe Animals always by you; ſome of which I have had theſe three Months, and are as beautiful as when firſt put in; only remember to place the external ſmooth Surface of the Lungs towards your Object Glaſs when you view it. In the ſame manner, the Extremities of the Blood Veſſels of any tranſparent Parts of Animal Bodies may be examined by that Microſcope.

X. I lately ſaw opened a young Man in St *Bartholomew's Hoſpital*, that died of the *Palpitation of the Heart*, whoſe violent Beating and prodigious ſubſultory Motion, for ſome Months before his Death, was not only eaſily felt by laying the Hand on the Region of the Heart: but ſeen to riſe and fall by raiſing the Bedcloaths, that covered it. And, which is almoſt incredible, ſometimes the Trembling and Throbbing made ſuch a Noiſe in his Breaſt, as plainly could be heard at ſome Diſtance from his Bed-ſide. This was accompanied with frequent *Deliquiums*, ſometimes ſlow, ſometimes ſwift, and often intermitting.

The left Ventricle *of the* Heart *prodigiouſly* diſtended: *by Dr* J. Douglas. *n.* 345. *p* 326.

Fernelius in *Pathol.* lib. 5. cap. 12. gives us an Obſervation of this kind; where he ſays the frequent Concuſſion of the Heart was ſo violent and powerful, as not only to diſplace or luxate, but even to break ſome of the adjoining Ribs; and *Sylvius de la Boë* has a parallel Obſervation in his Account of this Diſeaſe.

Kerkringius relates the Hiſtory of a Woman he opened, whoſe Heart was of a prodigious Bigneſs, in his *Spicileg. Anat.* Obſ. 16. As does *Monſieur Dionis*, at the End of his Anatomy, where the right Auricle of the Heart was dilated to the Bigneſs of the Head of a new-born Child.

In the Diſſection of the morbid Heart, I obſerved the following remarkable Particulars.

1. That the *Pericardium* or *Capſula Cordis* was very thick, and firmly adhered or grew by a fibrous Connection to all the outer Surface of the Heart.

2. Inſtead of the Water called *Liquor Pericardii*, there was only in ſome Places about the *Baſis* of the Heart, a mucilaginous clear Subſtance like a Jelly.

3. In the right Auricle laid open, there was nothing præternatural. The aſcending and deſcending *Cava* opened in the ſame as uſual. The *Veſtigium* or Mark of the *Foramen ovale*, with it's ſemicircular *Limbus*, was very plain.

And the *Orificium* of the *Vena Cordis Coronaria* was extremely large, yet it's Valve was leſs than uſual.

4. In

4. In the right Ventricle laid open, the *Valvulæ* called *Tricuſpides* were configurate after the uſual Manner. The Sides of this Cavity were thin and full of ſmall fleſhy *Columnæ*, as they commonly are, with great Variety of Furrows and little Holes. The three *Sigmoide* or *ſemilunar Valves*, in the Mouth of the *Arteria pulmonalis*, were as they always are in a natural State.

5. The left Auricle, was not much bigger than ordinary; but it's muſcular Appendage, called the *Bulb* of the *Pulmonary Vein* by the late Mr *Cowper*, was extraordinarily dilated and enlarged, beyond any Thing that I ever ſaw.

6. The left Ventricle, whoſe Capacity in a natural State is always leſs than the Right, was here conſiderably larger. And if the Experiment had been made, before Diſſection, of filling both with any Liquor, this had certainly contained three times more than the other.

7. The *Valvulæ* called *Mitrales*, placed at the Orifice of this Ventricle, are much thicker in Subſtance than ordinary; and the two fleſhy Columns, called by *Nicholaus Maſſa*, almoſt 200 Years ago, *duo parvi muſculi*, which ſend out abundance of ſmall Tendons to be inſerted into theſe Valves, were proportionably augmented in Bigneſs.

8. The *ſemilunary Valves* in the Mouth of the *Aorta*, or of that great *Vena pulſatilis* that diſpenſes the Blood to all the ſeveral Parts of the human Body, were very much præternaturally affected; as would eaſily appear upon comparing them with thoſe in the Orifice of the *pulmonary Artery*, in which they are thin and very broad, ſo as to be able to ſhut the Cavity of that Veſſel, and hinder the Blood from returning back into the Ventricle, and likewiſe tranſparent; but in this they are very thick, contracted, as it were, and furled together, and of a whitiſh Colour; and, in all Appearance, if the Perſon had lived longer, they had turned Boney, or undergone a Petrification.

As to the chief Symptom, the *Palpitation* of the *Heart*, it is not improbable but the firm Adheſion of the *Capſula Cordis membranoſa* to the Subſtance of the Heart, occaſioned that uncommon Trembling and Throbbing thereof: It's free and eaſy Motion being hindered by that thick *Involucrum* which ſurrounded it ſo cloſe on each Side. The learned Dr *Lower*, in his Treatiſe *de Corde humano*, gives us ſuch an Inſtance, and explains the Palpitation after this manner.

As to the Dilatation of the left Ventricle, and muſcular Bag of the *Pulmonary Vein*, it was altogether owing to the ill Configuration of the *Valves* we have now deſcribed; for as the great Artery or *Aorta* ariſes out of this Ventricle, it has three Valves, which, ſeparating, give Paſſage to the Blood from the Ventricle into the Veſſels; and in a natural State they ſhut that Paſſage, and ſo prevent the Blood from recoiling into the ſame, if it ſhould endeavour to return. But in this Caſe, by reaſon of it's contracted Narrowneſs and Thickneſs, not being able to cloſe or ſhut the Paſſage, the Blood flow'd back again into the Cavity, which

Fig. 141.

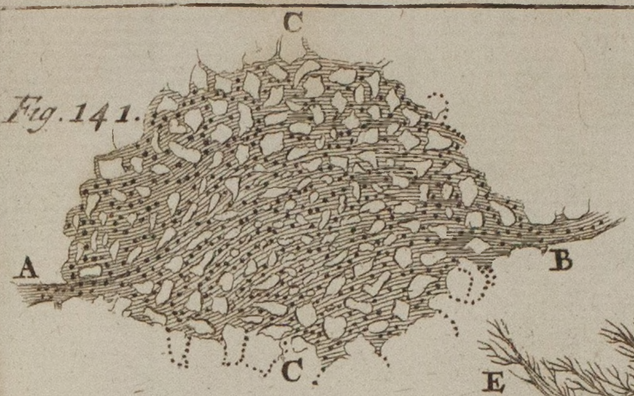


Fig. 142.

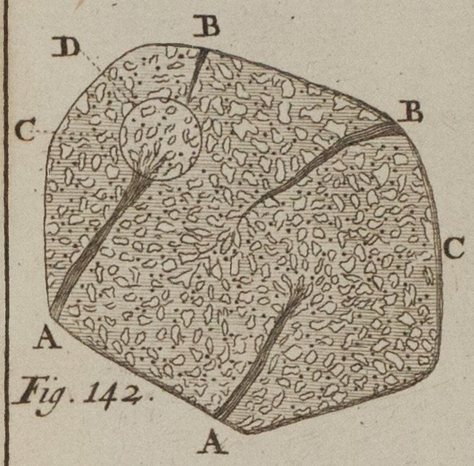


Fig. 140.

Fig. 136.

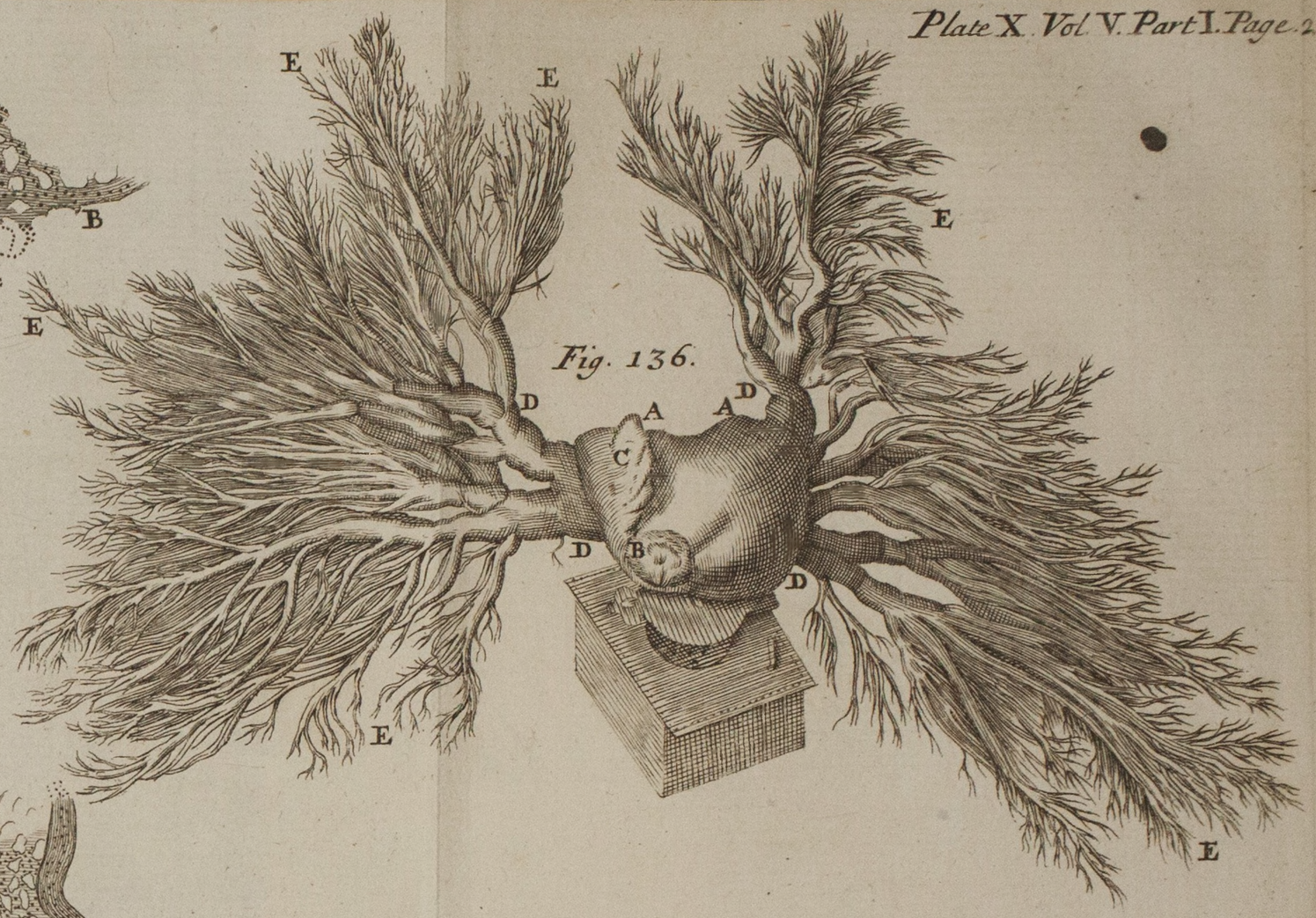
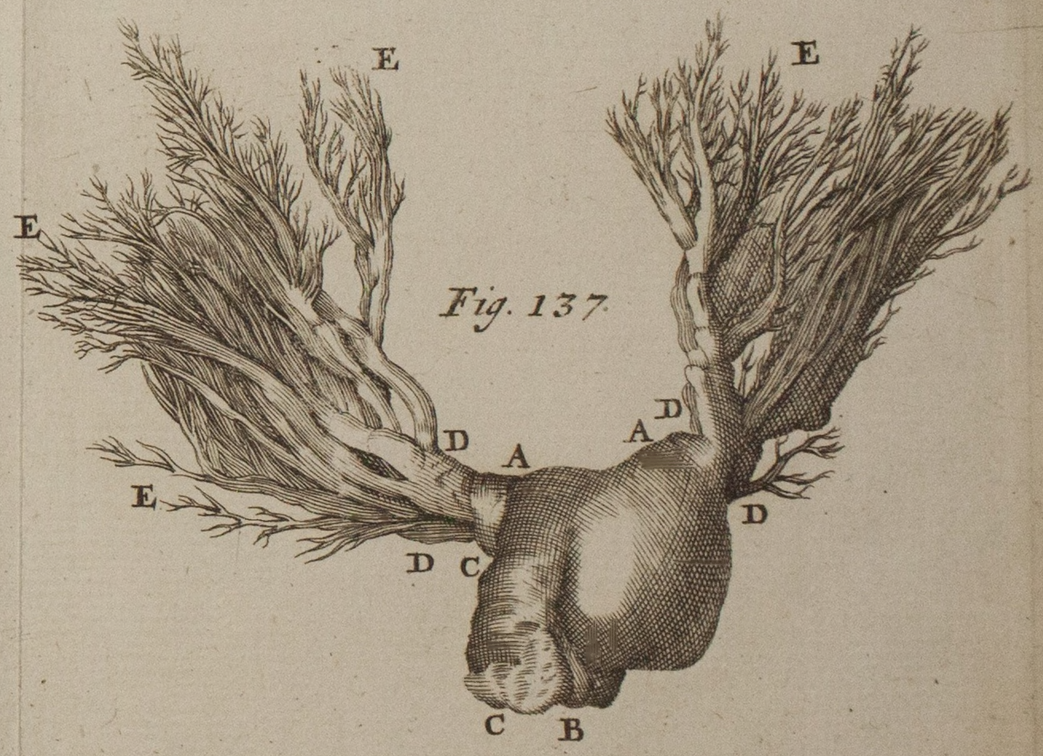


Fig. 138.

Fig. 137.



I. Harris Sculp.

which it had gradually enlarg'd, and dilated to this Bigneſs. Beſides, the *Muſcular Valves* not being duly qualified for the Performance of their Office, the Blood recoiled into the *Auricle*, which it had diſtended in the like Manner. This conſtant Regurgitation or Reflux of the Blood is beſides ſufficient of itſelf to produce this extraordinary Trembling, or παλμὸς καρδίας, as the *Greeks* call it.

Two Caſes of a Dropſy, *by Mr* W. Cheſeldon. *n.* 337. *p* 281. Fig. 144.

XI. 1. *Fig.* 144. Shews the Beginning of the *Aorta*, from the Heart of a Woman who died of a *Dropſy*. A, is the *Aorta*. B, B, two Chalk-Stones which poſſeſs'd the Place of the *Semilunar Valves*: The left Ventricle of the Heart was dilated to twice it's natural Magnitude. I ſuppoſe that theſe Stones occaſioned the *Dropſy*, by obſtructing the *Valves*, and hindering a regular Diſtribution of the Blood.

Fig 145.

2.] *Fig.* 145. Shews a Bone taken from between the Ventricles of the Heart of a Man who died *Hydropic* and *Tabid*: In this Body the whole *Pericardium* adhered to the Heart.

The Vena Azygos *inſerted into the* Right Auricle, *&c. by the ſame.* n. 337. *p* 282.

XII. I have ſeen a *Heart* with the *Vena Azygos* inſerted into the *Right Auricle*; and the deſcending *Cava* coming round the Baſis of the Heart, above the *Aorta* and Pulmonary Veſſels, to enter the *Auricle* at the lower Part with the *Aſcending Cava*.

Of the Force *of the* Heart, *by Dr* J. Jurin. *n.* 358. *p* 864.

XIII. 1. As many things have been deliver'd concerning the *Force* of the *Heart*, which are but little convincing, and which are contrary to one another, as well as to Reaſon; give me leave to propoſe a new Solution of this famous Problem. I ſhall therefore ſhew firſt what Objection there is to the Demonſtration of *Borellus*, then I ſhall take the Solutions of the learned *Morland* and *Keil* into examination, with the like philoſophical Liberty.

1. The firſt fault we have to find with *Borelli*'s Solution, and which indeed is far the greateſt, is, that he expounds the Power of the Heart by a ſluggiſh Weight at Reſt. For whereas the Heart itſelf is in motion while it contracts, and communicates motion to the Bodies oppoſing it, that is the Blood and the Tunicks of the Arteries, it is plain it cannot be known how great it's Power is any other way, than by making known the quantity of this Motion. But any Motion can no more be compared with a Weight at Reſt, than a Line can be compared with a Rectangle.

2. Secondly, that in the Experiment itſelf made by the Circulator, it does not at all appear that the Weight was ſuſpended by the contracting Force of the Muſcles alone. For aſſiſtance may be ſupply'd by that Force, by which the Muſcles made uſe of, as alſo the Cheeks, and perhaps the Ligaments themſelves oppoſe their Divulſion and the burſting of the Fibres, and by which alſo the Muſcles taken from a Carcaſe ſuſtain pretty heavy Weight.

3. That *Borellus* makes thoſe Forces equal, which belong to Muſ-

cles that are equal in Weight; which ſeems to be very doubtful, eſpecially when the Muſcles are unlike.

4. That he ſuppoſes the whole Power of the Heart to be apply'd at each Syſtole, and to be the greateſt that can be exerted, with the utmoſt contention and endeavour of the Fibres. Whereas the Circulator itſelf muſt yield to the labour in no long time, if it ſhould endeavour to lift the ſuſpended Weight either continually, or by turns after making a very ſhort pauſe.

5. That he makes the Reſiſtance of the Blood and Arteries to be ſixty times the whole Power of the Heart, inſtead of that Power which is exerted by the Heart to perform a Syſtole, and which perhaps is the leaſt part of the whole Power.

6. That he commits a great Error in determining that Proportion of ſixty times. For in *Prop.* 60. inſtead of the Ratio, which the Sum of the Powers *P* and *Q* has to the Sum of *R* and *S*, he uſes the Ratio which is between the Rectangle of the Powers *P* and *Q* and the Rectangle of *R* and *S*, which miſtake if it be corrected through the ſubſequent Propoſitions, we ſhall have in *Prop.* 73. a far greater Reſiſtance than that which is determin'd by *Borelli*, that is the Weight of 1,076,000 Pounds, inſtead of 180,000, and this by the Poſitions laid down by this great Man.

7. Laſtly, becauſe he obtrudes it upon his Readers as a kind of Miracle, that this weight of 180,000 Pounds is exceeded by the Power of the Heart equal to 3,000 Pounds, and calls in the Force of Percuſſion to aſſiſt him at a dead lift. Whereas there is no more Wonder in this, than when a weight of 3,000 Pounds makes an Equilibrium with another weight of 180,000 Pounds, which is hung at one ſixtieth part of the Diſtance from the Center of a Ballance of unequal Arms.

As to ſome leſſer Miſtakes, and ſeveral Hypotheſes which are not only arbitrary but contrary to one another, we ſhall gladly paſs them over in Silence.

The very learned *Joſeph Morland* comes next, who in his Diſquiſitions about the Force of the Heart publiſh'd in Engliſh, has given a very ingenious Method of reducing the Power of the Heart to Experiment. Now beſides the Error before obſerved in *Borelli*, or comparing the Force of the Heart with a Weight at Reſt, he is to be taken Notice of on this account alſo, that he ſuppoſes the whole Action of the Heart to be laid out in ſtretching the Tunicks of the Arteries. For the Heart does not only diſtend the Arteries, but alſo drives the Blood forward with a certain Velocity through the whole Tract of the Arteries and Veins.

Now it remains to conſider the Solution of the ingenious Dr *James Keil*, which he propoſes in his Medico-Phyſical Eſſays, belonging to his Treatiſe of the Animal Oeconomy. He was the firſt Man that ventured, not only to reject the Power of the Heart determin'd by *Borelli*, but alſo to ſubſtitute another, which is almoſt infinitely leſs than that.

Now

Now we judge him to have been miſtaken in what follows; beſides that he has fallen into that firſt Error of *Borelli*'s Solution.

For ſurely he has but ill underſtood that Corollary of *Newton*, for defining the Force of the Heart, or has wrongly apply'd it. For that weight which is determin'd by our *Britiſh Archimedes*, by which the Motion of the Water running out of the Veſſel may be produced, by no means does produce the Motion of the Water; for it acquires it's own Motion in falling by the Force of Gravity. But this weight, by falling for a given time, conceives a Motion equal to the Motion of the Water running out in the ſame given Time.

Beſides this learned Man ſuppoſes, that the Velocity of the Blood flowing out of the Heart is always equal through the whole duration of the Syſtole, which we ſhall ſhew in what follows to be notably unequal.

Alſo in that more ſimple Method, which this very learned Man afterwards makes uſe of, beſides the faults already obſerved, he commits two others.

He aſſumes that in different Animals, the Powers of the Heart will have the ſame Ratio to one another as the Weights of the ſame; which afterwards we ſhall ſhew to be falſe. Then he ſuppoſes the Velocity of the Blood flowing out of the Iliac Artery when cut, to be the ſame with which it is emitted out of the Heart into the Aorta. But ſince almoſt all the Blood expell'd out of the Heart is emitted through the other Iliac when cut, it is plain it's Velocity muſt be ſo much greater in the Iliac than in the Aorta, as the circular Section of the Iliac is exceeded by the Section of the Aorta. Beſides the equable Velocity with which the Blood flows through the Aorta, is very different from that Velocity with which it iſſues from the Heart itſelf.

And much in the ſame manner may that Method be refuted, which this learned Man makes uſe of, to determine the Ratio between the ſeveral Velocities of the Blood flowing through the Aorta, when it ſometimes is reſiſted and ſometimes not. But ſince by that Experiment not only one but both of the Velocities will be found greater than it ſhould be, the Ratio between them will not be greatly affected, but his proportion may be pretty ſafely admitted, as not varying much from the Truth.

Having thus prepared our way to the main point, we may now purſue it with greater accuracy.

By the Terms *Power or Force of the Heart*, we mean either the Motion itſelf of the Heart, while it performs it's Contraction, or the Motion of any weight, which beiug oppoſed to the Blood ruſhing out of the Heart, and carryed the contrary way by a proper Velocity, can by an equal Force ballance and ſtop the Efflux of the Blood, and thereby hinder that Contraction.

Since it is hardly to be hoped that we ſhould determine that Power *à priori*, becauſe we have not a ſufficient knowledge of the internal

Structure of the Heart, or of the Nature and Force of the contracting Cauſe; nothing is left but to eſtimate the ſame by it's Effects, or *à poſteriori*.

The whole Action of the Heart conſiſts in the Contraction of it's Ventricles. But the Ventricles in contracting urge the Blood, and by communicating a part of their Motion to it, drive it out with a great force where it can find a paſſage. Thus the Blood being forced into the Arteries, the Aorta and Pulmonic, and ruſhing with Violence every way, it impinges partly upon the Tunicks of the Arteries that are fallen and lank from the foregoing Syſtole, and partly upon the Blood that went before now flowing but ſlowly. Whence by degrees the Tunicks of the Arteries are thruſt outwards, and the foregoing Blood is accelerated in it's courſe. Now if we conceive in our Minds that the Arteries are diſtinguiſh'd by very ſmall tranſverſe Sections; at the firſt ſmall portion of Blood ruſhing from the Heart into the firſt Section, that Section will be partly diſtended, and partly the Blood before contained in the ſame will be thruſt into the next Section, which it will alſo diſtend, and thus this Action will be continued through the ſucceeding Sections of the Arteries. Then the ſecond and third and following little portions of Blood will fall upon the firſt Section of the Artery, and will dilate it ſomething more, and propel the Blood contained in the ſame into the next Sections ſucceſſively; and thus it proceeds till all the Blood is ejected out of the Ventricles. But this muſt be obſerved, that the more contracted and flaccid the Arteries are, ſo much the leſs reſiſtance they give to their Dilatation; and the more dilated they are, ſo much the more they withſtand a farther Dilatation. And therefore the Force of the Blood guſhing out of the Heart at firſt is more expended upon the Diſtention of the Arteries, than upon the protruſion of the foregoing Blood; but at laſt the antecedent Blood is more propell'd than the Arteries are diſtended, becauſe being already become rigid, 'tis with difficulty they admit any farther Diſtention.

Now as the Blood ruſhing out of the Heart communicates part of it's Motion (as ſaid before) to the Tunicks of the Arteries, and part to the foregoing Blood, it muſt needs abate of it's former Velocity. And therefore as it hinders the Contraction of the Ventricles, it receives a new Impulſe from them, part of which it impends on the Coats of the Arteries and the foregoing Blood, in the manner before deſcribed; whence it is again retarded, and receives another Stroke from the Ventricles, and ſo on till it is all expell'd out of the Ventricles.

Beſides the cauſe already explained there is ſtill another, by which the Blood flowing out of the Heart is retarded by degrees, and ſo receives new ſtrokes ſucceſſively by the Ventricles contracting themſelves. For as the Blood flows into the Aorta, if it is ſuppos'd to meet with no Reſiſtance at all, and ſo to ſuffer no diminution of Motion, yet it muſt continually increaſe in length as it paſſes from a wide into a narrow place, till the whole is come into the Aorta: And as the Section of the

Aorta

Aorta is not leſſen'd, the Velocity of the Blood muſt neceſſarily be leſſen'd. For the Motion of the Blood is in a Ratio compounded of the Ratio of the Section of the Aorta, of the Velocity in the ſame, and of the length of the Column of Blood, by our third Theorem concerning the Motion of running Waters. And ſince that portion of the Blood, which is already come into the Aorta, will be gradually retarded, the Blood will thence be retarded which is ſtill in the Ventricle, and hence the Contraction of the Ventricle itſelf will be retarded. Whence the Ventricles will continually communicate another and another part of their Motion to the contiguous Blood, which for theſe reaſons is conſtantly retarded. Now hence it appears (to take notice of it by the bye), that the Motion of the Blood iſſuing out of the Heart is one thing, and the Motion of the ſame already expell'd out of the Heart, and flowing within the Arteries, is another thing. Alſo the Stroke or Impulſe of the Ventricles impreſs'd upon the Blood, which otherwiſe would be but one, and would be perform'd in an Inſtant of Time, yet is continued through the whole Syſtole of the Heart, by the Force of the Cauſes mention'd above, by which the Blood is perpetually retarded.

See above Vol. IV. C V. § iv.

Therefore we may conſider each of the Ventricles of the Heart impelling the Blood, as a given Body impinging with a given Velocity upon another Body at Reſt, to which part of the Motion being communicated, both the Bodies will move forwards with a common Velocity. Now the Power of the ſame will be equal either to the Product of the weight of the Ventricle and its initial Velocity, before it impinges upon the Blood; or to the Sum of the Motions of the Ventricle and the Blood iſſuing out of the ſame, and of the Motion which is communicated to the Coats of the Arteries and the foregoing Blood; or elſe, if we ſuppoſe there is no Reſiſtance from the Arteries and the foregoing Blood, to the Sum of the Motions of the Ventricle itſelf and the iſſuing Blood.

Theorem I. *The Motion by which a Machine is contracted which is hollow and unequally contractible, is equal to the Sum of the Products of the ſeveral Particles of the Machine, drawn into their Reſpective Velocities.*

This is plain from Mechanicks.

Corol. 1. The Motion of a Machine is leſs than the Product of the weight of the Machine, drawn into the Velocity of thoſe parts of the Machine that are moved ſwifteſt of all in the Contraction.

2. The Motion of the Machine is equal to the Product of the weight of the ſame, drawn into ſome mean Velocity between the Velocities of thoſe parts of the Machine which are moved ſwifteſt, and of thoſe which are moved ſloweſt of all.

3. If ſeveral ſimilar Machines are contracted ſimilarly, with a mean Velocity which is either equable or inequable, yet is ſimilarly increaſed or diminiſh'd in all the Machines: The Motion by which each Machine

is contracted, is in a compound Ratio, of the quadruplicate Ratio of the homologous Diameter of that Machine, and the inverse Ratio of the Time in which the Contraction of the Machine is perform'd; or a Ratio compounded of the Ratio of the weight of the Machine, the subtriplicate Ratio of the same weight, and the inverse Ratio of the Time.

* 357 p. 929. Theor. II. *If out of the hollow Machine* A B C D, *which is unequally contractible, Water is squeezed forth by the Contraction of the Machine, the Motion of the Water issuing at the Orifice* A, *is equal to the Sum of the Factors of any transverse Sections of all the Filaments of the Water*

Fig. 146. A B, A C, A D, ; *each being drawn into the Lengths, and the respective Velocities.*

Demonstration. Instead of the Filaments of the Water, let the whole Machine be conceived to consist of very small Tubes unequally large A B, A C, A D, determining at the Orifice A.

The Motion of the Water in every Tube is equal to any Section of that Tube, drawn into the Velocity of the Water flowing through that Section, and into the Length of the same Tube; by *Theor. 3. of the Motion of running Waters.* Therefore the Sum of the Motions of the Water in all the Tubes taken together, or the Motion of the Water gushing out of the Orifice of the Machine, is equal to the Sum of the Factors of the Sections of all the Tubes or Filaments of Water, drawn into the Lengths, and the Velocities respectively. *Q. E. D.*

Corol. 1. The Motion of the issuing Water is less than the Product of the Orifice A, the Velocity of the issuing Water, and the length of the longest of all the Filaments of Water. For the Product of the Orifice and the Velocity of the running Water, is equal to the Sum of the Factors of the Sections of the Filaments, drawn severally into the respective Velocities. And the Sum of all these Factors, drawn into the length of the longest Filament, is greater than the Sum of the same drawn each into it's own length.

2. The Motion of the Water is equal to the Product of the Orifice A and the Velocity of the running Water, drawn into some mean Length between the lengths of the longest and shortest Filaments; or is equal to the Product of the quantity of Water issuing in a given Time, and the aforesaid mean length apply'd to that given Time.

3. If several similar Machines full of Water are alike contracted, or with a mean Velocity either equable or inequable, yet similarly increased or diminished in all the Machines; the Motion by which the Water gushes out of the Orifice of any Machine, has a Ratio compounded of the quadruplicate Ratio of any homologous Diameter of that Machine, and the reciprocal Ratio of the Time, in which the Contraction of the Machine is perform'd: Or a Ratio compounded of the Ratio of the weight of the Machine, or of the quantity of Water either contain'd in the Machine or expell'd from the same, the Ratio of the same Weight or the subtriplicate of the quantity, and the reciprocal Ratio of the Time.

A Pro-

A Problem. *To find the Power of the Heart.*

Make p = To the weight of the left Ventricle, or a quantity of Blood equal to the ſame weight.

S = The internal Surface of the ſame.

l = The mean length of the Filaments of Blood iſſuing from the ſame.

s = The Section of the Aorta.

q = Quantity of Blood contained in the left Ventricle.

t = Time in which the Blood would be expell'd from the Heart, taking away the Reſiſtance of the Arteries, and of the Blood going before.

v = Variable Velocity with which the Blood iſſuing from the Heart would flow through the Aorta, abſtracting from the Reſiſtance.

x = The variable length of the Aorta, deſcribed by the Blood guſhing from the Heart.

z = Time in which the lengh x is deſcribed.

Hence the mean variable Velocity of the Blood contiguous to the Ventricle, or the mean Velocity of the Ventricle itſelf, is $= \frac{sv}{S}$ ..

The Motion of the Ventricle (by *Theor.* 1. *Cor.* 2.) $= p \times \frac{sv}{S}$ ..

The Motion of the iſſuing Blood (by *Theor.* 2. *Cor.* 2.) $= \overline{sv \times l + x.}$

The Sum of theſe, or the Power of the Ventricle, $= sv \times \frac{p}{S} + l + x.$

But it is $v = \frac{\dot{x}}{z}$. Whence by *Newton*'s inverſe Method of Fluxions, the Power of the Ventricle will be found $= \frac{sx}{z} \times \overline{\frac{p}{S} + \frac{x}{2} + l.}$ Now ſince it is $z = t$, it will be $sx = q$.

Hence the Power of the Ventricle $= \frac{q}{t} \times \overline{\frac{p}{S} + \frac{q}{2s} + l.}$

In the ſame manner the Power of the right Ventricle will be found $= \frac{q}{t} \times \overline{\frac{\pi}{\Sigma} + \frac{q}{2\sigma} + \lambda.}$

Here the ſame things are ſignified by the Greek Letters in the right Ventricle, as by the Latin Letters in the left.

Hence the whole Power of the Heart $= \frac{q}{t} \times \overline{\frac{p}{S} + \frac{\pi}{\Sigma} + \frac{q}{2S} + \frac{q}{2\sigma} + l + \lambda.}$ *Q. E. I.*

If we ſuppoſe

p = 8 Ounces Averdupois. = 13. 128 Cubic Inches.

$\pi = 4$

$\pi = 4$ $= 6.564$
$S = 10$ ſquare Inches.
$\Sigma = 10$
$l = 2$ Inches.
$\lambda = 1\frac{1}{2}$
$q = 2$ Ounces Averdupois. $= 3.282$ Cubic Inches.
$s = 0.4185$ ſquare Inches } By Dr *Keil*'s Experiments.
$\sigma = 0.583$
$t = 0''.1.$

The Power of the Ventricles will be equal to the Motion of the underwritten weights. That is

	Pounds.	Ounces.
Of the left Ventricle — — —	9 .	1
Of the right Ventricle — — —	6 .	3
Of the whole Heart — — —	15 .	4

Of which weights the Velocity will be ſuch, as that a Line of an Inch long might be deſcribed by the ſame in a Second.

Corol. 1. As often as the Pulſe becomes quicker, either the Reſiſtance is leſſen'd, or the Power of the Heart is increaſed, or a leſs quantity of Blood than uſual is expell'd by the Heart at each Contraction.

2. If the Pulſe becomes ſlower than uſual, either the Reſiſtance is increaſed, or the Power of the Heart is diminiſhed, or a greater quantity of Blood is thrown out of the Heart.

3. When the Reſiſtance is increaſed, the Pulſe will neceſſarily become ſlower, or the Power of the Heart will be increaſed, or a leſs quantity of Blood than uſual will be ſqueezed out of the Heart.

4. When the Reſiſtance is leſſen'd, either the Pulſe is accelerated, or a greater quantity of Blood is thrown out at every Syſtole, or the Power of the Heart is diminiſh'd.

5. If the Power of the Heart is increaſed, either the Reſiſtance will neceſſarily be increaſed, or the Pulſe will be accelerated, or more Blood will be thrown out by the Heart.

6. If the Power of the Heart is diminiſhed, either the Reſiſtance will neceſſarily be diminiſhed, or the Pulſe will become ſlower, or leſs Blood will be ſqueezed from the Heart.

7. When a leſs quantity of Blood is diſcharged by the Heart, either the Pulſe will be accelerated, or the Force of the Heart diminiſhed, or the Reſiſtance will be increaſed.

8. When more Blood is ſqueezed out of the Heart, either the Pulſe will become ſlower, or the Power of the Heart will be increaſed, or the Reſiſtance will be diminiſhed.

Schol. 1. We have contented ourſelves to eſtimate the internal Surfaces of the Ventricles ſomething near the Truth, ſince it ſeems very difficult to determine them exactly, or to take account of that diminution they muſt undergo in contracting. For whether we make them 12 or 8 ſquare Inches, the change made in the Powers would be found to be but very little. This alſo may be obſerved of the mean length of the Filaments of Blood. We have alſo neglected the differences by which

which both the Arteries, and their Branches neareſt the Heart, are increaſed by *Section*, as being very difficult to be eſtimated, and almoſt inſenſible. Otherwiſe the Power of the Heart muſt be made ſomething ſmaller than is above determin'd.

2. The learned Dr *James Keil* has determin'd the Velocity of the Blood ruſhing out of the Heart, when the Reſiſtance is removed, to be about the ſame as that wherewith 6 $\frac{1}{2}$ Feet, would be deſcribed in a Second of Time. Now he makes the Velocity of the Blood to be equable through the whole Syſtole, which we have ſhewn above, to be notably unequal, and to be continually retarded from the Beginning of the Syſtole. If any one pleaſes to aſſign this, in the fourth Equation before, he muſt ſubſtitute the Power of the Ventricle laſt found, and any Value muſt be given to x, ſo that v, or the correſponding Velocity, may be diſcover'd. Thus, ſince at the Beginning of the Syſtole, 'tis $x = o$, and at the End $x = \frac{q}{s}$; the Velocity of the Blood at the Beginning of the Syſtole is determin'd to be ſuch, as that 14 $\frac{1}{4}$ Feet may be deſcribed, and at the End 4 $\frac{1}{4}$, in a Second of Time. In the like manner in the right Venticle, the initial Velocity of the Blood will make about 10 $\frac{5}{6}$, and the final Velocity 3 Feet, in the ſame Space of of Time.

Hitherto we have proceeded on the Suppoſition, that the Muſcles of the Heart, conſtituting the Ventricles, conceive in a moment of Time all their Motion, by which they perform their Contraction. Now if we ſuppoſe their Motion to be communicated to 'em, not indeed in an Inſtant, but yet in ſo ſmall a Space of Time, that it bears a very ſmall Proportion to the whole Duration of the Syſtole; the Power of the Heart muſt be made ſomething greater than is determin'd above. Now as the Syſtole proceeds, if that Motion is ſuppoſed to increaſe in the Ratio of the Time; the whole Motion acquired at the End of the Syſtole, will be as great again as we have ſuppoſed above, where no Reſiſtance is oppoſed to the Blood iſſuing out of the Heart. But when the uſual Reſiſtance is admitted, it will be five times greater; as will eaſily appear from Calculation. By a like Argumentation, our Calculus may be apply'd to any other Hypotheſis, in which the Motion of the Ventricles increaſe in a duplicate, or any other higher Ratio of the Times. The Power acquired at the End, will come out much greater than that above, that is, a triple Power in the duplicate Ratio, a Quadruple in the Triplicate, a Quintuple in the Quadruplicate, and ſo on *in infinitum*.

But to me, the ſecond *Hypotheſis*, in which the Ventricles acquire their whole Motion in a very ſhort Space of Time, ſeems to be far the more probable; ſince it is neceſſary that ſome time muſt be imploy'd to generate any Motion, nor does the Motion of the Ventricles increaſe ſo ſlowly, as not to increaſe ſwifter than according to the Ratio of the

Time. For the Motion of the Muſcles cannot be perform'd by the Impetus only of any Fluids that proceed from the Blood, ſince with either of our Arms, we can exert a Motion which is far greater than the Motion of the Blood flowing through all the Veſſels of the Body. It remains therefore, that the Fibres of the Muſcles conſtituting the Ventricles of the Heart, muſt be put into Motion by ſome Rarefaction of the Liquors flowing into the ſame. But this, whenever it acquires a great Force, is commonly ſudden and almoſt inſtantaneous. To which add, that a far leſs Motion of the Ventricles is produced according to this *Hypotheſis* than in the Third. But the moſt wiſe Artiſt, the Creator of all Things, in all his Works, makes uſe of no more Force than is neceſſary to compleat his Deſign.

But whether this Hypotheſis is admitted, or any other of thoſe abovemention'd may be thought nearer the Truth; all our *Corollaries* with equal Reaſon may be deduced from the *Problem*. Which whether they may be of any Aſſiſtance in explaining the Hiſtory of Diſeaſes, I muſt leave to the ſagacious Phyſicians to conſider. Now from the Nature of every Diſeaſe, it may be eaſily known, whether the Reſiſtance is increaſed or diminiſh'd. But it is probable that the Force of the Heart will be either increaſed or diminiſhed, when the Force of the other Muſcles is increaſed or diminiſh'd: Tho' I ſee the learned *Laurence Bellini* is of another Opinion.

Theorem III. The whole Motion of Reſiſtance, which is oppoſed to the Blood iſſuing out of the Heart, during it's Syſtole, or the whole Motion which is communicated to the precedent Blood, and the Coats of the Arteries, is nearly equal to the whole Power of the Heart.

Demon. The Syſtole of the Heart being compleated, the Part of the *Aorta* and *Pulmonic Artery*, which is neareſt the Heart, continues full of Blood through the whole Syſtole of the Arteries. Nor does their Fabrick permit, or the Ligaments by which they are join'd to the Heart, that the Coats intirely falling together, they ſhould be wholly ſhut up, or their Cavity ſhould be void of Blood. For thus the other Parts of the Arteries contracting themſelves, the Blood contain'd in the ſame would be repell'd backwards into the Vacuity, by a Motion which is not only uſeleſs, but contrary to the natural Motion of the Blood. Then alſo, the little ſemilunar Valves would not be diſtended towards the Ventricles, ſo that the Blood ſqueezed out of the Auricles into the Ventricles, would be protruded into the Arteries, even in the Diaſtole of the Heart.

Hence it appears that the Blood newly expell'd from the Heart, at the finiſhing of the Syſtole, will continue unmoved in the Arteries, and ſo not only receive the whole Motion of the Ventricles, but alſo communicate the whole, partly to the antecedent Blood, and partly to the Tunics of the Arteries. Q. E. D.

Theorem

Theorem IV. The Motion which in the Syſtole of the Heart, is communicated to the antecendent Blood, is to the Motion communicated to the Coats of the Arteries, as the Time of the Syſtole of the Heart, to the Time of the Diaſtole very nearly.

Demon. Whereas the Blood flows with an equable courſe through all the Veſſels of the Body, excepting thoſe Parts of the Arteries which are neareſt the Heart; it is neceſſary, that both the Motion that is loſt by the Friction of the Blood againſt the Sides of the Veſſels, as alſo the Motion given to the Blood by the Syſtole, either of the Heart or the Arteries, muſt be equal in equal Times. But the Motion which is communicated to the Blood by the Syſtole of the Arteries, is exactly the ſame which before had been impreſſed on the Coats of the Arteries by the Syſtole of the Heart, ſince the Arteries are again reſtored with the ſame Impetus with which they were diſtended. And the Syſtole of the Arteries is of the ſame Duration as the Diaſtole of the Heart. Whence the Propoſition is manifeſt. Q. E. D.

Cor. If we ſuppoſe with the very learned Dr *James Keil*, that the Syſtole of the Heart is perform'd in a third Part of the Time intercepted between two Pulſes; the Motion communicated to the preceeding Blood, will be a third Part of the whole Power of the Heart. But the Motion communicated to the Arteries, will be double the foregoing, or two third Parts of the whole Power of the Heart.

Theorem V. In different Animals, the Power of the Heart is in a Ratio, compounded of the quadruplicate Ratio of any homologous Diameter of the Animal, and the inverſe Ratio of the Time, in which the Heart is contracted; or in a Ratio compounded of the Ratio of the Weight of the Heart, or of the whole Animal, of the ſubtriplicate Ratio of the ſame, and the reciprocal Ratio of the Time of Contraction.

It is eaſily demonſtrated, either from *Carol. 3. Theor.* 1. and 2. or from the Power of the Heart determined by the foregoing *Problem.*

Corol. 1. If we ſuppoſe the Power of the Heart, to be as the Weight either of the Heart it ſelf, or of the entire Animal, or as the Quantity of Blood in the whole Animal; the length of the Animal will be as the Time in which the Syſtole of the Heart is perform'd, or in the inverſe Ratio of the Frequency of the Pulſes.

2. If the Ratio of the Length of the whole Animal, is greater than the inverſe Ratio of the Frequency of Pulſes, the Ratio of the Power of the Heart, will neceſſarily be greater than the Ratio of the Weight of the ſame.

Schol. Since is appears by Experiment, that the Pulſes of Children are not ſo much more frequent than the Pulſes of Men, as Children are exceeded in length by Men; we muſt conclude, by Virtue of the ſecond *Corollary*, that the Power of the Heart of a Man, has a greater Ratio to the Power of the Heart of a Child, than in the Ratio of their

Weights. And the like obtains in the other Muſcles. For if the Strength of the Body obſerved the Ratio of it's Weight, Children might travel equal Journies in the ſame Time as Men.

By a like reaſoning, as we have determin'd the Motion of the Blood iſſuing out of the Ventricles of the Heart, by help of the ſecond *Theorem*; the Motion of the Urine flowing out of the Urethra, may be alſo determin'd. For if we ſuppoſe the Length of the Uretha and Bladder to be equal to 12 Inches, and 2 Ounces of Urine to be diſcharg'd in the Space of a Second; the Motion of the Urine flowing out, will be equal to the Motion of the Weight of 1 $\frac{8}{2}$ Pounds, which deſcribes the Length of an Inch in a Second. But becauſe the Urine is expell'd not only by the contracting Force of the *Urinary Bladder*, but alſo by the Aſſiſtance of the *Diaphragma* and the *Abdominal Muſcles*; the Power of the Bladder cannot be eſtimated by the Motion of the flowing Urine.

Anſwer'd by Dr James Keil, *n.* 361. *p.* 995.

2.] The great Fault that Dr *Jurin* objects to *Borelli*, D. *Moreland*, and myſelf is this, that in eſtimating the Power of the Heart, we have undertook to determine, what Ratio it bears to a Weight at Reſt, or to the Gravity of a Body. He ſays that, "Whereas the Heart it-"ſelf is in Motion while it contracts and communicates Motion to the "Bodies oppoſing it, that is the Blood and the Tunicks of the Ar-"teries; it is plain it cannot be known how great it's Power is, any "other Way than by making known the Quantity of this Motion. But "any Motion can no more be compared with a Weight at Reſt, than a "Line can be compared with a Rectangle." But none of us, that I know of, has compared the Motion of the Heart with a Weight at Reſt. But I cannot ſee what ſhould hinder us from comparing the Power of the Heart, or the motive Force of the Heart, and the impelling Blood, with a Weight. For though between a Weight and the Motion of a ſolid Body there is no Relation, yet the motive Force, if it acts upon a Fluid, furely has ſome Relation to the Force of Gravity. And indeed the motive Force of a Body, producing in a given Time, a certain Quantity of Motion in the Fluid, is equal to a Weight, which falling by the Force of Gravity, acquires the ſame Quantity of Motion in the ſame Time. Hence that Force, by which Water is preſſed through any Orifice, is ſaid to be equal to a certain Weight: Becauſe the given Weight, and the Force preſſing out the Water, in equal Times, produce equal Motions. This ſeems to me, to be the genuine Senſe of *Newton*'s *Corollary*, nor does what I have explain'd, concerning the Power of the Heart, differ from this Senſe. *Newton*'s Words are, "The Force by which the whole Motion of the "iſſuing Water may be generated, is equal to the Weight, *&c.*" To this Dr *Jurin* ſeems not ſufficiently to attend, when he ſays, "But "that Weight, by which the Motion of the Water flowing out of the Veſſel may be generated, *&c.*

But

But if we have erred in this matter, we have erred with the greateſt Geometricians of this Age, *Huygens* and *Newton*, each of whom has expounded the Force of Fluids by the Force of Gravity. Nor does *Newton* do this only in the aforeſaid *Corollary*, but in other Places alſo he ſhews a Method, by which the Ratio of the Reſiſtance of a Medium, that is, of the Action of a Fluid on a ſolid Body, to the Force of Gravity, or a Centripetal Force may be found; as may be ſeen in *Prop.* 4 & 5 of his ſecond Book, and their *Corollaries*. Indeed the Action of Fluids upon a Solid is one Thing, and the Action of Solids upon one another, is another Thing. A Fluid moving with a given Velocity, may ſuſtain a given Weight, when the Parts of the Fluid continually ſucceeding one another impinge upon the Weight, and ſo the Force of the Fluid is really equal to the Weight. But ſince it is not ſo with Solids, their Force cannot be compared with Gravity.

Beſides this very ingenious Perſon reproves me, becauſe I have ſuppoſed the Velocity of the Blood, expell'd by the Heart, to be equal through the whole Syſtole, which he has demonſtrated to be very unequal. But I have no where given an equal Velocity to the Blood, but for the Sum, I have taken the mean of all the Velocities. But it does not yet appear to me, whether the Celerity of the Blood ejected out of the Heart is equal or unequal; at preſent that Opinion which makes for the equal Celerity ſeems the more probable.

But having cleared up the Blemiſhes which this learned Man has found in my firſt Method, let us ſee what has diſpleaſed him in the other which is ſubjoyn'd. This is the Aſſumption which is made uſe of by *Borelli*, and other learned Men, that in ſimilar Muſcles, the Force is as the Weights. Dr *Jurin* endeavours to eſtabliſh another Proportion of the Forces, in his fifth *Theorem*; but ſince the Demonſtration is derived from the common Principle of all his *Theorems*, it will alſo be involved in their common Fate. For if that Principle is fallacious, as it ſeems to me, nor is adapted to the Caſes to which it is apply'd; every thing muſt fall which is built upon this Foundation. This learned Man ſuppoſes, that the Coats of the Veſſels ruſh with violence upon the Blood contained within, and by their Stroke to communicate to the Blood a Part of it's Motion; and here in the Motion of the Heart, he would have the Ventricle as a ſolid Body, moving with a given Velocity, to impinge upon the Blood, and by it's Stroke to communicate a Part of it's Motion to it: Which Suppoſition agrees neither to the Motion of the Blood, nor of the Heart, nor of the Air ſqueez'd out of the Lungs, nor by any Reiteration of ſmall Strokes can be ſo accommodated to the Motions of theſe, but that the Concluſions drawn from hence muſt be held as uncertain, and altogether falſe.

Since between the Blood and the inſide of the Heart, no Space intercedes, but one is contiguous to the other; this cannot act upon that by a Stroke, but by Preſſure. Nor have the Venticles any Velocity at the

the beginning of their Contraction, but by contracting they acquire a Velocity in time, as heavy Bodies by falling, or Fluids by Rarefaction, from which perhaps the whole Force of the Heart proceeds. Therefore the Motion of Contraction is not equable, as this learned Man would have it, but an accelerated Motion like that of a falling Body. Therefore there is the ſame difference between the Stroke, with which Dr *Jurin* maintains that the Heart ſtrikes the Blood, and the Preſſure by which the Heart acts upon the Blood, as there is between the Action of a ſolid Body in Motion, and the Force of Gravity. But he confeſſes theſe cannot be compared; and therefore the Preſſure or Action of the Heart upon the Blood, neither is, nor ever can be explained by this learned Man by a Stroke. The Power of the Heart found by himſelf, confirms this Opinion. For if a Weight moving with a given Velocity, could be equal to the power of the Heart, then the Blood directly ſtriking with all the Force of the Heart againſt that Weight, would deſtroy the Motion of the Weight in a moment of Time. But if the Blood meets the Weight with never ſo great violence, it will never deſtroy all it's Motion in an Inſtant, and therefore the Power of the Heart is leſs than this Weight, nor can the Force of the Heart be duly expounded by the Motion of a Weight.

Dr *Jurin* eſtimates and conſiders the Forces of Fluids upon ſolid Bodies, every where in the ſame manner as the Forces of Solids upon one another, notwithſtanding there is a very great difference between them. And from hence flow all the Errors of his Propoſitions. For whenever a ſolid Body, whoſe Parts firmly cohere among themſelves, impinges againſt another; every Particle of the Body at one and the ſame Time, imparts it's Force to the other. But the Matter is quite otherwiſe in Fluids, in which there is no Coherence of Parts, no Part of the Fluid acts upon the oppoſite Body, unleſs by Contact itſelf. Therefore when a Column of Water is turned upwards againſt a ſolid Body, the Parts of the Column which are at a Diſtance from the Body, communicate no Force to it. Alſo a ſolid Body communicates only one Stroke to another; but a Column of a Fluid continually acts upon a Body oppoſite to it, and the leaſt Part of the Column, in the leaſt Moment of Time, imparts to it an infinitely ſmall Stroke, juſt in the ſame Manner as heavy Bodies act in falling, to which therefore the Motion of Fluids is rightly compared. Again, all the Motion of a ſolid Body, directly impinging againſt another, may be deſtroy'd in a Moment of Time; but the motion of a Solid, communicating Force to a Fluid, is diminiſhed only by degrees, and vaniſhes in a given Time; in the ſame manner as Gravity exerts it's Force upon a Body which is thrown upwards. From whence it is abundantly manifeſt, that there is a great affinity between the Force of a Fluid put into Motion, and the Force of Gravity, and that one may ſafely be expounded by the other: But that the Force of a ſolid Body can never be referr'd to the Force of Gravity. And ſince the moſt learned Dr

Jurin,

Jurin, does not ſeem to have ſufficiently attended to this Difference, he ſeems to me to have departed much from the Truth. Therefore laying aſide his Hypotheſis of the Stroke of the Veſſels, and aſſuming, for a Principle, the Force of Preſſure which Nature makes uſe of, if he ſhall think fit to conſtruct other *Theorems* concerning the Motion and Force of the Heart and the Blood, after his elegant Method of Demonſtration, he will perform a Thing worthy of himſelf, I am ſure acceptable to me, and I believe very uſeful to the learned World.

— *Defended by Dr* J. Jurin, *n.* 362. *p.* 1039.

3.] This celebrated Man complains in the firſt Place, that I have attack'd him unjuſtly, together with the learned *Borelli* and *Morland*, as comparing the Motion of the Heart with a Weight at Reſt. After I had obſerved, that a certain Motion of the Blood and Arteries proceeded from the Force of the Heart, I affirmed that we could not know how great the Power of the Heart was, till we could arrive at the Knowledge of this Motion. For that any motion could no more be compared with a Weight at Reſt, than a Line could be compared with a Rectangle. By which Words I would be underſtood, not that theſe learned Men expreſsly compared the Motion of the Heart with a Weight at Reſt, but that by expounding the Power of the Heart by a Weight, they pointed out no method by which the Quantity of Motion ariſing from the Power of the Heart might be eſtimated. If I rightly underſtand the meaning of this very learned Man, he thus endeavours to get clear of this Objection. The Power of the Heart conſiſts in Preſſure, which it imparts equably to the Blood, in the ſame manner as the Force of Gravity impels a Weight downwards, and by it's perpetual Action, accelerates it into Motion. Wherefore ſince the Power of the Heart is equal to a Weight, as defined by the *Corollary* of *Newton*, it will impreſs the ſame Motion upon the Blood, while the Syſtole continues, as that Weight would acquire in falling the ſame Time by the Force of Gravity. Now ſince this learned Man explains his meaning in this Manner, I confeſs that Objection of mine is entirely removed; if the Power of the Heart is equal to the aforeſaid Weight, and the ſame conſiſts in an equable Preſſure continued through the whole Syſtole. But of theſe two Propoſitions, this learned Man does not at all endeavour to prove the latter, but gives it as an Hypotheſis; tho' I have attempted to make the contrary Opinion the more probable, induced to it by ſome Reaſons. That is, that the Power of the Heart does by no means act equably upon the Blood thro' the whole Syſtole, but when it has collected it's whole Force for a ſmall particle of Time, it ruſhes upon the Blood with one Impulſe, and expels it out of the Ventricles, in the manner we have before explain'd at large. As to the firſt Propoſition, we ſhall demonſtrate it to be falſe, even granting him his Hypotheſis.

As to the meaning of *Newton*'s *Corollary*, we ſhall not give the Reader much trouble, ſince we do not think him much concerned, which

which of us has underſtood *Newton* beſt. Nor has my learned Adverſary explained his Opinion ſo clearly, but that there may be danger of affixing a Senſe to it, which if he were ſtill alive he might diſclaim. But it may be convenient to obſerve this, that whereas Dr *Keil* ſpeaks of the Force with which Water is impreſſed thro' any Orifice ; *Newton* has not mentioned a Word in that *Corollary*, in which Water is ſignified to be thrown out by any Force. He has only determined a Weight equal to that Force, by which the whole Motion of the running Water may be generated, or which, falling by the Force of Gravity, may acquire a Motion, which is equal to the Motion of the Water running out in the ſame Time.

Now the learned Reader will eaſily perceive, that if this grea Man has not miſunderſtood this *Corollary*, yet ſurely he has not rightly applied it ; he muſt conſider what difference there is between the Efflux of Water, at a Hole in the bottom of a Veſſel which is always full, (in which manner it is conſidered by *Newton* in that *Corollary*) and the Efflux of Blood out of the Heart into the Aorta. For in the firſt Caſe, the Water has already acquired it's whole Velocity, and for a given ſpace of Time it flows equably out of the Hole. But the Force of the Heart, by Dr *Keil*'s Hypotheſis, is apply'd to the Blood at Reſt in the Ventricle, and propels it towards the Aorta, with an infinitely ſmall Velocity in the firſt Moment of Time ; but the equable Preſſure being continued, at laſt it impreſſes a finite Velocity to it, and continually increaſes it, till it has expelled all the Blood out of the Ventricle.

Again, in *Newton*'s Caſe, the Motion is conſider'd, not indeed of the whole Water contained in the Cataract, which is all in Motion, and tends towards the Exit with different Velocity but of the Water only now at the Hole, and juſt going out. But the Force of the Heart impreſſes a Motion to the whole Maſs of Blood contained in the Ventricle, and drives the whole towards the Aorta.

Laſtly, we deny that a Weight of five Ounces, as determin'd by Dr *Keil*, can acquire by the Force of Gravity in a Syſtole of the Heart, ſuch a Quantity of Motion as the Power of the Heart produces ; even granting him that Hypotheſis, that the Power of the Heart conſiſts in equable Preſſure. For by this Hypotheſis, the Motion produced by the Force of the left Ventricle, according to our Calculation *, will be equal to the Motion of about 18 Pounds Weight, which deſcribes the Length of an Inch in a Second. But the Force which a Weight of five Ounces will acquire by the Force of Gravity, in the tenth Part of a Second, or during one Syſtole of the Heart, (if all the Reſiſtance of the Arteries, and the foregoing Blood be taken away) will be nearly equal to the Motion of a Weight of 12 Pounds, which moves with the Velocity aforeſaid. Now aſſuming this Hypotheſis, if any one has a mind to determine the true Weight, which is equal to the Power of the Heart ; he will find by Calculation, the Weight of

* See above.

about

about 7 $\frac{1}{2}$ Ounces. For this will nearly acquire the ſame Motion by falling, during the Syſtole of the Heart, that the Power of the Heart itſelf produces.

But perhaps it may be reply'd, that the Difference here aſſigned between the Motion acquired by the Weight of Dr *Keil*, and the Motion ariſing from the Power of the Heart, may proceed from hence, that poſſibly theſe Suppoſitions may not be very accurate, by which we have reduced to Numbers, the Algebraical Symbols made uſe of in our Calculation. To ſatisfy which Scruple, and to ſhew at the ſame Time that we ſhould find a much greater Difference, had not theſe Poſitions been very favourable to Dr *Keil*, it may be worth while to have recourſe to ſome ſimple Caſe, in which a given Quantity of Water is ſqueez'd through a given Orifice, in a given Time, by ſome equable Force or Preſſure, which are the Conditions ſuppoſed by the Adverſary, for defining the Power of the Heart.

Now in this Caſe we ſhall demonſtrate, that neither the Motion of running Water, nor the Motion impreſſed to the whole Quantity of Water by that Force, will be equal to the Motion of the Water in the *Corollary* of *Newton*; nor will that Force or Preſſure, be equal to the Weight determined by that *Corollary*. Which if we ſhall perform, Dr *Keil*'s whole Demonſtration muſt entirely fall to the Ground.

We will aſſume therefore a given Cylinder of Water, contained in a Cylindrical Tube of indefinite Length; and that Section of the Tube will be inſtead of an Orifice, to which either Superficies of the Water reaches, and to the other Superficies a Force may be apply'd, by means of a Piſton of the ſame Diameter as the Tube itſelf. Now in a given Time, let any given Quantity of Water flow through the ſaid Section of the Tube; then another equal Quantity through a Hole made with an equal Diameter in the bottom of the Veſſel, which in *Newton*'s Manner ſtill continues to be full. And in the firſt Place let us examine, whether in both Caſes there will be equal Motions of the running Water.

Let the Time of the Efflux of the Water, be expounded by the right Line A C, and the equable Velocity with which the Water runs out at the Hole in the bottom of the Veſſel, be expounded by the right Line A B. Whence the Quantity of Water flowing out at the Hole, being as the Time and Velocity conjunctly, will be expounded by the Rectangle A B C D. And the Motion of the ſame will be expounded by the ſolid Parallelepiped, made on the ſame Rectangle, drawn into the Height A B, at being in a Ratio compounded of the Ratios of the Quantity and Velocity. Fig. 147.

In the other Caſe, wherein the Water flows through the Cylindrical Tube, the Time (as before) will be expounded by the ſame right Line A C, but the Velocity of the Water will be as the Time, for the Force apply'd acts equably upon a given Quantity of Water, by

the Hypotheſis, and therefore will be repreſented by the variable Line F G, proportional to the right Line A F, or to the Time from the Beginning of the Efflux. But the Particle of Water paſſing through the aforeſaid Section, in the Particle of Time F H, will be expounded by the Rectangle of F H drawn into the Exponent of the Velocity F G; or if the little right Line F H be conceived to vaniſh, by the Trapezium F G I H, and the Quantity of Water flowing for the whole Time A C will be reprepreſented by the right-angled Triangle A C E. And becauſe, by the Hypotheſis, that Quantity is equal to the Quantity of Water flowing in the former Caſe, the Triangle A C E will be equal to the Rectangle A B D C; whence C E, or the Velocity acquir'd at the End of Time A C, will be double to the Velocity C D or A B, with which the Water flows out of the Hole at the Bottom of the Veſſel. Now whereas the Motion of the Water paſſing in the Particle of Time F H, is in the Ratio of the Quantity and Velocity conjunctly, it will be expounded by the vaniſhing Priſm, which is made of the Trapezium F G I H drawn into the Velocity F G. Whence the whole Motion of the Water flowing in the whole Time A C, will be expounded by the Pyramid, whoſe Baſe is the Square of of the right Line C E, and whoſe perpendicular Altitude is the Line A C. Now as this Pyramid is to the Parallelepiped determined in the former Caſe, as 4 to 3, the Motions alſo of the flowing Water in each Caſe, will be in the ſame Proportion, and therefore unequal; which we undertook to demonſtrate in the firſt Place.

The next Thing is to ſhew, that the whole Motion finally impreſſed on the whole Water contained in the Tube, is not equal to the Motion determin'd in the firſt Example. Now ſince that whole Quantity of Water is not at all determin'd by the foregoing Poſitions, we will here aſſume it to be equal to the Quantity of Water expounded by the Rectangle A B C D, which in the firſt Caſe flows out of the Hole, and in the Second, runs through the aforeſaid Section. Then ſince the whole Motion finally impreſſed to it, is in the Ratio of the Quantity, and the final Velocity conjunctly, it will be expounded by the Parallelepiped made of the Rectangle A B D C drawn into the right Line C E. Now this is to the Parallelepiped determined in the firſt Caſe, made of the ſame Rectangle, and the right Line C D, as the Height C E to the Height C D, or in a duple Ratio. Laſtly, ſince we might have expounded the Quantity of Water contained in the Tube, by any other Rectangle, as well as the Rectangle A B C D; it is plain that this Motion may have any Ratio to the Motion determin'd in the firſt Caſe, and therefore is by no means equal to it. Which was to be demonſtrated in the ſecond Place.

It ſtill remains to be ſhewn, that the Force apply'd in this Caſe, is not equal to the Weight determined by the *Corollary* of *Newton*. Now this Force, and the Force of Gravity acting upon that Weight, ſince they are both equable, will be in the Ratio of the Motions, produced by

by each in a given Time. But as we have now demonſtrated that theſe are unequal, thoſe Forces will alſo be unequal: Which was the laſt Thing to be demonſtrated.

This learned Man proceeds to that other Fault which I had found in his Solution; which is, that he has ſuppoſed the Velocity of the Blood flowing out of the Heart to be equable, which is demonſtrated by me to be remarkably inequable. Now he denies that he has aſcribed an equable Velocity to the Blood, but only to have uſed a mean Velocity for the Sum of all the different Velocities. Beſides he ſays, that it does not ſufficiently appear to him, whether the Velocity of the ejected Blood be equal or unequal, but the Opinion of an equal Velocity to him ſeems moſt rational. But let the candid Reader judge, if any one pretending to find the Velocity of the Blood, applies the Quantity of the expelled Blood to the Orifice of the Aorta, without mentioning the different Velocities, or the mean Velocity, whether he does not ſuppoſe the Velocity of the Blood to be equable. Let him alſo determine, whether any Force or Preſſure, applied to a Fluid at Reſt in a Veſſel, (for ſuch is the Hypotheſis of this learned Man) will not urge the Fluid in the firſt Moment of Time, with the ſame Velocity as in the laſt Moment.

This learned Man having thus anſwer'd (as he thought) thoſe Objections which I had made to his firſt Method, proceeds to vindicate that his eaſier Method. In this I had obſerved, that he aſſumes this Propoſition, that in different Animals, the Forces of their Hearts are in the Ratio of their Weights; alſo that he ſuppoſed the Velocity of the Blood flowing out of the Iliac Artery when cut, to be equal to that by which the Blood is emitted out of the Heart into the Aorta; both which Poſitions we have demonſtrated to be falſe. This learned Man does not defend the latter Miſtake, but he vindicates the former, by the Authority of *Borelli* and other learned Men, who often make uſe of this Aſſumption. I admit it to be ſo, and therefore have reproved *Borelli* for this Aſſumption. It was therefore incumbent on this learned Man, to take our Demonſtration into Examination. Now he conceives this to depend upon a certain fallacious Principle, on which ſince all my *Theorems* are founded, they muſt all be involved in a common Ruin. For he affirms that I ſuppoſe, that the Ventricles of the Heart, as it were a ſolid Body moving with a given Velocity, impinge upon the Blood, and by that Stroke communicate to it a Part of their Motion. And this Hypotheſis, as this learned Man thinks, can neither agree to the Motion of the Blood, nor of the Heart, nor of the Air ſqueez'd out of the Lungs.

As to what belongs to the Lungs, ſince this learned Man thought fit to mention this by the Way, I acknowledge that I conſider'd the Lungs, as it contracted, to impinge with a given Velocity upon the Air contained in it, and I profeſs I did this on purpoſe. For as not only *Bellini*, but many other very learned Men, among whom my

learned Adverſary is not the leaſt, have advanced many Things about that Force, by which in Breathing, the Air acts upon the Blood paſſing through the Lungs, and diſſolves it's grumous Parts ; which Diſſolution they imagine to happen at the very Begining of Expiration ; I purpoſed to take this their Opinion into Examination. Now I perceived, if I allow'd the Air to be expell'd by an equable Force or Preſſure, that the Motion imparted to the Air by the Lungs at the Beginning of Expiration, or the Reaction of the Air upon the Lungs, and therefore upon the Blood paſſing through, muſt be eſteem'd as an infinitely little Quantity, and therefore could perform none of thoſe Effects which were aſcribed to it. But if I had done ſo, I thought that *Bellini* and his Followers might juſtly complain, that I had not done fairly by them, as having rejected their Opinion on account of a Demonſtration, which was derived from an arbitrary Hypotheſis, the moſt oppoſite to their Sentiments. Therefore I choſe rather to deduce a Demonſtration from ſuch an Hypotheſis, as was moſt favourable to them, and which aſcribed to the Air at the Beginning of Expiration, the greateſt Quantity of Motion. But this was that in which it is ſuppoſed, that at the Beginning of Expiration the Lungs impinge upon the Air with a given Velocity.

But in determining the Power of the Heart, I firſt propoſe that Hypotheſis as the moſt ſimple of all, and deduce my Solution from it, in which the Ventricles with their whole Impetus acquired at an Inſtant of Time, as a ſolid Body endued with a given Velocity, ruſh upon the Blood at once. Then I afterwards conſider that Hypotheſis, in which the the Ventricles of the Heart conceive their whole Motion in a very ſmall Particle of Time, and which ſeems the moſt probable to me. Then I come to Dr *Keil*'s Hypotheſis, and infinite others, to all which I accommodate my Solution. So that my Solution will obtain, whether that Principle is uncertain and fallacious, or whether it ſhall be found true and reaſonable.

Yet I ſee nothing of Argument alledged, but that I have as much right to make uſe of this Poſition, as this learned Man has of uſing the contrary, his Force of Preſſure : We cannot deny that there is no Space intervening between the Sides of the Ventricles and the Blood, and yet it does not appear why the Effect cannot be perform'd by a Stroke. Certainly if a Stroke be given to a Cube touching a Globe, the Cube will as eaſily communicate to the Globe a Part of it's impreſſed Motion, as if there were a Space between them.

Now theſe are ſolid Bodies, but when the Queſtion is about the Motion of Fluids, the affair will be very different. Dr *Keil* explains at large the Difference there is between the Strokes of ſolid Bodies, and the Action either of a Solid upon a Fluid, or of a Fluid upon a Fluid : Which Difference as he thinks I did not attend to, he aſſerts that, whatever Errors are in my Propoſition proceed from hence. Now I readily admit this Difference, and that this learned Man has rightly

inſiſted

inſiſted on it; and I affirm I was not unacquainted with this common Doctrine, ſince nothing is more frequently met with in Writers upon Mechanicks. Yet I found it neceſſary to explain ſome new Caſes, in which, as that Doctrine could not take Place, a new Method was to be purſued. This may be cleared up in three Words. And to make uſe of an eaſy Example, ſuppoſe a Cylinder of Water of a given Length to be at Reſt in a given Tube, and let another ſolid Cylinder of an equal Diameter move through that Tube, and impinge againſt the Cylinder of Water with a given Velocity. What will be the Effect? Why, the whole Cylinder of Water by that Stroke will be put into Motion, after the ſame Manner as if it had been a ſolid Cylinder, and the other Cylinder would loſe a Part of it's Motion in a Moment of Time, and both Cylinders would move through the Tube with a common Velocity. And juſt ſo it would happen, if the Cylinder of Water flowing through this Tube, ſhould ſtrike againſt the ſolid Cylinder at Reſt. But if the Cylinder of Water ſhould move through the Tube with a given Velocity, and the ſolid Cylinder ſhould meet it with ſome other Velocity, ſo that the Quantities of Motion of the watry and ſolid Cylinder may be equal, the Motion of each Cylinder would be deſtroy'd in a Moment of Time, juſt as if two ſolid Bodies, whoſe Motions are equal, ſhould meet one another. As to any other Caſes more compounded, the learned Reader may find them in our Diſſertation concerning the Motion of running Waters, and he will ſee at the ſame Time how that may be brought about, which ſeems to have been the chief difficulty of my learned Adverſary; that is where I have ſhewn, that the Blood may be ſtopp'd, though it ruſhes with it's whole Impetus out of the Ventricle, when it meets with a ſolid Body which is endued with a given Quantity of Motion.

XIV. *A Paper Omitted.*

A Diſcourſe concerning ſome *Influence* of *Reſpiration* on the *Motion* of the *Heart*, hitherto unobſerv'd. By *J. Drake*, M. D. F. R. S. *n.* 281. *p.* 1217.

XV. *Account of a Book Omitted.*

Johannis Conradi Beckeri, Phil. & Med. D. Paradoxum Medico-Legale *De Submerſorum Morte ſine Potâ Aqua*, aliquot Cadaverum ſectionibus detectum, & e Principiis Mechanicis illuſtratum. Cui adjicitur Dodecas Obſervationum circumſtantiis curaque rariſſimarum. *Gieſſæ Haſſorum*, M.DCC.IV. *n.* 303. *p.* 2152.

CHAP.

CHAP. V.

The ABDOMEN.

Of Secretions *in an* Animal Body; *by Dr* J. Morland, *n.* 283. *p.* 1292.

I. THE whole Buſineſs of *Secretions* ſeems to me reducible to this double Enquiry: *1ſt*, How a thin Fluid (ſuch as is the *Urine*) may be ſeparated from the Maſs of Blood, and the remaining Parts of the Blood circulate back to the Heart. *2dly*, How a thick Fluid (ſuch as is the *Bile* or *Semen*, for Example) may be ſeparated from the Maſs of Blood, and the other Fluids, both thinner and thicker than this particular Fluid to be ſeparated, circulate back to the Heart. And that I may be the more plain, I ſhall give a general Idea of the Structure of the *Glands*. A *Gland*, I conceiv'd to be compos'd,

1ſt, Of the Ramifications of the Blood-Veſſels inclos'd in a common Membrane, which ſends off ſeveral Fibres, by which theſe minute Veſſels are tied together; and that the Veins are a continuation of the Arteries. Of this Dr *Areſkin* has fully convinced us, by an *Injection of Wax* in an Human Body ſo dexterouſly performed, that the *Wax* being *injected* by the *Arteries* filled the *Veins* at the ſame time; and afterwards by a nice Diſſection of the Part, where the *Continuation* of the ſmall *Ramifications* of the *Arteries* and *Veins* appeared to the naked Eye.

2dly, I conceive, that when the Branches of the Arteries begin to grow very ſmall, they ſend off ſeveral Ducts, whoſe Orifices are of different Dimenſions. Theſe Ducts are of two Sorts.

The Firſt of theſe, which in the ſame Artery are always ſmaller than the *2d*, paſs immediately from the Artery, and open into the Veins.

The Second which paſs off nearer to the Extremity of the Arteries, unite and carry off a Liquor from the Maſs of Blood for particular Ends in ſeveral Parts of the Body. It is to be obſerved, that in one Caſe the ſecond Sort are only to be found.

I imagine, that a thin Fluid may be ſecerned from a thick one, when the Orifices of the ſecretory Ducts are ſo ſmall, as to admit no other but that thin Fluid, and that at the ſame Time the remaining Parts of the Blood which are thicker, continue their Courſe in the Veſſel.

Again, I imagine that a thick Fluid may be ſecern'd, when the thinner Parts are carry'd off ſome other Way, ſo that the Liquor to be ſecerned will be the thinneſt of the remaining Maſs.

Upon

Upon these Principles I think it will be easy to explain the Doctrine of Secretions. And now, *In the first Place*, Let us examine how the thinner Secretions are performed: As for Instance, the Urine.

When the Blood by the Contraction of the Heart is push'd into the Arteries, they are dilated, which again contracting themselves, push it forward into all the Parts of the Body, and amongst the rest into the Ramifications of the Arteries of which the Glands of the *Kidneys* are compos'd. By this means the Blood passes by the Orifices of the *Secretory Ducts*; when these Arteries contract themselves they press the Blood, and force the thinner Parts into the Orifices of those Ducts, which will admit no thicker Fluid, and carry it toward the *Pelvis*, and the remaining Part of the Blood, into the Veins by them to be carry'd back to the Heart. Thus a thin Liquor may be separated from the Mass of Blood.

In the second Place, Let us examine how a thick Liquor may be separated from the Mass of Blood where thinner Liquors are mixed with it.

For Instance, let us take the *Gall* or *Semen*.

When the Blood is push'd into the *Celiac* or *Mesenteric* Arteries, 'tis forced to pass into the Glands of the *Stomach*, *Pancreas*, *Spleen*, and *Intestines*, &c. where the *Liquor Gastricus*, *Succus Pancreaticus*, *Liquor Intestinalis*, are separated by the above mention'd Method. The Blood thus robb'd of various thin Liquors is push'd on into the Veins, which answer to these Arteries, which Veins unite, and form a large Trunk called the *Vena Porta*, which entering into the Substance of the Liver by it's small Ramifications chiefly forms the Glands of which the Liver is compos'd. Here again all the Fluids contain'd in the *Vena Porta*, which are thinner than the Bile, are separated from this Mass of Blood, by the first Sort of Secretory Ducts (which we said opened into the Veins) and there are discharged and mixed with the Blood, which is passing toward the Heart. At the same Time the *Bile*, with the rest of the Blood which is thicker, continues it's Course in the Artery: Now all the thin Liquors being seperated, the Bile is the thinnest Part of this Mass of Blood, and so may be received by Excretory Ducts, which are capable to receive it, and no other.

The *Semen* being a very thick Liquor is separated much after the same manner, *viz.* The Blood being push'd into the *Spermatick* Arteries, passes into the Substance of the *Testicles*, where all the Liquors that are thinner than *that* out of which the *Semen* is to be taken, are separated by the first Sort of Secretory Ducts, and carried back to the Mass of Blood. Then this *Liquor Seminalis* being the thinnest Part of the remaining Mass, is separated by Excretory Ducts, capable to receive it, and no other. After the *Liquor Seminalis* is separated from the Mass of Blood by the aforesaid Method, it is push'd forward into the Excretory Ducts, where there are other Ducts, which take their Origin all along from them, which Ducts are capable to receive the thinnest

thinneſt Parts of the *Liquor Seminalis*, and convey them to the Maſs of Blood: And thus the *Semen* is left behind to paſs into the *Vas deferens*.

And 'tis worth remarking, that as the *Semen* grows thicker and thicker, by continual Separation, the Canal in which it is to run, grows larger and larger; as appears by the Structure of the *Teſticles*, *Epididymis* and *Vas deferens*. Hence we may give a true Account, why the Canals of which the Teſticles are compoſed, are ſo long, *viz.* That there might be time enough to ſeparate all the thin Fluids,

By this Method we ſee, how the thickeſt and thinneſt Fluids may be ſeparated from the Maſs of Blood. And how intermediate Liquors may be ſeparated after the ſame Manner by Canals of intermediate Dimenſions.

Thus, in a Word, the whole Doctrine of Secretions may be reduc'd to this.

To ſeparate a Liquor of any determin'd Thickneſs, all the Fluids, which are thinner, muſt be carry'd off by ſmall Canals, and the Liquor to be ſeparated, being the thinneſt of the remaining Maſs is ſecerned, becauſe the Ducts are capable to receive it, and no other.

Corollaries. 1. Hence the Uſe of the Spleen is evident.

2. Hence appears the Origin and Uſe of the Lymphatics.

3. Hence the Texture and Uſe of many minute Parts of the Body may be diſcover'd, which hitherto has been unknown.

Of the Glands *in the* Human Spleen; *by Dr* J. Douglas. *n.* 349. *p.* 499.

II. *Anatomy* has receiv'd much improvement, from a true Obſervation of what has been found in the Diſſection of *Morbid* Bodies. Thus I have ſeen in a *Diſeaſed* Subject, the *Glands* diſperſed through the fibrous Subſtance of the *Human Spleen*, which in a *Natural* State appear not to the naked Eye: It was in a Boy about 4 or 5 Years old, that died of a general *Atrophy*, or Conſumption of all the muſcular fleſhy Parts of the Body, occaſion'd, without all doubt, from the numerous glandulous Swellings ſcatter'd up and down the whole Meſentery; which, by compreſſing the Lymphatic Veſſels, call'd in this Place *Vaſa Lactea*, prevented the Acceſs and Supply of the Chyle, ſo neceſſary for the continu'd Nouriſhment and Increaſe of the Parts. For without the conſtant Recruit of this Liquor, the Maſs of Blood will in a ſhort time be unfit to perform any of thoſe good Offices, which a freſh Acceſſion of Chyle qualifies it for.

In a Piece of this *Spleen* we might ſee, without the Aſſiſtance of a Glaſs, ſeveral round whitiſh Bodies of a pretty hard Conſiſtence, and abundance of ſmall, white, and ſofter Specks; but both of the ſame Nature. Theſe, to me, at leaſt, appear to be ſo many diſtinct Glands become viſible; which, in a Natural State, are only to be ſeen by a fine Glaſs, as the curious *Malpighius* firſt obſery'd. (*Vid.* his

Treatiſe

Treatiſe *de Liene, cap.* V. *De quibuſdam corporibus per Lienem diſperſis. Minimæ hæ Glandulæ*, ſays he, *non æque facile ſeſe produnt in quocunque animalium Liene : imo ſolâ Lienis laceratione innoteſcunt in Bove, Ove,* &c. *In Homine vero difficilius emergunt : ſi tamen ex morbo univerſum glandularum genus turgeat, manifeſtiores redduntur, aucta ipſarum magnitudine, ut in defunctâ puellâ obſervavi ; in qua Lien globulis conſpicuis racematim diſperſis totus ſcatebat.* Which Caſe was the very ſame with mine.

Two, and Three Spleens, *found in* one Body; *by Mr* W. Cheſelden, *n.* 337. *p.* 282. *Fig.* 148, 149, 150.

III. *Fig.* 148, ſhews three Spleens taken from one Body.
Fig. 149, ſhews two Spleens taken from a Man.
Fig. 150, ſhews two Spleens taken from a Woman.

In all theſe three Caſes of the *Spleens*, each had proper Veſſels; but the Arteries only are expreſſed in the Figures.

The *Spleens* in each Body taken together, were but equal in Magnitude to one we uſually meet with.

Of an Ulcer *in the Right* Kidney; *by Dr* J. Douglas, *n.* 325. *p.* 32.

IV. I aſſiſted lately at the Opening of a Gentleman, who died the Day before, in the 45th Year of his Age; where I obſerved the following Particulars relating to the unuſual Structure and morbid Diſpoſition of the Parts contained in the Cavities of the *Thorax* and *Abdomen*.

When the Skin, with the other Integuments, were taken off, I obſerved, that part of the *Omentum* had thruſt itſelf through the annular Holes of the Abdominal Muſcles on the left Side, and there form'd an *Epiplocele*, or *Hernia Omentalis*, as large as a Walnut.

The *Omentum* reach'd as low down as the *Pubis* and Inſide of the *Ilia*, to which it was ty'd; and by fibrous Connexions it adher'd to all the *Peritonæum* below the Navel.

All the Fat on the *Omentum* and Guts was firm, and hard like Tallow.

The Inteſtines and Stomach were quite empty, without either Wind or *Fæces*.

The left Kidney was much larger than ordinary, being near eight Inches long; it's Surface being divided into ſeveral diſtinct Lobes, as in a *Fœtus*.

The right Kidney was full of a fœtid purulent Matter: All it's inner Subſtance was wholly waſted; and it's external or cortical Part was ſtretched ſo very thin, that a ſmall Touch of the Finger could eaſily break through it.

All the Fat and Glands about the Kidney laſt mention'd were hard, obſtructed, indurate, and big, which made a great Compreſſion on the *Muſculus Pſoas* and the *Muſculus Quadratus Lumborum*.

The Ureter proceeding from this right Kidney was cover'd with a Cruſt or Bed of indurate Glands; and beſides, it's Capacity was ſtraitened and contracted in ſeveral Places.

The Cavity of the *Vesica Urinaria* was very small; it's Substance so very thick and hard, that I could not even by the help of a Blow-pipe distend it any wider: It's Inside seemed excoriated with several little fleshy Caruncles, or red Excrescencies, here and there.

There was a remarkable Corrosion in all the Inside of the *Urethra*.

All the upper and convex Part of the Liver adhered firmly to the *Peritonæum* that covers the Diaphragm, and to the same Membrane where it covers part of the *Musculus Abdominis Transversalis*: It's Substance was so very tender and soft, that it seemed to be almost rotten.

The Gall-Bladder was extremely large and full; the bilious Liquor it contain'd, being of a whitish-yellow Colour.

Between the *Tunica Vaginalis* and *Albuginea* of the left Testicle, there was a large hydatical or watery Tumour; and upon the last named Coat of the same Testicle there were several chalky Concretions, about the Bigness of a Barley-corn each.

In the right Auricle of the Heart there was a large *Polypus* that fill'd up it's Cavity, extending itself a great way into the ascending and descending Trunks of the *Vena Cava*.

All the rest of the *Viscera* were as they should be in a Natural State.

The Symptoms this Person complain'd of during his Illness, as far as I was inform'd by those who attended him, were, that about a Year-and-half ago he began to decline in Health; his first Complaints being a Heat, Sharpness or Pain in making Water; constant Desire to Urine, though in great Misery after. When the Water stood a while, there appeared a greasy Substance on it's Surface, not unlike the Cream or Ice that is found on the top of *Aqua calcis vivæ*; some Time after, it deposited a purulent Matter in great Quantity, but without any offensive Smell: The Water when made was thick and whitish, but when the Corruption settled to the bottom of the Pot, it became clear. He seldom complained of any great Pain in his Back or Loins; whence they concluded the Ulcer was in the Neck of the Bladder, tho' the vast Discharge of Matter was an Argument of the contrary: But he always was on the Rack when he rose up after sitting, and it was a great Difficulty to him to get up, which perhaps was occasion'd by the Weight and Pressure of the Kidney, and adjacent indurate Glands, lying on the Head of the *Psoas* Muscle, and *Quadratus Lumborum*.

He had often a total Suppression of Urine; but was much reliev'd by *Sal Succini* and *Cornu Cervi*. He took several Doses of *Cantharides* with *Camphire*, without any ill Effect from the Fly, but with little Relief to his Distemper. For three Weeks past he was seized with a violent Looseness, which at last, in Spight of all Means, carried him off.

V. 1.] I have lately read over with great Pleasure a most ingenious little Tract on Fevers. In the Main, I think the Author in the right, that most, if not all, Fevers proceed from the Obstruction of the Glands.

Of Powder'd Blue passing the Lacteal Vessels, by Dr M. Lister, n. 270. p. 819.

In *Page* 54 of that Book, An Experiment of mine (published many Years ago, † and in the Success of which I thought myself very happy) is not fairly represented: as, I suppose, standing too much in his way; and therefore is removed, and passed over by him, as if not done by me, or at best mistaken. However it was afterwards experimented at *Oxford* by Dr *Musgrave* with a surprizing Success; *viz.* that a Dog kept long fasting, would not only admit into the Lacteals a tinctured Liquor, but a very substantial one, such as powder'd Blue.

† *Vid.* Supra V. III. C. IV. §. xxiii.

And therefore to account for Fevers, and the Obstruction of the Glands, we must admit of crude, and otherwise vitiated Chyle, as well, if not oftener, than the external Accidents from Cold and Heat, and the disorderly Temperature of the Air.

2.] The *New Theory of continual Fevers* lately publish'd, speaking (*pag.* 54, 55.) of the Experiment of Dr *Lister*'s of *colouring the Lacteals*, intimating, that the Doctor *could never get the Experiment done to his Satisfaction*——and——*that People may be deceiv'd with Blue Tinctures for* [*that*] *this is the natural Colour of these Lacteals when they are almost or altogether empty*; I have drawn out of my *Adversaria* the Sum of what was (after Dr *Lister*) done by me in that Matter.

On the same, by Dr W. Musgrave, n. 275. p. 996.

Feb. 1682-3. I injected into the *Jejunum* of a Dog that had for a Day before but little Meat, about twelve Ounces of a Solution of *Indigo* in Fountain Water; and after three Hours, opening the Dog a second time, I observ'd several of the *Lacteals* of a *Bluish* Colour; which, upon stretching of the *Mesentery*, did several times disappear; but was most easily discern'd when the *Mesentery* lay loose; an Argument that the *Bluish* Colour was not properly of the Vessel, but of the Liquor contained in it.

A few Days after this, repeating the Experiment in another Company, with the Solution of *Stone Blue* in Fountain Water, and on a Dog that had been kept fasting 36 Hours; I saw several of the Lacteals become of a *perfect Blue Colour*, within very few Minutes after the Injection: for they appear'd so before I could sow up the Gut.

About the Beginning of *March* following, having kept a Spaniel fasting 36 Hours, and then Syringing a Pint of a deep Decoction of *Stone Blue* with common Water into one of the small Guts; and after three Hours, opening the Dog again, I saw many of the Lacteals of a *deep Blue Colour*. Several of them were cut, and afforded a *Blue Liquor*, (some of the Decoction,) running forth on the Mesentery. After this I examin'd the *Ductus Thoracicus*, (on which together with other Vessels near it, I had, upon my Return, made a Ligature) and saw the *Receptaculum Chili*, and that *Ductus*, of a *Blueish Colour*; not so Blue, indeed as the Lacteals, from the Solution mixing in and near

the *Receptaculum*, with *Lympha*; but much *Bluer* than the *Ductus* uſes to be, or than the *Lymphatics* under the Liver (with which I compared it) were.

I truſted not my own Eyes in any one of theſe Experiments; but in each of them had the Company and Aſſiſtance of ſeveral Phyſicians; who all agreed with me as to the Colouring of the Lacteals.

The Entrance into the Lacteals (which is much the narroweſt Part of all the way from the Mouth to the Maſs of Blood) being thus beyond Exception, proved wide enough to admit ſo groſs a Body as *Stone Blue*, we may here in part explain the Admiſſion of Liquors, as of Diuretic Waters, *&c.*) into the Veſſels in *prodigious Quantities* in a very little Time.

The ſame Wideneſs of the *Lacteals* makes them eaſy to receive (together with proper Vehicles) thoſe groſſer Bodies which afterwards compoſe the grumous Part of the Blood, the Cartilages and Bones.

And this open Entrance being allowed, it will no longer ſeem impoſſible, that with our Nouriſhment, Eggs or *Animalcula* themſelves, ſhould enter theſe Veſſels, there being no Manner of Queſtion, but that of both the one and the other, ſome are much leſs in Bulk than the greateſt Particles of *Indigo*, in the Decoction abovementioned ſeen in the Lacteals.

Add to this the many Species that are of little Inſects, and their great Fertility; ſo many and ſo great, that of the People of the Animal Kingdom, a very ſmall Proportion (perhaps not a quarter Part) comes within View of the naked Eye; and then, we ſhall be the better able to account for the great Variety, as well as Numbers of Inſects obſerv'd in the Juices of the Body Animal.

But the chiefeſt Uſe of the Wideneſs of the Lacteal Orifices, is in deducing from thence the Reception of groſs Matters (ſuch as are the Effects of Indigeſtion, *&c.*) which afterwards in the Blood and *Genus Nervoſum*, many Times produce ſevere Diſtempers.

Which Notion, in ſome Degree, was confirmed by it's firſt Propoſer (*vide Clariſſ.* Liſteri *de Fontibus medicatis* Angliæ *Exercitationem alteram*, *Ed. Lond. pag.* 48.)

A Diſeaſe *caus'd by ſwallowing* Pebble-ſtones, *by Sir* Ch. Holt, *n.* 275. *p.* 995. † *Vid.* Supra V. III. P. 1. C. iv. §. xvi.

VI. *Gobſill* (whoſe Caſe is printed in the *Ph. Tr.* N. 253.) came lately to me, and told me the Pebble-Stones grew very troubleſome to him; that he had of late vomited up two of them, which he ſhewed me, and I cauſed them to be weighed. One weighed ℥ij, and the other ℥j. ℈ijſs. He complains that his Strength is of late much impaired; that he voids great Quantities of Blood by Stool, which keeps him very weak. His Stomach is much decay'd, and will retain but few Things. His Hands are palſied, always extream cold, and his Fingers contracted; he is not able to open them without Help, or keep them ſo, unleſs by Force. His Legs are very likely, in a ſmall time, to be as uſeleſs to him as his Hands, for he ſays they begin to fail him, and in the ſame Manner

Fig. 143.

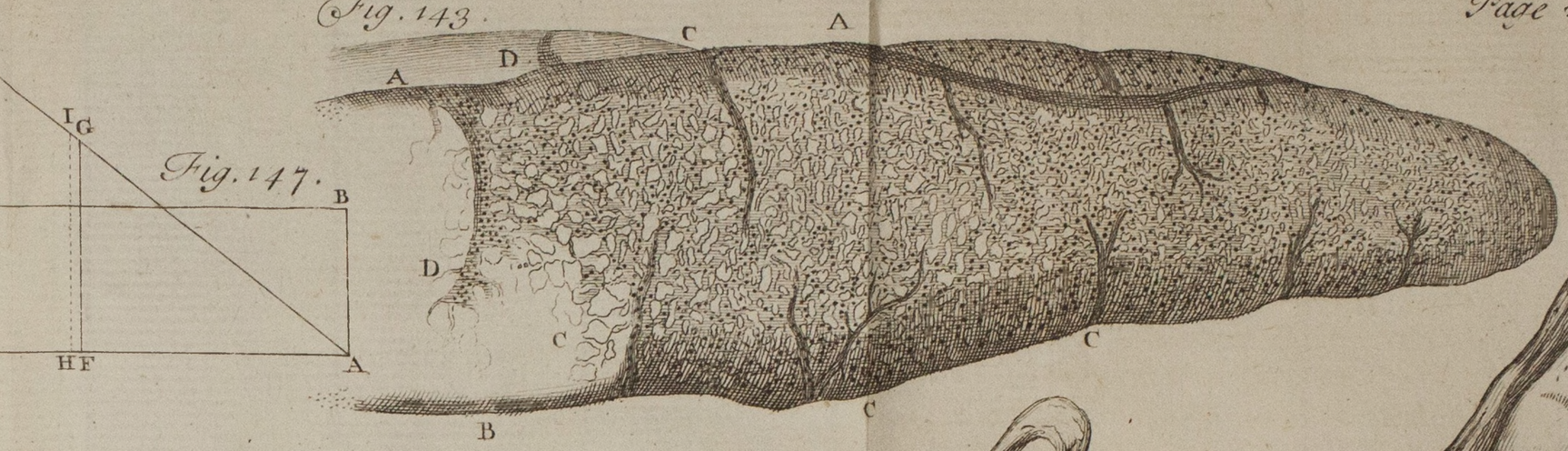
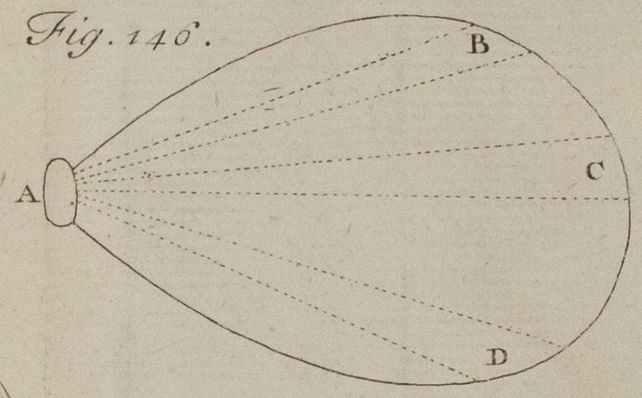


Fig. 147.

Fig. 146.



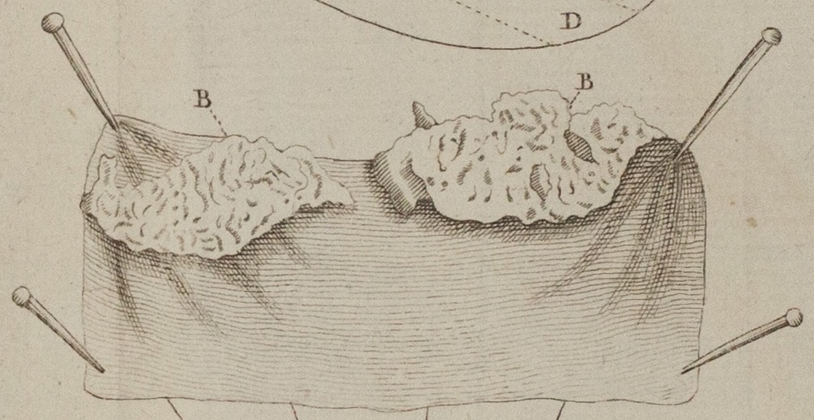


Fig. 144.

Fig. 139.

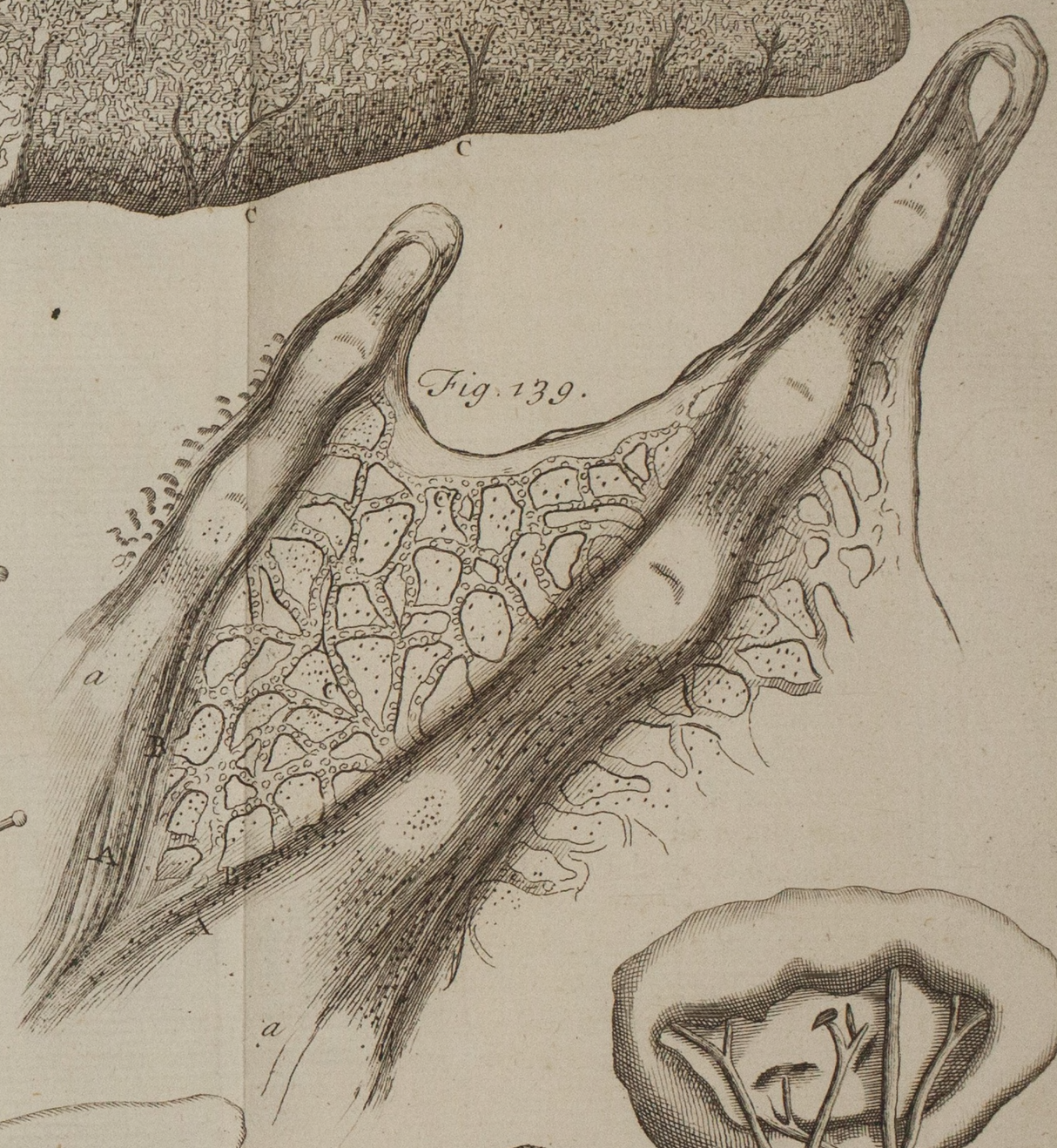


Fig. 149.

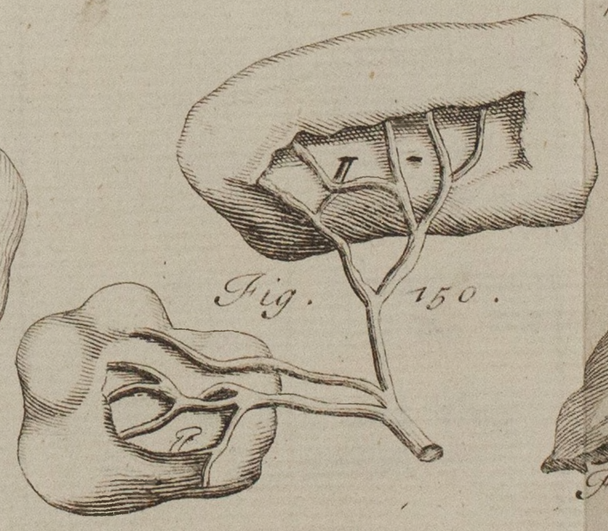
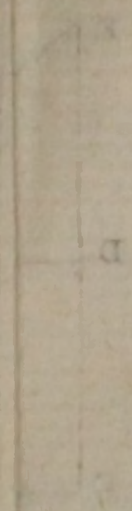


Fig. 150.

Fig. 145.

Fig. 148.

J. Harris Sculp.



Manner grow cold, and have little Senſation in them. But the moſt remarkable of all his Complaints, was, a new Progreſs the Stones had either found or made. Formerly at Night in Bed, they us'd to get up (as he expreſs'd it) to his Heart, and upon turning to his Knees, or ſtanding upright on his Feet, they would drop one by one ſo diſtinctly, that they might be counted, and in this State they always aroſe ſtraight up, on the right Side of his Breaſt; but now they riſe obliquely, and get under his right Arm, inclining towards the *Scapula*, and when they are in this Place, by giving him a Blow with the Fiſt on his right Shoulder, they will all fall down in a Lump together, and may very plainly be heard to claſh on the other Stones, which lie as they did formerly juſt above the *Os Pubis*. After he had told me this Story, I made the Experiment before Dr *Fowke* and Dr *Davies*, and the Matter of Fact proved true as he related it.

The Miſchiefs of ſwallowing the Stones of Fruit, by Mr H. Vaughan, n. 281. p. 1244.

VII. 1.] A Gentleman ſome Time ago eat above two Pounds of common Prunes, and ſome Time after about a Pound more: About a Fortnight before he died he had ſome Symptoms of the Stone. He had a violent Pain in the Neck of the *Veſica*, and about the *Urethra*, with Obſtructions in his Urine, &c. I ordered him a Terebinthinate Glyſter, which gave him Eaſe: His Pains afterwards increaſing, a Phyſician was ſent for, who preſcrib'd Glyſters, with Diuretics and Narcotics, to no Purpoſe. After his Death he was diſſected in the Preſence of Dr *Weſt*, and others. We found that the Prune-Stones had made a Perforation thro' the *Inteſtinum Rectum* into the *Pelvis*. We tied one Part of the Gut, and cut out a Piece, and emptied it: We took out 128 Prune-Stones in Number, beſides what we left behind in *Stercore*, in the other Part of the *Inteſtinum Rectum*. There was likewiſe a large *Polypus* taken out of the Left Ventricle of the Heart, &c.

A Plumb-Stone *in the* Guts *for* thirty *Years*, &c. *by Mr* J. Yonge. *n.* 282. *p.* 1279.

2.] *Sarah Swayn*, of a thin Habit, and middle Stature when but ſix Years old, was firſt afflicted with a violent Pain, together with a large hard Swelling on the left Side of her Belly, which laſted twelve Hours, and then went off without Uſe of any Remedy, or ſenſible Evacuation; and at the End of three Months returned, laſted, and went off as before.

Several Years it obſerved that Period, and then changed it's Intermiſſion from three Months to three Weeks, and ſo continued till ſhe was thirty-five Years old; in which Time ſhe married, and bore one Child, the Pain of which ſhe averr'd to be much leſs than what theſe *Paroxyſms* gave her.

During her Pregnancy, her Pains nor Intermiſſions had no Alteration, and in her whole Life ſhe found no Diet diſturb'd her but Milk and Salt Meats.

About nine Months before ſhe was cured, the Pain and Tumour increaſed to the Bigneſs of a Man's two Fiſts; ſhe endeavoured by many

many Remedies to get Eaſe, but in vain, till the Torment and Watching had ſo weakened her, that ſhe could not riſe out of her Bed.

In this Condition ſhe was adviſed by a Woman to take a Doſe of powder'd *Jalap*; it operated violently, and ſuddenly drove the Pain from her Side down to the *Anus*, where it reſembled a *Teneſmus*, *viz.* a conſtant and violent Inclination to Stools, without being able to force off any thing; and after ſhe had been thus crucified four Days, her Urine alſo ſtopt, and two Days after that, I was called in.

I perceived by their Report of the Matter, that ſomething obſtructed the Paſſage of her Excrements, and ſoon found it ſo by a Probe; I then anointed the Paſſage with *Populneum*, and taking hold of the Subſtance with a Pair of large Forceps, made to extract Stones from the Bladder after Lithotomy, I drew it forth.

Abundance of Wind and Excrements guſh'd out, and continued to flow till her Guts were emptied of all the Matter which had been ſo long retained; after which I ordered her an Anodyne Clyſter, and a compoſing Draught, and ever ſince (being ſeveral Years) ſhe continues well.

Fig. 151. The Thing extracted was round, ſomewhat oblong, having on it ſome ſuch Impreſſions as Mens Fingers make on Wax or Plaiſter. It then weighed ten Drachms, now ſcarce an Ounce; it was five Inches in Circumference; altho' it felt and otherwiſe appeared a Stone; it ſwam on Water, which made me ſee the Inſide of it, by cutting it in two with a Knife; externally it was black, and ſmooth as if varniſh'd, and no thicker; next to this thin Blackneſs was a Cruſt of Matter like Brick, the Thickneſs of an half Crown; within that appeared a Subſtance reſembling Paſte-Board, or chewed Paper, and within that lay a

Fig. 153. Prune or withered Plumb, with the Stone and Kernel cut aſunder by my Knife.

Thus all theſe wonderful Accidents, which ſo long moleſted this Woman, were occaſioned by this Plumb ſwallowed ſo many Years before; but how thoſe different Accretions were made to it in ſuch a Place as the Inteſtines? How it ceaſed to torment her at ſo many and ſuch different Intervals? Where it lurked between thoſe Fits, and how the Pain and Tumour obſerved ſuch exact Periods for ſo many Years; at firſt every three Months, and afterward every three Weeks? Are Queſtions I leave to others to reſolve.

Stones *from the* Gall-Bladder. Many Authors (*a*) tell us of various Stones ejected by Stool, and of late many of them have been found to come out of the Gall-Bladder through the Choleric Channels of Jaundic'd People. I have ſeen two ſuch, bigger than any I have read of, one as big as a Pullet's Egg, which came from a Lady in the Operation of a ſtrong Cholagogue, taken for a Jaundice, that had reſiſted many other Remedies; the other as

(*a*) *Miſcell. Cur.* vol. 2. *obſ.* 89. 136. *Act. Med.* Barth. vol. 5. *obſ.* 65.

as big as a large Nutmeg, driven out by the ſame Means from an aged Man languiſhing in the ſame Diſtemper, and both of them for many Days after thoſe Stones came off, evacuated great Quantities of Choler by Stool, and were freed of the Diſeaſe.

That thoſe two Stones were generated in the *Folliculus Fellis*, or *Ductus Choledochus*, no Man will doubt, who conſiders the Conſequence, and knows that in Colour, Taſte, Weight, and Shape, they reſembled ſuch as are found in thoſe Parts upon Diſſection of Jaundic'd Bodies. I once ſaw near an Handful of them taken out of the Gall-Bladder of the *Portugal* Ambaſſador that died in *London*, 1679, and we are told by *Baglivi*, that *Malpigh*'s was full of them: They uſually are of a ſubcitrine Colour, reſemble bright Myrrh, and ſeem an Aggregate of ſmall Stones, which perhaps are made ſingly in the *Veſicula*, and coaleſce in the *Ductus*.

The Conſequence of their coming off, ſhews, that they cauſed the Jaundice in thoſe two Perſons I have mentioned, by obſtructing the Channels through which the Bile paſſes from the common Receptacle into the *Duodenum*. It may perhaps ſeem impoſſible to ſome Men, that Subſtances of that Magnitude could paſs through a *Meatus* ſo ſmall as the common *Ductus* is. But it hath been no Wonder to me this twenty Years, ſince I diſſected a Phyſician of this Place, who died of the Jaundice, and found the *Ductus Communis* large enough to admit my greateſt Finger, as three Phyſicians and one Surgeon beſides myſelf, ſaw.

Thoſe Stones which are generated in the Guts are of another Sort, and eaſily diſtinguiſhable from thoſe I am writing of. *Becker* ſpeaking of ſome Stones voided by Stool, ſaid——*Calculos illos in Inteſtinis genitos eſſe, quia colore, pondere, & figura à Choledochis lapillis diſtincti, arbitratus ſum.* Thoſe generated in the Gall cauſe the Jaundice, thoſe in the Guts, beget Cholical, Splanchnical, Hypochondriacal Pains, and ſometimes Nephritical, all which vaniſh when they are ejected.

I have ſeen Lumps of Stones as big as a Tennis-Ball, taken out of a Bullock's Guts. The Authors of the *German* Miſcellany (*b*) write of one very much bigger. *L. Riverius* (*c*) of a Man that continually with all his Stools voided Stones like thoſe generated in the Kidneys. *T. Bartholine* (*d*) mentions ſeveral, one particularly notable, being as big as a Pigeon's Egg, which was purged off from a Woman by a gentle Pill.——*In exteriore ſuperficie ſubcinereum, & dum à me clavo ferreo in duas æquales partes diffringitur, interius inſtar cryſtalli albicantem & rutilantem.*

There are many ſuch in the *Miſcell. Cur.* and which reſemble mine, *Vol.* 7. *Obſ.* 90. but there is one much more ſo, *Ambr. Pary*, *lib.* 25. *cap.* 19. but neither of them ſo ſtrange in Cauſe or Effects as mine.

Galen,

(*b*) *Vol.* 3. *obſ.* 110. (*c*) *Ad. Med. vol.* 1. *obſ.* 100. (*d*) *Vol.* 5. *obſ.* 65.

Galen, *Crato*, *Sennertus*, *M. Donatus*, *Z. Luſitanus*, *Fernelius*, *G. Horſtius*, *Schenckius*, have told the World of Stones generated in, and ejected from, the Inteſtines of diſeaſed People, but none that I know with ſuch ſurprizing Circumſtances as this.

Fig. 151, 152, 153. Fig. 151. *The Ball.* Fig. 152. *It's Inſide.* Fig. 153. *The Plumb-Stone.*

Some Inſtances of the Miſchiefs *from* Plumb-ſtones *ſwallow'd; by Dr* Hans Sloane, ibid. *p.* 1283.

3.] A certain Perſon in *Lancaſhire*, having been for many Years ill of the Cholic, and receiving Relief from no Medicine, was diſſected after his Death. They took out of one of his Guts a large Ball ſix Inches about, of an Ounce and half Weight, made up of a ſpungy Matter which ſwims in Water, and viewed by a Microſcope, appeared to be made up of very ſmall, tranſparent Hairs or Fibres, wrought together, after the Manner of the *Tophus Bovinus*, taken out of the Maws of Oxen. In the Middle or Center of it was a common *Prune* or *Plumb-Stone*, which had been ſwallowed, and ſticking ſomewhere in the Guts, and gathered that Subſtance about it which reſembled the ſmall Hairs on the Skins of ſeveral Creatures or Fibres of Plants we eat. Dr *Charles Leigh*, in his Natural Hiſtory of *Lancaſhire*, &c. in his firſt Table has figured this *Fig.* 4. He ſhewing me the ſame, I was deſirous to ſee what it was made of, and had it cut for that Purpoſe, and found it of a hairy or fibrous Subſtance, Layer upon Layer, or Coat upon Coat, over a Plumb-ſtone. This Ball with it's Plumb-Stone, Dr *Leigh* gave me, and it is now in my Poſſeſſion, and ſeems to be of the ſame Subſtance with that mentioned by Mr *Yonge*.

Dr *Cole* ſhew'd me a Letter he had from the Country, and ſome ſmaller Balls than the two before-mentioned, which had in their Centers Plumb-ſtones. The Perſon he was conſulted for, had, I think, the Cholic to a great Degree, and had voided ſeveral of them, they were not ſo ſpherical, but of a compreſs'd Figure, ſmooth on the Outſide, and glaz'd as ſome of the *Tophi Bovini* are; and ſeemed within of the ſame Subſtance with the former *ſtratum ſuper ſtratum* upon a Plumb-ſtone.

Dr *William Stokeham* ſhewed me a Ball about the Largeneſs of that I had of Dr *Leigh*, which had been voided by a Perſon after great Sickneſs, and preſerved by the Patient's Phyſician, Dr *George Thompſon*, who has wrote a large Account of this Caſe in his *experimenta admiranda*, p. 67. *de Lithocolo*. I had this laſt Ball in my Poſſeſſion ſome Time, and in Appearance it was of the ſame Subſtance, but what was contained in it I could not tell, not being permitted to open it; but that Author tells us it had ſeveral Plumb and Cherry-ſtones in it. Theſe Balls ſeem'd to be form'd ſomething after the Manner of *Bezoars*, which generally have ſome Seed for their Center or *Nucleus*, on which Coats of another Subſtance are gathered.

Theſe Inſtances are ſufficient to ſhew the Folly of that common Opinion, that the Stones of Fruit are wholſome; for tho' by Nature the Guts are ſo defended by the *Mucus Inteſtinalis*, that very ſeldom People

People ſuffer; yet if we conſider the various Circumvolutions of the Guts, their Valves and Cells; and at the ſame Time conſider the Hair of the Skins of the Animals we feed on, the Wool or Down on Herbs and Fruit, the Fibres, Veſſels, and Nerves of Plants, which are not alter'd by the Stomach, the ſame Caſe may very eaſily happen. I once ſaw as ſtrange a Diſtemper, and almoſt as obſtinate and long as I ever met with, proceed from a great Quantity of *Strawberry-Seeds*, which had lodg'd in the Guts, and after their Diſcharge the Perſon was eaſed. And I have heard of many (beſides thoſe publiſh'd) who have loſt their Lives by ſwallowing many *Cherry-Stones*.

4.] I intended to have given an Account of a Ball lately voided by Madam *C——ly*, after ſuch ſevere Pains that her Life was in Danger; but ſhe is not willing to have it cut, and the Bulk of it is much ſhort of another Caſe that I know of; but this may ſerve as a further Inſtance of the Danger of ſwallowing the Stones of Fruit; for immediately after ſhe voided ſeveral *Plumb-ſtones*, tho' ſhe had not of twelve Months before eaten any of that Fruit. —*on the ſame; by Mr* R. Thoreſby, *n.* 304. *p.* 2164.

Captain *Weſt* told me he had once ſeen two Stones voided by a Neighbour, larger than any of thoſe three formerly mentioned; he has ſince procur'd them for me, and the leſſer of them is ſomewhat larger than the biggeſt of the other, but the other is ſurprizingly great; the Form of it is not much unlike the *Echinus* Shell, or *Helmet-ſtone*, flat on one Side, and roundiſh on the other; 'tis above ſix Inches one Way, and ſeven the other, in Circumference. Mr *Hodgkinſon* ſent this Relation along with them, 'That they were taken 'from *William Coldell* of *Green*, *May* the 10th, 1693. They weighed 'nine Ounces when firſt evacuated, and were remov'd by a Diet-'Drink with an Alcali Powder, and a Magiſterial Stomach-Plaiſter; 'that the Perſon died ſeven Years after, of one too large to be eva-'cuated: for upon the griping of it betwixt the Hypochondrium and 'Share-Bone, it felt to be as large as a Gooſe-Egg.'

5.] One *Crumbleholm* came to me ſome Time ago, and complain'd of a great Loſs of Appetite, with Scorbutic Itch, and ever and anon ſevere Convulſive Cholics below his Navel, all along the *Hypogaſtrium*. They laſt not above a Quarter of an Hour, but often return, and raiſe Tumours the Bigneſs of a large Walnut, which diſappear, and remove as the Pain ſhifts. He has been troubled with it ſome Years, and took Phyſick of almoſt every one he met with; but, as far as I can perceive, not in any regular Method. I began with mild Emollient and Carminative Glyſters; purged with *Decoct. Sen. Gereon. Syr. de Spin. cervin. & Tinct. Sacr.* In the Intervals of the Purges, I gave *Æthiops Mineral*, with bitter Decoctions Alterative, made more Carminative with *Rad. Zedoar.* and *Caſtor*. He was relieved for that Time; his Appetite and Complexion mended, but preſently was as ill as ever. Then he ſhew'd me the Stones voided by Stool, upon a ſlight Mercurial Purge, which he took laſt *Eaſter*. Upon opening one —*Another Caſe*, &c. *by Dr* Holbrooke, *n.* 325. *p.* 28.

of them, I found he had ſwallowed either ſome Plumb or Apricot Stones, which by their Stay in the Inteſtines, were inclos'd in th- Excrements, as I take it; and, by the Purge being diſlodged from their *Sinus*, ſent forth. Hoping then that by ſtronger Evacuations, if I could remove any other that might remain, it might tend to his Cure, I order'd ſtronger Medicines. However, I could not get any more from him; and he b-ing out of Hopes, and uneaſy to be kept any longer from his Buſineſs, has left off taking any thing. Laſt Week I ſaw him, and found him much in the ſame Condition, tho' ſomewhat weaker, and ſunk more in his Fleſh.

——*on the ſame, by Dr* W. Cole. Ibid. p. 30.

I look upon theſe Stones of *Crumbleholm*'s to be not formed of *adhering Excrements*, as Dr *Holbrooke* ſeems to ſuppoſe, but to be made thus:

When the Plumb-ſtones happen to be included in a fit Glandulous Receptacle, I conceive they may come to be thus coated over by the viſcous Liquor ſecreted out of the Secretory Ducts of thoſe Glandules, which by long lying there may come to acquire ſo great a Bulk, by the continual Appulſe of the ſame Liquor.

This Receptacle I gueſs to be the *Inteſtinum cæcum*, which, though ſmall naturally, may be, as other Membranous and Glandulous Parts are, capable of a conſiderable Extenſion: So that, when by Reaſon of the *Periſtaltic* Motion of the *Inteſtines* above, one of the Plumb-ſtones may happen to be, by it's pointed Extremity, intruded; the whole may, by the ſame repeated, though ſlow Motion, dilate the Cavity ſo, that the whole Body of the Stone may by the ſame Method be ſtill farther and farther protruded, till it come to the further Extremity; which being cloſed, muſt be preſumed to detain it there, ſince 'tis hard to conceive it can quickly get out again, that *Periſtaltic* Motion being always forward. One of theſe Stones being thus enter'd, 'tis eaſy to conceive more may be admitted, ſince the firſt cannot but dilate the Paſſage for another that follows, and ſo on till the Cavity be full: Whilſt theſe Stones lie there, they muſt be conceived to offend the Part, as having extended it beyond it's Natural State: So that the Secretory Ducts of the Gland, of which the inner Coat of that, as well as the reſt of the Inteſtines, is conſtituted, muſt be proportionally dilated; whereby an eaſier Way is made for the Liquor, they ſeparate, to be excreted.' This being of a viſcid and concreſcible Nature, muſt, ſince it cannot get forth, be preſum'd to adhere to the *Subſtratum*, the Stones, and ſo by Degrees incruſt them; which Cruſt, by the long Confinement, muſt grow ſo much thicker, for the ſame Reaſon as it began, the Ducts being kept conſtantly open, and the Cavity more and more dilated, the greater the Incruſtation is. So that I conceive the Symptoms are eaſily accountable for, from the Offence given to the Part, which being ſenſible, as all membranous and fibrous Parts are, the Pain muſt grow greater, the greater the Extenſion is; and the Change of the Poſture of the Tumour may very well be conceived to

proceed

proceed from the different Poſtures the Inteſtines put on, by the Chyle or Excrements paſſing along them, and ſometimes filling one Part, ſometimes another, as they are protruded further and further, their Lubricity on the Surface, Length, and Confinement obviouſly favouring that *Phænomenon*. I am of Opinion, the true *Bezoar Stones* are form'd in the Beaſts, that yield them, in the ſame Manner; but whether their Stomachs or Inteſtines have other Cavities capable of receiving and retaining them to their full Growth, is to be determined by Anatomy. This, I think, is certain, that all of them have either a Straw, Stick, or other Subſtance different from the exterior Matter, which we call the Stone, in the Middle of them; and thence I conclude the Manner of their Formation to be the ſame. From the Continuance of his Symptoms, I believe there may be more behind; and cannot think any other Method more likely to extrude them, than by having his *Abdomen* well anointed with ſome emollient Oils or Liniments, and very well agitated backward and forward, as much and as long as he can bear, and this both Morning and Evening: After a little while, that the Stones may be preſumed by this Agitation to be ſomewhat diſlodged, ſome gentle Purgative, I conceive, may be of uſe to be now and then given to carry them downwards, and with all emollient Glyſters to ſollicit it gently, *&c.*

Miſchiefs from ſwallowing *the* Stones *of* Bullace *and* Sloes, *by Mr* W. Derham, *n.* 349. *p.* 484.

VII. The *Larger* Stones of *Prunes* and *Plumbs* ſwallow'd, have frequently, I know, produc'd very fatal Effects; the leſſer Stones of *Sloes*, *Cherries*, &c. having not been thought ſo dangerous (many ſwallowing them on a Notion that they are uſeful in preventing a Surfeit from the Fruit) I ſhall give an Inſtance of the ill Conſequences of theſe *Leſſer* Stones.

About two Years ago, the Servant of a neighbouring Clergyman complained to me of exceſſive Pains in and about his Stomach; that he never lay under any Dejection of Appetite; but that whenever he did eat he could not retain it, but in a little Time vomited it up. By which Means he was, in a ſhort Time, reduc'd to a very low and languiſhing Condition, inſomuch, that they began to deſpair of his Life.

Upon this he applied himſelf to ſome Practitioners in Phyſic, one of which ply'd him with ſtrong Vomits eight Days together, with very little Signs of Succeſs. But ſome Time after, having Occaſion to ride ſomewhat more than ordinary, he found himſelf very ſore in his Stomach, and ſick; which ending in violent Vomiting and Straining, brought up the firſt Stones he ever perceived to come from him, which were about twenty in Number.

After this he had frequent Returns of the vomiting up of *Bullace* and *Sloe-Stones*, eſpecially upon ſtrong Exerciſes; particularly moving and ſtooping much; in riding alſo, tho' gently: Upon theſe Occaſions he

he would be feized with acute Pains in his Stomach, and ſoon after vomit up more of thoſe Stones.

He hath counted above one hundred and twenty *Bullace* and *Sloe-Stones* that have been diſcharged; and many others he could not number, by reaſon they came up when he was in Riding, or in his Buſineſs. He is not yet free of them, but is in Pain oftentimes, and vomits them up, eſpecially in riding; but after he hath diſcharged them, he is much eaſier for a while. He commonly brings up a ſlimy Matter with them, mixed with Blood, or ſomething very like Blood.

The Cauſe of all this Diſaſter the Man aſſures himſelf was this, namely, being in his Youth a great Lover of Fruit, he uſed greedily to devour all Sorts he could come at, and *Bullace* and *Sloes* being the eaſieſt to be gotten, he uſed to ingurgitate great Quantities of them, without evacuating many of the Stones by Stool, as he well remembers, and as he obſerved others did. Theſe Stones he thinks have lain in his Stomach (ſome of them at leaſt) above ten Years; but he felt no Pains till about four Years ago. And thoſe at firſt were not ſo violent, nor attended with ſuch ſevere Fits of Vomiting and Loſs of Appetite, as they by Degrees came to be afterwards.

An unuſual Cholic, *by Dr* Davies, *n.* 275. *p.* 965.

VIII. Laſt *May*, Dr *Shaw* of *Tamworth*, deſired my Aſſiſtance in the following Caſe. A Perſon, aged between fifty and ſixty, had been for three or four Years laſt paſt troubled with Gripes, which generally return'd once a Month, or thereabouts; his Body for the moſt Part coſtive, and therefore was forced to ſpur Nature with *Daffey*'s Elixir or Aloes; ſometimes the ſmoaking a Pipe of Tobacco ſupply'd the Uſe of theſe Medicines. Laſt *April* coming from *London*, heated himſelf very much with his Journey, having walked a good Part of the Way, and as ſoon as he came Home, had a Return of his Cholic Pains, which continued upon him for eighteen Days, notwithſtanding the Methods commonly uſed in that Caſe, during which Time he had no Stool, beſides what the firſt and ſecond Clyſters brought away; his Complaint upon his Seizure, was of a Pain in his right Side, in the *Regio Iliaca*. Some Time before he died, his Belly ſwelled much, and was as tenſe as any Drum; he vomited for two or three Days at the Beginning, which left him, and returned not till juſt before he died, which was at the Expiration of the 18th Day, at which Time he brought up two or three Mouthfuls of black Choler; but never, during his whole Illneſs, vomited any Excrement. Dr *Shaw* prevail'd to have an haſty Inſpection of his *Abdomen*; he found ſome black Choler in the Stomach, the *Duodenum* and the reſt of the *Inteſtina tenuia* void of Excrement, but incredibly diſtemper'd with Wind, and tracing the Canalis of the Guts as far as the *Cæcum*, found that of a blackiſh Colour; and from thence, for about a Yard in Length, the Colon mortified, and ſo rotten, that the Excrements had made their Way thro'

it

it at ſeveral Places, into the Cavity of the *Abdomen*; about two Inches of the mortified Gut was faſten'd to the *Peritonæum* on the right Side. This Part of the Colon was ſo extended with Excrements of a ſoft Conſiſtence, that they, when taken out, filled two Chamber-pots; at the Extremity of the Mortification, towards the *Rectum*, the Obſtruction which occaſioned all theſe Misfortunes, offered itſelf to View very plainly; for about ten Inches of the Colon was doubled, as if you had taken a Piece of Tape, and folded it; the two contiguous Surfaces of the Duplicature adhered ſo firmly together, that you could not ſeparate them without tearing the exterior Coat of the Inteſtine. Upon ſeparating this Coaleſcence, there fell from that Part a whitiſh Mucus, the Adheſion was about three Inches broad; the middle of the Duplicature which made the acute Angle, and where the Excrements ſtopped, was ſmaller, and the Membranes thinner than in any other Part of the Gut; from thence towards the *Rectum*, the Colon was ſound, and void of Excrements, occaſioned by the frequent Uſe of Clyſters.

Of a Child, *with the* Inteſtines, *&c. in the* Thorax; *by Sir* Ch. Holt, *n.* 275. *p.* 992. *Fig.* 154.

IX. I was lately preſent at the Opening of a Child, which dy'd about two Months old; they gave the following Account of the Child's Sickneſs: That

'The Child was uneaſy and reſtleſs from it's Birth, and conſtantly 'laboured under a Difficulty of Breathing.

'That it's Illneſs was like nothing they had ſeen in other Children; 'neither could they perceive it reliev'd by any thing adminiſtred to it, 'tho' by the Advice of a learned Phyſician; but it lay groaning and 'pining till it died.

'That they had always obſerv'd, when the Child was undreſs'd, 'an odd ſort of working in it's Breaſt; and could perceive a Crawl-'ing round the Ribs and Breaſt on both Sides, as if a Knot of ſmall 'Eels, or large Earth-worms had been pent up within the Cavity.'

When we had open'd the *Abdomen*, there appear'd none of the *Viſcera* belonging to the Belly, except the Liver, the Kidneys, *Veſica Urinaria*, and *Inteſtinum Rectum*. We at firſt imagin'd that the other Inteſtines might be cover'd by the Liver, which (tho' it be commonly large in Children) in this exceeded the uſual Size; but upon turning of it up towards the *Diaphragm*, we only found under it's concave Part, the Stomach, not lying in it's natural Poſture, for the *Pylorus* was drawn by the *Duodenum* croſs the *Vertebræ* of the Back towards the *Fundus Ventriculi*, and part of the *Duodenum* paſs'd through a Foramen in the *Diaphragm*, plac'd on the left Side of that through which the *Gula* deſcends, which occaſioned the *Pylorus* to lie almoſt *ſub fundo Ventriculi*. We then reſolv'd to trace the *Rectum* from the *Anus* upward, not doubting but that it would lead us to the *Meſentery* and *Inteſtines*. The *Rectum* lay in an oblique Line from the *Anus* to this new *Foramen*, and was receiv'd into it with a Portion of the *Duodenum*. This *Foramen* ſeem'd to be form'd by Nature, *à primo Ortu*, for

for tranſmitting thoſe Guts into the *Thorax*; for had it been made by any Force, it's Sides would have appear'd wounded, or lacerated; but, on the contrary, round this Orifice there was a ſmooth Verge, as is ſeen in *Foramine Venæ Cavæ pervio*, or that, *per quod Gula deſcendit*.

When we took off the *Sternum*, we ſaw the *Meſentery cum adjunctis Inteſtinis* in the Cavity of the *Thorax*, and lying upon the Heart and Lungs. There was no *Omentum* ſpread over the *Inteſtines*; that, as I remember, was wholly miſſing, as was likewiſe the *Mediaſtinum*. Moſt Part of the *Duodenum* lay in the *Thorax*, and all the reſt of the Guts, except the *Rectum*, which aſcended in an oblique Line from the *Anus*, and it's upper End was inſerted into this Orifice. We then began to conſider how this Child, according to the common Notions of Nutrition, could be nouriſhed? That it was nouriſhed ſeems plain, becauſe it daily receiv'd Food, and regularly voided Excrement, as we were aſſured by thoſe who attended upon it. So we propos'd to enquire what Communication there was between that Gland or Glands, in the middle of the Meſentery (commonly called *Pancreas Aſellii*) and the *Receptaculum Chyli* placed between the internal lumbar Muſcles, called *Pſoas*; but upon the moſt accurate Search we were capable of making, there was none to be found; for the whole Meſeraick Membrane, and Inteſtines, lay perfectly looſe upon the Heart and Lungs, abſolutely diſengaged from any Manner of Communication with any other Part.

That Vermicular Motion, which ſhewed itſelf on the Ribs and Breaſt, we aſcribed to the Periſtaltic Motion of the Guts; and the *Dyſpnæa*, we thought, might be occaſioned by the Preſſure made on the Lungs by the Inteſtines and Meſentery, which likewiſe ſo filled the *Thorax*, that there wanted Room for the Lobes of the Lungs to move freely in, and by Conſequence Inſpiration and Expiration would be performed with Difficulty. *In the* Figure; *a*, *Shews the* Foramen *thro' which in the* Figure *the* Vena Cava *paſſes*. *b*, *The* Foramen *thro' which the* Gula *deſcends*. *c*, *The* Foramen *thro' which Part of the* Rectum *and* Duodenum *went into the* Thorax.

Fig. 154.

An extraordinary Effect *of the* Cholick, *by Mr* St Andre, *n.* 351. *p.* 580.

X. The *Periſtaltic* Motion of the Inteſtines is by all Anatomiſts ſuppoſed to be the proper Motion of thoſe Cylindrical Tubes.

The uſe of this Motion is to propel the Chyle into the *Vaſa lactea*, and to accelerate the groſſer Parts of the Aliment downwards, in order to expel them, when all their nutritive Contents are extracted.

This Motion thus eſtabliſhed, it naturally ſeems to follow, that an Inverſion of it (call'd for that Reaſon an *Antiperiſtaltic* Motion) ſhould force the *Aliments*, *Bile*, *Pancreatic Juice*, and laſtly the *Fæces* to aſcend towards the Mouth.

The Cauſe of this *Antivermicular* Motion, is aſſigned to a Stoppage of the Inteſtine, or to a great Length of it, being engaged in the

ſame

ſame Manner as the Fingers of a Glove are choak'd by inverting the Glove in drawing it off.

This ſuppoſed, the *Antiperiſtaltic Hypotheſis* ſeems at firſt Sight very natural, and anſwers moſt Difficulties. For if the *Vermicular* Motion accelerates the Contents of the Inteſtines downwards; the *Antivermicular* ſhould force them upwards towards the Mouth.

Was this Suppoſition as certain as 'tis generally received, I ſhould not preſume to advance that there is no ſuch thing as an *Antiperiſtaltic* Motion of the Inteſtines; and that the *Meſerere mei* is as often a violent Contraction of the Abdominal Muſcles, as a Stoppage or Inverſion of the Inteſtines.

So laying aſide all Prevention, let it be granted that this Contraction of the Abdominal Muſcles is caus'd by the Redundancy of the Inteſtines or their Contents: Then comparing the Symptoms of this Diſeaſe, with thoſe of the different Kinds of *Hernia's*, we ſhall find by the Analogy of the Parts, Reaſon and repeated Experience, that the *Chordapſus*, ſo call'd by *Celſus*, is a Diſeaſe in which the *Inteſtines* and *Omentum*; at other Times, the *Pancreas* or *Spleen*; nay, even the *Meſentery* itſelf, are ſometimes forced thro' the *Diaphragm* into the *Thorax*.

All theſe tender Parts being ſtrongly compreſs'd by the continual Motion of this Muſcle, muſt by Conſequence cauſe the ſame Accidents as in the *Bubonocele* or compleat *Hernia*, there being no Difference in theſe two Caſes; but that the firſt is a ſtrangling of the *Inteſtine* by the *Diaphragm*, and the latter a choaking of the *Inteſtines* by the *Abdominal Muſcles*.

One Example of the many of the like Nature, that I can produce, will much confirm this Aſſertion.

A Gentleman that came to Town in good Health, meeting with ſome Friends, drank a great deal of new-bottled Oat-Ale, after ſome Pints of Wine. Theſe Liquors fermented ſo violently in his Stomach and Inteſtines, that he was taken with a violent *Cholic* the ſame Night.

In the Morning an Apothecary was ſent for, who adminiſtred a Clyſter, and took ſome Ounces of Blood to relieve the Patient, who complain'd of a great Pain in his left Side.

The Clyſters being repeated the Night following, as alſo the next Morning, and the Patient growing worſe, the Apothecary gave him a violent Vomit; which operated eight or nine Times: This added Fuel to the Fire; and the Patient having from that Time been in a deſperate Condition, two eminent Phyſicians were called, who order'd that the Clyſters ſhould be repeated: But they not prevailing, I was ſent for about ſix Hours before the Patient died: I found him complaining of a violent Pain in all the Region of the *Abdomen*; a frequent Inclination to vomit; labouring with a great Difficulty of Breathing,

Breathing, together with a very ſlow Pulſe; his Belly being very hard, though not ſwell'd.

This laſt Indication made me conclude, that the Diſeaſe was a violent Contraction of the Abdominal Muſcles, which had overcome the *Diaphragm*, and that probably the *Inteſtines* might be forc'd into the *Thorax*.

I was the more confirm'd in this Opinion from Examples of the like Caſe; upon which I order'd a Fomentation of hot Milk, adding to every Quart a Drachm of *Liquid Laudanum*, which, in theſe Maladies gives great Relief: But, before it could be got ready, the Patient expir'd in a violent Convulſion.

In opening this Body, I found the Abdominal Muſcles ſo much contracted, that it was almoſt impoſſible to penetrate them with a ſharp Scalpel.

Upon Examination, I found the Stomach empty, and ſome Parts of the *Duodenum*, but the *Jejunum* and *Ilium* ſo much diſtended with the fermented Oat-Ale, that the *Ilium* had four Inches in Diameter, and the *Colon* above eight.

The *Ilium* was alſo pretty much inflamed in it's inferior Part; and all the Valves of the *Colon* were obliterated, by the great Diſtention of that *Inteſtine*.

But the greateſt Diſaſter was, the Dilatation made in the *Diaphragm*, as I ſuppos'd; juſt upon the Chink which remits the intercoſtal Nerve to the *Viſcera* of the *Abdomen*, thro' which a Portion of the *Colon* was forc'd, and the greateſt Part of the *Omentum* and *Pancreas*.

Theſe tender Parts being choak'd, ſoon inflamed, a Mortification of them following; and a Rupture of the *Pancreatick Vein* caus'd an internal *Hæmorrhage*, which fill'd all the left Cavity of the *Thorax*, inſomuch that the whole left Lobe of the Lungs was compreſſed almoſt under the *Muſculus Scalenus*.

The Quantity of extravaſated Blood was very great, and it was not in the leaſt coagulated.

I ſhould have been more particular in proving the Impoſſibility of the *Antiperiſtaltic* Motion, if Dr *Haguenot* had not prevented me by his *Memoir*.

This Gentleman is not far from Truth, and what he ſays is certain: But I am ſurprized that the like Caſe has not occurr'd in his Practice.

The diſeaſed Parts were produc'd before the Royal Society.

A Diſſection of a Perſon that died of the Iliac Paſſion; *by Mr* H. Vaughan, *n.* 281. *p.* 1245.

XI. I lately attended a Youth (14 Years of Age, of a ſanguine Conſtitution) for about 30 Hours in the *Iliaca Paſſio*, very terrible for the Time. About 3 or 4 Hours before he died, I adminiſtred a *Terebinthinate* Clyſter, which gave, during it's Stay, immediate Eaſe; he continu'd ſo for about an Hour, but then his Diſeaſe return'd again as ſevere

ſevere as ever; ſome time before he died he voided ſome of his Clyſter by Vomit.

After Death he was diſſected, I found the *Liver* only ſomething larger than ordinary, the *Ventricle* was conſiderably extended; in the *Jejunum* the Excrements had made a Breach, and ſome Quantity was evacuated; a conſiderable Part of the *Ilium* was very livid, but not in the leaſt diſtended; the *Colon* was much like a contus'd Wound about three or four Days old; in the Centre of it, I found it ſomething freſher, not ſo livid as the Outſide: About the Beginning of the *Rectum* there was another large Ruption, and more Excrements voided.

I diſſected lately a Child which had an Involution of the Inteſtines, which the Vulgar calls the Twiſting of the Guts.

XII. A Country Man, who had been a long Time emaciated, troubled with Cholicks and Spaſmodick Contractions in the Hypochondria, and evacuated almoſt nothing by Stool, being quite worn out with continual Pain, at laſt died. Upon opening his Body, we found the *large Inteſtines*, eſpecially towards the Flexure of the *Duodenum*, ſo firmly connected with one another, and with thoſe that lay next to them, by Means of callous Protuberancies, that it was difficult to ſeparate one from another, and, which was worſe, their Subſtance was grown into a hard Cartilage, and ſo thickened, that ſcarce any Cavity remained.

The Inteſtines *grown* Cartilaginous; *by* A. Meſaporitus, *n.* 303. *p.* 2119.

XIII. 1. *Thomas Philips* of *Eaſtthorp* in *Eſſex*, was well in every reſpect till he was a Year and a Quarter old; at which Time a very ſtrange and almoſt continual rumbling in his Inteſtines ſeiz'd him; the Conſequence was a violent Looſeneſs, for which all the Phyſicians in the Place could find no Remedy: But at laſt when they deſpair'd of the Child's Life, the Looſeneſs terminated in ſuch an unuſual Obſtruction, that he did not go to Stool for a Fortnight or three Weeks together; and from three Weeks together it proceeded gradually to the Intervals of ſeventeen or eighteen Weeks, and ſo continued till he came to be about the Age of Fifteen, when it's Body reſum'd it's natural Temper, which laſted four or five Years; but then the Obſtruction return'd and continued, or rather increas'd till he died; for it was cuſtomary with him in the laſt Years of his Life not to evacuate any manner of Excrement under the Interval of nineteen or twenty Weeks; and ſometimes (twice at leaſt) he had no Diſcharge for one or two and twenty Weeks together. He liv'd to be near twenty-three Years of Age, and walk'd about almoſt to the Hour of his Death. He was ſuddenly ſeized with very ſick Fits (but could not vomit); two or three of which Fits carried him off in a few Hours; and when he died, it was nine Weeks after he had any Stool. I aſked him whether he did vomit often, or had at any Time any excrementitious Taſtes in his Mouth, or did ſweat much, or made more Urine than in Proportion

Of an Extraordinary Coſtive *Perſon; by Mr* B. Sherman, *n.* 302. *p.* 2111.

to his drinking, or whether he found any Eaſe when he did either vomit, ſweat, or urined; all which Queſtions were anſwer'd in the Negative. When he did go to Stool, he evacuated very many times in a Day, and ſeveral Days together, until he had emptied himſelf. But his Mother aſſures me, that throughout his whole Life he never diſcharg'd any other than very thin Excrement.

Before his Time of Evacuation came about, he was of an extraordinary Bigneſs many Weeks before his going to Stool, unleſs when he could break Wind, which he often endeavour'd to do, by laying his Body on the Edge of a Table or Stool; but could not often by ſo doing produce the deſired Effect. He declin'd the Uſe of all Medicines for many Years before he died, contenting himſelf with going to Stool once in three or four months, or nineteen or twenty Weeks. But what is moſt remarkable, is, that he generally had a pretty good Stomach, and eat and drank as the reſt of the Family did; nay, till the Time that his Body came to be very full, he could do the Work of a Man at Plow, or ſuch like huſbandry Labour.

His Mother would by no means permit me to open him: But the Story is certainly true, for I had it from the Perſon's own Mouth in his Life-time, and confirm'd at the ſame time by his Mother, who is yet living; many Gentlemen too had the Curioſity to ſee and examine the Perſon.

A Remark *on this Caſe, by Mr* W. Cowper. *Ibid.*

2.] It is not improbable, if the *Abdomen* of this Perſon had been opened, but ſome of it's Contents would have been found not unlike thoſe I have mentioned, in my Explication of the 34th *Table* of Prints publiſhed by Dr *Bidloo*; where I take Notice of a young *Gentlewoman* I diſſected, in whom I obſerved the *Omentum* ſo leſſened, that at firſt it appeared doubtful if that Part had ever been exiſtent in that Subject; but, on ſtrict Examination, the little Remains of it reſembled a *Congeries* of ſmall *Glandules*, ſtuffed with a *Suet*-like Matter. The whole Canal of the *Inteſtines*, even from the *Pylorus* to the *Anus*, was diſtended with *Excrements*, and the *Surfaces* of all the ſmall *Guts* adhered ſo ſtrictly to each other, that they could not be parted without tearing their external *Membrane*, to which the *Omentum* contributed by it's Adheſion: The whole *Compages* of the *Inteſtines* very much reſembling that of the external Surface of the *Brain* covered with the *Pia mater*, ſo that the *Meſentery* in that Subject could not be ſeen till this external Incloſure was divided. By this Diſorder, 'tis certain, the *Periſtaltic* Motion of the *Guts* muſt needs be very much leſſened, if not quite hindred. The *Peritonæum* alſo in that Caſe was very much thickened, and had ſeveral preternatural white Bodies ſet at various Diſtances on it's internal Surface; the like appeared on the *Stomach*, which very much reſembled in Figure the *Miliary Glands* on the back Part of the *Aſpera Arteria*.

XIV. This Child was five Months old, and was ſo emaciated, that he appeared rather to have decreaſed, than to have increaſed in Bulk, from the Time of his Birth, his whole Body not weighing above five Pounds. The Skin and Muſcles of the *Abdomen* were very thin, but the *Peritonæum* was preternaturally thick. The *Ventriculus* was more like to an Inteſtine than to a Stomach, it's Length being five Inches, and it's Breadth but one Inch. The Coats of it were thick and fleſhy, and the Cavity very inconſiderable. The *Pylorus*, and almoſt half of the *Duodenum* were cartilaginous, and ſomething inclined to an Oſſification, ſo that no Nouriſhment could have paſſed into the Inteſtines, tho' the Stomach had been capable of containing it, which makes it no Wonder that the Body was ſo emaciated. There were ſcarce any Foot-ſteps of the *Omentum* to be ſeen, even at the Bottom of the Stomach, to which it uſually adheres.

A Diſſection *of a Child* Emaciated, *by Dr* P. Blair. *n.* 253. *p.* 631.

The right Lobe of the *Lungs* adhered firmly to the Ribs, and had three Exulcerations, which contain'd purulent Matter. It was ſo very thin and compact, that it ſeem'd as if that Lobe had never been of Uſe in Reſpiration. The left Lobe was of a more florid Red, ſpongy, and free from any Adheſion.

Upon enquiring after the Symptoms this Child had been affected with, his Mother told me, he ſeem'd to be healthy till he was about a Month old, when he was ſeiz'd with a violent *Vomiting*, and a Stoppage of Urine and Stool. Some Time after, both theſe became more regular, but the *Vomiting* ſtill continued. He ſeem'd to have a great Appetite, taking what Suck, Drink, or other Food was offer'd him, with a kind of Eagerneſs; but he immediately threw it all up again. He had all along breathed freely, and had no Cough, notwithſtanding the Exulcerations above-mentioned. This confirm'd me in the Opinion, that he had never breath'd by the right Lobe of the Lungs.

There could be nothing more emaciated than this Child was; and it ſeems to be worth conſidering, whether his Illneſs might not be owing in a great Meaſure to the Want of the *Omentum*, (for he ſeemed never to have had any); as alſo, whence it is that this Part is generally conſum'd in an Atrophy, and in moſt Hydropical Caſes, except where itſelf is more eſpecially concern'd.

XV. That Wounds of the *large Inteſtines* are frequently mortal, and thoſe of the *ſmall* ones always kill the Patient, has in all Ages been univerſally received as a Truth.

A Piece *of the* Gut *of a* Dog cut *out, and* cur'd, *by Mr* J. Shipton. *n.* 283. *p.* 1299.

Hippocrates, Lib. 6. Aph. 18, 24. pronounces a bitter Sentence upon them; as alſo *Celſus*, Lib. 5. cap. 26. Lib. 7. cap. 16. And *Fabritius ab Aquapendente* (Operat. Chir. cap. 55.) confirms the ſame Sentence from his own Experience.

I know very well that *Paul Barbette* affirms that a Wound of one of the ſmall Inteſtines has been cured; which he likewiſe ſays *he can*

prove by a remarkable Example, Chirurg. Part 2. *lib.* 2. *cap.* 11. I wiſh he had left the Hiſtory of ſuch a remarkable Caſe to Poſterity, that ſo, having all the Circumſtances of it before our Eyes, we might be able to form a more certain Judgment about it. It is ſurpriſing beſides, that amongſt ſo many famous Men who practiſed Surgery in the ſame Country with him, and favoured the Publick with a great many Obſervations, there ſhould none of them tranſmit ſuch a remarkable Cure to Poſterity. But I ſhall neither contradict the Truth of his Aſſertion, nor vindicate it againſt the Experience of the reſt of the World.

But though Wounds in the Inteſtines of Men are acknowledged by all the World to be extremely dangerous, yet that the Cure of them in Dogs is far leſs troubleſome, and attended with leſs Danger, will appear from the following Experiment, which I made *November* 20, 1702, in the Preſence of Mr *William Plahille*, Maſter of the Society of Surgeons in *London*.

Having tied a Dog in the uſual Manner, we made a large Wound into his Belly, took out a Part of the *Inteſtinum Ileum* that firſt appeared, tied the *Meſeriack* Veſſels which run upon it, cut the Inteſtines acroſs in two Places with a Pair of Sciſſars, took about two Inches of it quite away, ſewed up the Wound of the Inteſtine with the Glover's Stitch, and that of the Abdomen with the interrupted Suture, covered it over with Plaiſter, and then let him go looſe. At firſt he tottered as if he was giddy, and ſeemed to be very weak; and that ſame Night he vomited twice: A few days afterwards, the Sutures becoming a little looſe, we tied them a little tighter, by putting in little Pegs, and twiſting the Threads upon them. And, in three Weeks after, laying aſide the Dreſſings and Bandage, he cicatriſed it himſelf by licking it.

I muſt not neglect to mention the Retraction of the Inteſtine as ſoon as it was cut through, when ſhrinking on each Side, and ſhutting itſelf up, it exactly reſembled a Sphincter.

Afterſome Weeks, during which Time he continued healthy and every way in good Order, we had him hanged, and opened him, and found that Part of the Inteſtine where it was ſewed, in the left Hypochondrium (far enough from the external Wound, which was made in the right Hypogaſtrium) firmly attached to the Peritonæum (See Fig. 155, *f.*) and enlarged into a Bag (DDD). The Omentum (G) likewiſe adhered to it, and the Inteſtines there in ſeveral Places (* * *e e*) were grown to one another. In order to view the Cicatrix more accurately on the Inſide, we laid open the Inteſtine according to it's Length, whereby on one Side we ſaw the Lips of the Wound contiguous, (DDD) and connected to the Peritonæum *(f)*; on the other Side they were divided, and glued as it were to the contiguous parts of the neighbouring Inteſtines. So that the internal Coat of theſe Inteſtines, filling up the Deficiency of the Gut at that Part, continued the inteſtinal Canal, and ſerved very well to convey the Aliment, *e, e.*

Fig. 155.

Brunnerus

Brunnerus in his *Preface to New Experiments concerning the Pancreas*, mentions his having made a Wound of an Inch and a half long, in the ſmall Inteſtine of a Dog, and he eſcaped with his Life, though with great Difficulty.

The ſame Operation ſucceeded better with Mr *Cowper*, who, in the Acts of the Royal Society, No. 208 †, affirms that he laid open the ſmall Inteſtine of a large Dog according to it's Length, and cured it in a ſhort Time, without ſewing it up (only ſtitching the Wound of the Abdomen) and without any troubleſome Symptoms, and that either with or without Dr Colbatch's Styptick Powder. But neither of theſe two mention their cutting away any Part of the Inteſtines.

† *See above*, V. III. P. i. C. 5. S. 21.

There is an Obſervation of Dr *Wallis* in the Acts of the Royal Society, N. 219 *, not unlike the former. A Horſe in jumping had a Stake ſtuck into his Belly, whereby the Stomach was wounded. A Farrier was brought, but not for ſome Hours after; he enlarged the Wound, ſewed up the Stomach, drew the Lips of the Wound of the Abdomen gently together, put in Tents, and the Horſe got well in a few Weeks.

* *See above* V. III. P. i. C. 4. S. 12.

But I look upon a Wound of the ſmall Inteſtines in Men, to be no leſs Mortal than a Wound in the Heart; for the Fibres of them are not ſo fleſhy in Men as in Dogs, who are uſed to harder Aliments, and ſeem to require more Motion and Heat in the inteſtinal Canal, to elaborate the Chyle, and expel the Fæces, which in them too are for the moſt Part more hard. But although the Art of Surgery is but little employed in the Cure of Brutes, yet it is worth while to make Experiments in theſe, which afterwards may prove to be uſeful to Mankind; and as we ſee the Inteſtine of a Dog, after a Bit of it is taken out, can be united again ſo as to perform it's Function as before, it will make us more bold in ſewing up Wounds of the large Inteſtines at leaſt in Men, and more confident of Succeſs.

A, *a*, *a*, The upper Part of the *Ileum* towards the *Stomach*. B, *b*, *b*, The lower Part of the ſame Inteſtine. C, The Cicatrix of the Wound of the Inteſtine on the Inſide. D, D, D, The Lips of the divided Inteſtine. E, The upper Orifice of the Inteſtine. F, The lower Orifice. *e*, *e*, *e*, The internal Parts of the neighbouring Inteſtines, ſupplying the Place of that Portion of the *Ileum*, which was deficient in this Part. *f*, Part of the *Peritonæum* adhering to the Inteſtine. G, The *Omentum* likewiſe connected to the Inteſtine. * * The Marks of the *Inteſtine* ſeparated, where it was connected with the other. H, H, The Trunk of the *Aorta*. I, The *Cæliac* Artery. *g*, The right *Gaſtrick*. *h*, The right *Gaſtro-epiploick*. *i*, The *Hepatick*. *k*, The *Pylorick*. *l*, The larger *Gaſtrick*. *m*, *m*, The *Splenick* Artery. K, The upper *Meſenterick* Artery. L, The *Phrenick*. O, The Trunk of the *Vena Portarum*. P, P, Arteries and Veins diſperſed through the *Meſentery*.

XVI. One

Nails, Keys, &c. found in the Stomach *of an* Idiot, *by Mr* C. Amijand. n. 317. p. 170.

XVI. One that was an Idiot from his Infancy, died lately at *Oſtend*, in the 33*d* Year of his Age; his Death having been preceded with twelve Days continual remitting Fever, and a conſiderable Tumour and Pain about the Region of the Liver; his Brother, in whoſe Houſe he had been a conſtant Dweller, being deſirous to know the Cauſe of it, deſired Mr *Ricks* to open him, who ſent his Son, and a Servant to perform it. A large Abſceſs, or Impoſthume, was found in each Lobe of the Liver, whoſe Bulk did far exceed the ordinary Stint. In the *Stomach* was found a Bundle of the Things following, cloſely involved and embraced by it; *viz.* Nine Cart-wheel Nails, and ſix leſſer; a large and long Iron Screw; two Pair of Compaſſes, the one having a Circle two Inches in Diameter; a middle-ſize Key; a large Iron Pin, as big as my Thumb, and four Inches long, with a Ring at the End on't; another of Braſs, but much leſs; the Handle of an Iron Spring-Knife, (ſwallow'd, as 'tis believ'd, entire, but the Sides and two Pieces making up the Spring of it, found aſunder; the Pegs of the Knife, tying thoſe ſeveral Pieces together, were not found;) the upper and lower-moſt End of a Braſs Pommel, inſervient to a Sea-coal Grate, weighing nine Ounces; a broad Piece of Lead, weighing three Ounces and a half: The whole conſiſting of 28 Pieces, weighing betwixt two and three Pounds. They were found all in a Bundle with the largeſt End one Way, and the ſmalleſt the other; the ſmall End of one of the large Nails was ſo bent, that it would have made a perfect Circle, had not the very Tip of that ſame Nail been bent back again; this End was forked, and wonderfully ſharp, as were likewiſe the Ends of the Compaſſes. None of the Pieces were found poliſh'd, neither could I find the Braſs or the Lead any ways impaired or endamaged; but the Iron Pieces were extreamly corroded, eſpecially one of the Sides of the Knife, which had lain in the Stomach about eight Months, was eaten quite through in two or three Places, towards the Blade's End; and three or four Nails mightily endamaged, did appear as if ſome particular *Menſtruum* or Diſſolvent had been poured upon them, capable only to diſſolve that Metal, as *Aq. regalis* has the Property to diſſolve Gold, *Sp. Nitri* Silver, *Vinegar* Lead, leaving thoſe other Metals joined and alienated with them, untouched: The Lead had lain in the Stomach about eight Months, and the braſs Pin above twelve. It was very eaſy to gueſs at the Time thoſe different Pieces of Iron had been in the Stomach, in conſidering how much one Piece had ſuffered more than the other. This Obſervation is like to give a Check to the Notion of thoſe who believed that Oſtridges did diſſolve Braſs and Iron by Friction only; for if ſo, I ſee little Reaſon why the Iron Branches of the Compaſſes ſhould have been found ſo very much worn out, and the Braſs Branches not in the leaſt impaired. Mr *Ricks*'s Son, who opened him, told me, That the Stomach had been no ways wounded or endamaged; which does not appear to me probable, when the Patient was known to have

have vomited and evacuated Blood by Stool for ſix Weeks before he died: It could have been wiſhed the Gullet and Guts had likewiſe been opened; for 'tis plain, ſome of the Pieces had paſſed the *Pylorus*, as the Pegs of the Knife; and perhaps ſome ſmaller Pieces than thoſe that were found in the Stomach, might have been forced thither. This Fellow, from his Youth, had accuſtomed himſelf to ſwallow large Morſels, Glutton like, and without chewing; which, no doubt made the Paſſage of the *Oeſophagus* wider, and diſpoſed it to give Entrance to all thoſe extraneous Bodies. This Idiot, and ſometimes mad Fellow, was never known to ſleep a Wink, tho' he was often compelled to go to Bed, and had, to incline him to ſleep, been very much harraſs'd and fatigu'd before: He was always known to eat three times as much as the reſt of Mankind, and when furious, to grow quiet upon the appaoach of Meat.

An Account of a Stone *voided by* Stool; *which had obſtructed the* Ductus communis Bilarius; *by Dr* W. Muſgrave. *n.* 306. *p.* 2233.

XVII. Mr *Harvey* (Nephew to the celebrated Phyſician of that Name) ſhewed me a *Stone* which he had voided ſome Years ſince, by *Stool*; and which he repreſented to me, as having come from the *Ductus communis bilarius*: But the Largeneſs of it is ſuch, as made the latter Part of the Account ſeem, at firſt hearing, ſomewhat dubious.

The Figure of the *Stone* is oval; the Length almoſt an Inch; the Breadth, (or ſhorteſt Diameter) $\frac{7}{10}$ of an Inch: It weighed 59 Grains, when I ſaw it; but at it's coming off, was (as I am informed) above a Drachm in Weight: Some part of it being, by frequent handling, rubbed away. The Surface rough, unequal, divided into ſeveral little Riſings, each about the Size of half a Vetch, or ſomewhat leſs. Fig. 178.

The many ſtrong annular Fibres, which appear not only at the Oriſice, where the *Ductus communis* opens into the *Duodenum*; but alſo all along the oblique Paſſage of that *Ductus*, between the Coats of the Inteſtine, (which Paſſage is, according to Dr *Gliſſon*'s Meaſure, about half an Inch in Length) do, by way of Sphincter, keep this End of the *Ductus Communis* very ſtrait and cloſe. And beſides the Straitneſs of the *Ductus*, the two oblique Inſertions it makes at ſome Diſtance from one another, thro' the two outer Coats of the *Duodenum*, render it yet more difficult for a Subſtance of any Bulk to paſs this Way. So that however great Stones may be generated in the *Gall*-Bladder, *Ductus Cyſticus*, *Hepaticus*, or *Communis*, it is not eaſy to conceive, how a Stone of the Magnitude here deſcribed, could poſſibly, thro' a Paſſage of itſelf ſo very narrow, ſtrait, and difficult, be conveyed into the *Duodenum*.

From theſe Conſiderations, I was extreamly deſirous to hear what could be ſaid, to prove, That this *Stone* was not form'd in the *Fiſtula alimentaris*, but (large, as it now is) came this way into it: In anſwer to which, the Gentleman was pleaſed to let me know,

That,

That, before the Diſcharge of this *Stone*, he had the *Jaundice*; which came ſuddenly on him, and continued ſeveral Months, in a ſevere, and moſt exceſſive Manner:

That this *Jaundice*, beſide the diſcolouring of his Urine and Skin, to a very great Degree; beſide Loſs of Appetite, Faintneſs, and many other Symptoms, uſual in this Diſtemper, was alſo accompanied with a Pain (in, or) near the Stomach:

That, during this *Jaundice*, his Stools were of a white Colour, as having very little or no Mixture of *Choler* in them;

That, travelling under theſe Circumſtances, more eſpecially with a conſtant Pain, in his Coach from *London* to *Clifton* in *Dorſetſhire*, and, after a little Time, to *Bath*; he found, a little after his Arrival at *Bath*, this *Stone* come off by Stool; and, together with it, almoſt a Spoonful of *Gravelly Matter*; and a conſiderable Quantity of Choler, as appear'd from the Yellowneſs of the Stools: All which happen'd ſo ſoon after he came to *Bath*, as evidently to prove the Diſcharge of both (Choler and Stone) to proceed from the Motion of the Coach.

That his Deliverance from the *Jaundice*, commenc'd from the Expulſion of this Stone: For, ſoon after that, the Colour of the Skin and Urine, and all the ill Symptoms vaniſhed; and, in a very little Time, (Weakneſs only excepted) he recovered.

Theſe Propoſitions, put together, make a conſiderable Argument, That the Orifice of the *Ductus Communis* (how ſtrait, and how ſtrong ſoever) was, in this Gentleman, ſo far dilated, as to give Way to the *Stone*, here deſcribed; that is, dilated to a Circle, in Diameter 7-10ths of an Inch, in Circumference one whole Inch and 3-4ths.

The *Jaundice* is often obſerv'd to be a moſt ſtubborn Diſtemper, not eaſily yielding to our moſt probable Methods; and many Times to none at all. *Riverius* poſitively affirms, That, when it proceeds from a Stone obſtructing the Current of the Choler, it is incurable: Urging this Reaſon for his Opinion; *Calculus, cum diſſolvi non poſſit, morbum facit incurabilem.* Cap. de *Ictero.*

When the *Jaundice* is thus difficult of Cure, eſpecially when there is a Probability (whether from a Pain fix'd in, or near the Region of the Liver, or from any good Argument whatſoever) that it ariſes from the Cauſe now mentioned; rather than to beat over the ſame Ground to no Purpoſe, it may not be amiſs to adviſe *Exerciſe* on Horſe-back, in Coach, or any other ſuch Way, as ſhall be likely to diſlodge the *Stone*, and bring it off.

But, to make this Exerciſe effectual, it ought to be violent, as the Patient can well bear it; and in ſuch Manner, as may, by much Agitation of the Body, be moſt conducing to the Deſign in Hand.

An Account of a Ball *voided*

XVIII. A Girl at *Rawden*, four Miles from *Leeds* in *Yorkſhire*, about fourteen Years of Age, having been tormented with Colical, and,

as

as was ſuppoſed, Nephritic Pains for ſome Time; at length voided a roundiſh Ball, *per Anum*, as hard to feel as a Stone.

by Stool: *By Mr* R. Thoreſby, *n.* 291. *p.* 1595.

After a while, the Pains returning with greater Violence, ſo as to make her roll upon the Ground, ſhe voided another as hard, and much bigger.

Upon which, Mrs *Ward*, a Gentlewoman who had been much afflicted with Gravel, gave her ſome of thoſe Medicines which ſhe us'd to take herſelf. Whereupon the Girl voided a third Ball, alſo *per Anum*, with leſs Pain, yet the greateſt of the three.

The firſt of theſe Balls is ſmooth and gloſſy, of the Colour of a right Hazel-Nut, three Inches about, and ſomewhat compreſſed. The other two rough and gritty, and in like Manner a little compreſſed into a kind of obtuſely triangular Figure. The ſecond is four Inches and a half round about; the laſt, five Inches and a half.

Conſidering their Bulk, all three are very light, eſpecially the two latter and greater ones, of which the laſt weighs but five Drachms thirty-ſix Grains; and both of them ſwim in Water.

This Lightneſs proceeds from the Matter whereof they conſiſt; which, in ſome Places, is purely Downy or Furzy; in others, mixed with a gritty Subſtance, yet not confuſedly, but regularly mixed. The furzy Parts poſſeſs'd the central Part of the Ball, with a ſmall Particle of blackiſh Glaſs, or other vitrify'd Subſtance in the very Centre itſelf. Over which are ſeveral Coats, gritty and furzy, alternately ending in the Circumference with a Grit, much reſembling the Groundwork and Superſtructure of the Oriental *Bezoar* Stone.

The Powder of one of theſe Balls ſcraped off with a Knife, is no way mov'd or affected with any Sort either of Alcaline or Acid Liquor dropp'd thereupon. Neither being burn'd, doth it ſtink, it conſiſts therefore of no Animal Subſtance; but the Girl being of the *Green-Sickneſs* Age, the gritty Parts (with the glaſſy Particle in the Center, as the moſt ponderous and leaſt moveable) ſeem to be broken off of Tobacco-Pipes, and ground ſmall between her Teeth; the downy, or furzy, to be lick'd, or ſcrap'd off the Lean of Mutton, or the Rind of Peaches, or ſome other Part, or Plant; her Stomach kneading the Matter into a Coat, as her changeable Appetite ſupplied it alternately with one or the other Sort.

XIX. In *April* 1704, I was deſired, together with Dr *C.* of *Tiverton*, to ſee a Woman of that Town, named Mrs *Pear*. She is about thirty, of a tender Conſtitution; had an ill Habit of Body, and about *Candlemas* laſt a Fever; which continuing near three Weeks, was at length overcome by *Teſtaceous* Powders and *Alexipharmacs*, but chiefly by the *Cortex*.

An Account of Hydatides *voided by* Stool; *by Dr* W Muſgrave. *n.* 295. *p.* 797.

In this Fever ſhe had ſowre Vomitings, and a Pain in her Stomach; which remain'd a long Time; and, after the Fever, was accompanied with a copious Salivation; with Wind, and Pains in her Side, to a De-

a Degree extraordinary; under all which ſhe labour'd to the Time of my ſeeing her.

About three Weeks before my Viſit, ſhe was ſeiz'd with a Jaundice, and while taking Medicines (*Pilulas & Decoctum Ictericum* Fulleri) for that Illneſs, ſhe brought off ſeveral *Bladders by Stool*, and continued ſo to do, ſometimes every Day, at other times once in two or three Days, ever ſince the firſt Diſcharge of this Kind, to the Time of my Viſit.

Theſe *Bladders* were of various Sizes; the leaſt that came off, was of the Bigneſs of a great Pin's Head; the largeſt, equal to a Pullet's Egg: They were alſo of differing Colours; ſome white, others more yellow, from the Liquor contain'd in them, which was a Sort of Jelly, like that of Harts-horn, ting'd more or leſs with Saffron.

Before the Diſcharge of theſe *Bladders*, there was (beſides the Symptoms already mentioned) a Coldneſs and Sickneſs at Stomach, almoſt perpetual; with frequent Inclinations to vomit; and Hyſteric Suffocations: Since that Diſcharge, theſe Symptoms are vaniſh'd, and ſucceeded by a Soreneſs of the ſame Part, as if ſomething had been torn there.

The *Bladders* came off without Pain, many of them whole and entire; one of which I ſaw, about the Bigneſs of a large Gall, or Marble Stone: Others were broken, and appear'd not unlike the empty Skins of Currants, Gooſeberries, and Plumbs.

Only one *Bladder* came away by Vomiting, and that broken; but, to all Appearance, had been large almoſt as a Gooſe Egg. The Jelly thrown up with this *Bladder*, and which in all likelihood had been contain'd in it, (before it broke in coming up) was thicker, and more fœtid, than was found in any of the other *Bladders*.

The Number of thoſe which came off by Stool, made ſeveral Scores.

During the whole Courſe of this Illneſs, the Patient was rather looſe than coſtive; had no manner of Appetite, and ſeldom ſlept without an Opiate.

I found her much waſted in Fleſh, with a dead, pale Look; ſuch as argued her to be very low. She had Stools of an unuſual Smell, no way natural, and had vomited a deal of cold Phlegm.

She was very willing to think theſe *Bladders* came from her Stomach, and urg'd the following Reaſons for her Opinion; *Firſt*, for that, had they been originally in the Bowels, in all Likelihood the Purges, (of which ſhe took many in the *Jaundice*) would, as ſhe ſaid, have carried them off much ſooner. *Secondly*, From the (almoſt) conſtant Pain of her Stomach, and frequent Inclination to vomit, ever ſince her Fever, to the Time of the *Bladders* being diſcharged. *Thirdly*, From the Rawneſs and Soreneſs of her Stomach, after the *Bladders* came off.

Theſe were her Reaſons; and, I think, they may be eſteem'd ſo far of Force, as to prove, That ſome, and perhaps a great Number of theſe *Bladders*, came from her Stomach.

There was no Appearance, in any one of theſe *Bladders*, of ſuch an Order of Parts, or Organs, as ſhewed them to be Inſects; nor upon Examination was there any Animal diſcerned in the Liquor contained in them; theſe Obſervations indeed were made only by the naked Eye.

The Medicines given, after I was called in, were chiefly of the *Vulnerary* and *Digeſtive* Kinds: That which did her moſt Service, (but it was after the *Bladders* were come off) was a *Tincture of Myrrh and Gentian*, in large and frequent Doſes; and with a proper Vehicle: Under the Uſe of this Medicine, from a very weak Condition, ſhe recovered an Appetite, *&c.* and is now perfectly well.

An Account of Hydatides *voided with the* Urine; *by Dr* Davies. *n.* 273. *p.* 897.

XX. A Gentlewoman between forty and fifty Years of Age, in the Autumn drank ſome Aluminous Waters for a Month or five Weeks, and in a Month's Time, after the Uſe of theſe Waters, found a Pain in the Renal Region, where ſhe never had been afflicted with any before: This Pain returned after the firſt Paroxyſm in about a Month's Time, and afterwards more frequently, till about the *Chriſtmas* following, it viſited her every Day; about which time ſhe ſent for me; and had, when I came to her, the Symptoms of a Stone in her left Kidney, *viz.* a grinding, and ſometimes a very acute Pain on that Side of the *Spina Dorſi*, a Vomiting, her Urine during the Paroxyſm tinged with Blood, and in it bloody *Ramenta*: But what moſt ſurprized me, was a dozen at leaſt of *Hydatides*, ſome of the biggeſt of them 1 $\frac{1}{2}$ Inch long, their Circumference equalled that of an ordinary Gooſe-Quill; in Shape they exactly repreſented the *Veſiculæ Natatoriæ* in Fiſh, growing ſmaller about the middle, as thoſe generally do, and were filled with a Liquor, which my Taſte and Smell made me believe to be Urine; I never diſcovered any Pus in her Urine, nor had ſhe any Pain at the Sphincter of the Bladder, nor in the *Meatus Urinarius*, either before, at, or after making Urine. The Paroxyſm laſted generally three or four Hours; as ſoon as theſe *Hydatides* came away, (which they did not all at once making Water, but at ſeveral Times) the Pain in her Back, *&c.* abated very ſenſibly, and ſhe continued eaſy and well the reſt of the Day, excepting an external Soreneſs, which the Pain had cauſed. I thought theſe *Veſiculæ* at firſt to be membranous, ſince their Conſiſtence was ſo tough as to bear taking out of the Chamber-pot, and gentle handling; but afterwards was convinced that they ow'd their Origin to a glutinous ſlimy Matter; becauſe upon long ſtanding in Urine, or fair Water, they quite diſappeared and were diſſolved, making the Water, or Urine, to look thick and turbid. By the Uſe of Medicines all theſe Symptoms diſappeared, and ſhe continued well.

An Account of a Bunch of Hair *voided with the* Urine; *by Mr* J. Yonge, *n.* 323. *p.* 414.

XXI. 1. A Plethoric Woman about fifty Years old, that uſed often to be afflicted with Nephritic Pains, deſired my Aſſiſtance. I found by the Purulency and Stench of her Urine, that ſhe had not only Stones and Gravel, but an Ulcer in one or both her Kidneys; and therefore gave her a Doſe of *Cantharides* with *Camphire* made into Pills, and followed it with plentiful Draughts of a ſlippery Emulſion. This made her piſs off abundance of blackiſh Gravel, and white thick Matter like Bird-Lime, without any Pain or ill Symptoms, and ſhe continued eaſy for a Week; then her Pains returned, and went off by the ſame Remedy. About eighteen Days afterwards, her Pain ſeeming to threaten a Return, I repeated the Medicine; but that Night it gave her very great Pain in the Side of her Belly, and at laſt threw her into Convulſions, which went off upon the Diſcharge of Urine, of a great deal of Matter, and in it a Bunch of ſhort Hair, almoſt rotten: For ſome Time after ſhe uſed a Nephritick Courſe, which hath hitherto preſerved her from the Return of Pain, Matter, Stones, and Impediment of Urine.

I herewith ſend a third part of that Bunch, which the laſt Doſe of *Cantharides* forced from her.

—Obſervations *on the* Bunch *of* Hair, *by Mr* Lewenhoeck, *ibid. p.* 416.

2.] I viewed part of the *Hairy Subſtance* thro' a Microſcrope, and judged it to be the Hair or white Wool of a Sheep; which Wool was broken into ſuch ſmall or ſhort Particles, that ſome of 'em were no longer than ſix Diameters of the Breadth of a Hair; which I ſuppoſe could not proceed from the Body of a Man, but that it was rather found in the Heel of one's Stocking. And the oftner I repeated my Obſervations, the more I was confirm'd in my Opinion; for I could not only diſcover the ſhort broken woolly Particles, but I ſaw alſo a great Number of the Ends grinded to pieces as it were; inſomuch that not only the Bark (if I may ſo call it) or Outſide of the woolly Particles were rubbed off, but the inward little Hairs, of which the Wool is compoſed, were ſo divided from one another, that they appeared with their Ends like little Bruſhes.

Moreover, under the ſaid Stuff, or white woolly Parts, there lay very ſmall Particles compoſed of exceeding ſlender little Tubes, or Pipes, which I look'd upon to be ſmall Bits of Straw, and they were ſo ſmall that one Grain of Sand could cover them: There were likewiſe other ſmall Particles of the ſame Figure, but I did not take them to be Straw, but rather the outmoſt Huſk, or Skin of a Grain of Wheat, or Rye; and under thoſe, I ſaw one Particle covered all over with ſmall Hairs, ſuch as we ſee at the Top of Wheat or Rye; as likewiſe ſome few litttle Bits of Wood, ſomewhat thicker than a Hair of one's Head: There was alſo a ſmall Particle of the outmoſt Skin of a Man, for I could ſee the little Scales of which our outmoſt Skin is compoſed, very plainly: Now theſe Particles that were not Wool, might be very eaſily brought

brought into the Stocking, in Caſe one ſets one's bare Foot upon the Floor before one puts it on.

There lay moreover, in the ſaid Matter, an unſpeakably great Number of exceeding ſlender long Particles, which I imagine to be thoſe hairy Particles, of which a little Fibre of Wool (ſetting aſide the Bark or Skin of it) is compoſed; as alſo ſeveral earthy Particles, which I took to be Part of the Dirt of the Floor, or of the Foot itſelf.

There alſo lay a great many particular little Figures, which I could not diſcover what they were; and theſe laſt mentioned Particles were ſo ſtrongly joined to ſome little Hairs, or Wool, by the perſpir'd viſcous Matter from the Foot, as I ſuppoſe, that I could not ſeparate 'em but by the Help of ſome Water: Amongſt others, I alſo ſaw two ſlender Particles lying, which I ſhould likewiſe have taken for the outmoſt Skin of a Man, were it not that they were larger than any of the Scales that I could ever take from my Skin, which are moſtly of an equal Thickneſs. In ſhort, there appeared to my Sight ſo many, and ſuch particular Figures, that there was no account to be given of them; only I obſerv'd amongſt them one ſmall Particle, not of a ſingle Feather, ſuch as it appears to our naked Eye upon the Body of a Bird, but rather of the fineſt Down; and the more I unravelled, or ſeparated the Particles of Wool from one another, ſtill the greater Reaſon had I to judge, that the Perſon who had worn the Stocking, had been uſed to go often bare-footed upon the Floor.

Now, ſuppoſing that theſe woolly Particles might have fallen into any Spoon Meat thicker than ordinary, the Perſon might ſwallow it down without being aware of it.

Now my Reaſons for gueſſing that theſe woolly Particles ſhould come out of a Stocking, and that *that* ſhould be occaſioned by the Motion of the Foot, are theſe that follow: I myſelf always wear heavy white Woollen Under-Stockings; and having ſeveral times view'd the broken woollen Particles which lie in a Heap, as it were cleaving together, under the Heel, and having alſo ſingled out of them ſeveral Fibres, or Threads of Wool, to prove that they are compoſed of little Hairs, and theſe woolly Particles exactly agreeing with thoſe that were ſent to me, I could no longer doubt that the ſaid woolly Particles that were ſo ſent to me, were any way different from thoſe Particles that were found in the Heel of the Stocking.

3.] I have again examined the Woman from whom the Bunch of Hair came, as alſo her Daughter, and Servant that attended her when it was ejected; and they all affirmed that the Chamber-pot uſed was a white glazed one, and very clean; and the Woman tells me ſhe ſenſibly felt it when it came away, and that a Tumour which ſhe felt in one Side of her Belly, did thereupon vaniſh. That ever ſince, which is eight Months, ſhe hath been unmoleſted with thoſe Torments, and otherSymptoms which ſeized her frequently before; only now and then

—*On the* ſame, *by Mr* J. Yonge, *ib. p.* 420.

then ſome ſmall Pains happen about her Loins; and ſometimes ſhe brings off Mucilage in her Urine.

I am not very credulous, nor did I ſoon believe it poſſible for Hair to paſs through thoſe Ways, by which the Urine is convey'd to the Kidneys, *&c.* But when I conſidered all the Circumſtances, and how frequently Things unaccountable happen, the Reality of which we are well aſſured of, I make no doubt of it's Truth.

—On the ſame, by the ſame. ibid. p. 424.

4.] I find that the Account I gave of the *Hairy Bunch* ejected by Urine, did not meet with that Regard and Credit which I think it deſerv'd. I own, that Mr *Lewenhoek*'s Objections ſeem to have ſome Strength, but cannot ſhock my Belief at all. For beſides a nice Examination, and full Conſideration of all the Circumſtances at firſt, I am confirm'd in the Aſſurance I then had, that it came thro' the *Urethra*, and was not convey'd, or by any Accident dropt into the Pot, by ſuch Evidence, *à poſteriori*, as is little ſhort of Demonſtration; *viz.* that the Tumour which was in the Side of her Belly, in which her chief Anguiſh lay before the Evacuation, vaniſh'd with it; together with all thoſe other Symptoms which moleſted her, *viz.* Strangury, fœtid and purulent Urine, and have not now (in two Years time) made any Return.

An Account of ſeveral Solid *Bodies* voided *with the* Urine; *by the* ſame. *ibid. p.* 420.

XXII. Tho' it be difficult to account how Solid Bodies, which have come away with the Urine, could paſs thro' thoſe Ways by which the Urine is conveyed to the Kidneys, *&c.* yet Authors of good Credit have given us many Caſes of this Kind.

Diemerbroeck Anat. lib. 1. *c.* 17. mentions divers of his own knowledge, and many more from *Plutarch*, *Langius*, *Alex. Benedictus*, *J. M. Heſſius*, *J. Alexandrinus*, *N. Florentinus*, *P. Pigræus*, and others, That Needles, Lumps of Fat, Iron Keys, Roots, Seeds, Nails, *&c.* have come off in Urine. To theſe may be added *Tho. Bartholinus*, *Act. Med. Vol.* 2. *Obſ.* 125. *Vol.* 3. *Obſ.* 68. *Vol.* 5. *Obſ.* 57. 70. as alſo in his *Tr. de Lac. Thorac. Cap.* 6. 9. *Fabr. Hildanus*, *Cent.* 5. *Obſ.* 51. who write of Pins, *&c.* caſt off by Urine. But Dr *Fairfax*, writes of one more ſtrange; * That a Leaden-bullet ſwallowed by a Woman for the Cholick, was piſs'd off ſome Years afterward, incruſtated with a gravelly, gritty, and ſtony Accretion.

† *Vid* Supra V. III. P. I. C. IV. S. LXXX.

About twenty Years ſince, I was aſſured by a Phyſician practiſing in the Weſt part of *Cornwall*, that he knew a Woman that piſs'd out a ſmall Plumb-Stone. But there happen'd at *Loo* in the ſame County, about 16 Years ago, a more ſurpriſing Accident of that Sort, which I here give as I had it from the Pen of (Dr J. H.) the Phyſician concern'd, who is alive, and the Truth of it well known in and about the Town where it happened.

'*Nathaniel Mitchell* of *Loo* in *Cornwall*, aged about 50, was in the 'Summer 1690, ſeized with violent Colical Pains, which he mitigated 'by

‘ by Glyſters, but could not perfectly free himſelf of them. About
‘ *Michaelmas* 1691, his Pains being very violent, he was relieved by
‘ the ſame Remedy; and by the Perſwaſion of a ſkilful Woman, he
‘ drank the Powder of Nettle-roots in White-Wine: After the firſt or
‘ ſecond Doſe he diſcharged a great Quantity of Urine, with a very
‘ feculent Sediment. About the Beginning of *November* 1691, being
‘ Coſtive, he eat Mallow-roots and Corinths boiled and mixed with
‘ Butter (his uſual Medicine to render him laxative). In a little
‘ Time after eating it, he was much diſordered, and complained of
‘ an Oppreſſion of Wind; at length the Wind (as he termed it) ſettled
‘ at the Bottom of his Belly, and in a very little time with his Urine
‘ he emitted ſome of the Herbs, with above 40 Corinths: A few
‘ Days after he piſs'd off ſeveral Parſley-leaves, which he had a little
‘ before eaten. I was called to him about the 12th of *November*, when
‘ his Urine being ſhewn me, I thought that part of his Excrements
‘ had been evacuated that way, and that ſome latent Ulcer had
‘ made a Paſſage through the *Inteſtinum Rectum* into the Bladder, but
‘ found it otherwiſe; for there was no Fœtor in the Urine, he had no
‘ *Teneſmus*, nor bloody, nor purulent Dejections; but to ſatisfy my-
‘ ſelf further in this Particular, I ordered him a Glyſter tinctured with
‘ Indigo, which he retained above half an Hour, but his Urine was
‘ not at all diſcoulered with it. I preſcribed Pills of——, two of
‘ which came off in his Urine *November* 18, in an oblong Form, about
‘ the Bigneſs of the End of the firſt Quill in a Gooſe's Wing. The
‘ Pills I have by me, except the half of one, which I rubb'd abroad
‘ with my Fingers. Some time after he piſs'd out a Piece of a Raiſin.
‘ He lived till *Midſummer* 1692, in which time he ejected, at divers
‘ Times, Parts of Roots, and other Things he eat.’

His Wife reſiſted all the Importunity that could be made to have his Body diſſected.

Diemerbroeck, *Fairfax*, *T. Bartholine*, *O. Borichius*, *N. Blegny*, Mr *Pecquet*, and others, are of Opinion that there is a concealed Channel for the Urine to the Emulgents, *&c.* than thoſe commonly ſuppoſed; and they think it appears ſo by divers Phænomena, and Experiments, though it be yet concealed. ’Tis certain, the Matter of an *Empyema*, and the Corruptions in the Thorax in penetrating Wounds thereof, have been piſs'd off, and to that Purpoſe Diuretics are uſed in Vulneraries, *&c.* See *Malpighius*, *N. Blegny*, Serjeant *Wiſeman*, &c. And I have known a large ripe Apoſtumation in the Thigh ſink ſuddenly, and all the Matter come away by Urine from a Woman. Mr *Leyſer* hath the like Story in his *Obſervations*.

I had once a Boy of about ſix Years old brought me, that piſſed off the moſt part of his Urine from an Orifice in his Navel. I remember *Blaſius*, or *Veſlingius*, relates the like, and accounts for it.

An Account of two Large Stones *voided by the* Urethra; *by Dr* T. Bullen. *Communicated by Mr* E. Lhuyd. *n.* 295. *p.* 1804.

XXIII. The following Account (of two *Large Stones* voided by the *Urethra*) I received from Dr *Bullen*, a Phyſician in *Cheſhire*. They are much of the ſame Size and Shape; and being joined together, the Circumference one way is above three Inches and a half, and the other three and a quarter.

The Perſon that voided them took an exceſſive Quantity of *Honey* during his Illneſs, to which alone he attributes his Deliverance.

Thomas Olton, a Man of ſeventy Years of Age, living not far from *Malban*, in *Cheſhire*, being grievouſly afflicted with the Stone in the Bladder, applied to me and other Phyſicians, ſeveral Times for Aſſiſtance, and had a great many things given him, without any Relief. At laſt however, in one of the Paroxyſms, which was the ſevereſt he ever had, he voided two Stones by the Urethra, exactly reſembling in
Fig. 156. Figure theſe two Braſs Models of them, ſent lately to the Muſeum at *Oxford*, by Sir *R. W.* and they weighed ſeparately upwards of two Drachms.

The firſt Stone gave him intolerable Pain in paſſing; but he ſcarce felt the ſecond: And indeed no Wonder, that the Urethra, after being ſo dilated and tore by the firſt, ſhould afford an eaſy Paſſage for the
Fig. 156. other. But theſe two Stones made only one while in the Bladder, which appears plain upon joining them together where they were broke. The Wound in the Urethra being neglected, remains ſtill open; and he is obliged to make uſe of a large Horn, adapted to the Root of the *Penis*, when he wants to make Water, to hinder it from ſpoiling his own Cloaths, and thoſe of other People, who happen to be nigh him upon theſe Occaſions.

All this I affirm to be true, and the Truth of it is well known to ſeveral others in that Part of the Country. But if any one happens to be doubtful about this Caſe, I would adviſe him to conſult *Schenkius*'s Obſervations upon the *Stone* in the *Bladder*.

An Account of the Diſſection *of a Perſon that died of the* Stone; *by Mr* R. Thoreſby. *n.* 336. *p.* 536.

XXIV. A young Man, one *Joſhua Spurrit*, near *Leeds*, having been for a long time ſadly afflicted with the *Stone*, was the laſt Year tormented in an extraordinary Manner. I have three Stones that he voided, which are of a great Bigneſs to paſs the *Penis*, and five more that he could not get rid of without the Aſſiſtance of Mr *Pollard* a Surgeon at *Leeds*, who, by an Inciſion, made way for them, as they came ſeverally near the *Glans*. Whenever one of theſe great Stones broke out, there was a Crack within his Body, as if the Sphincter Muſcle, or the Bladder itſelf, was rent. At length he died of this Diſtemper, and was diſſected: There were found in the Top of his Bladder (which was contracted like a Purſe) two prodigious large Stones, one of which I meaſured, which was rather more than five Inches and a half one way, and four the other way; it weighed two Ounces wanting three Drachms; the other weighed but one Ounce and one Drachm: There were two very odd Stones taken out of the right

Fig. 154

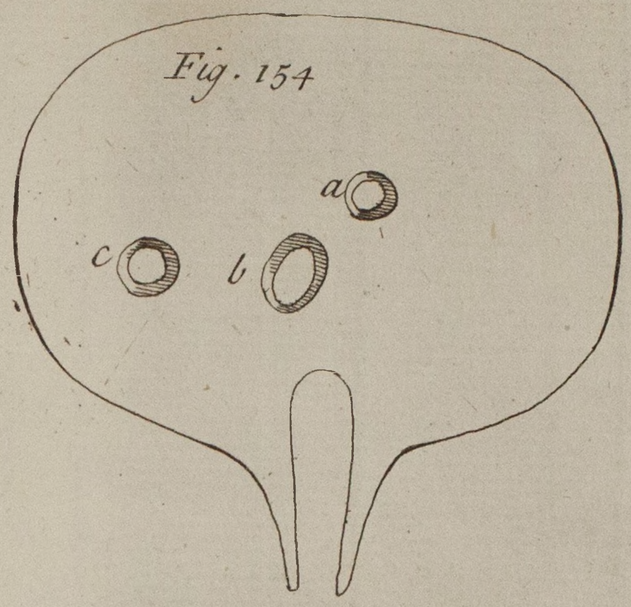


Fig. 151.

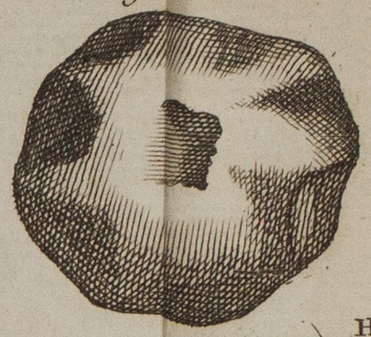


Fig. 153

Fig. 152

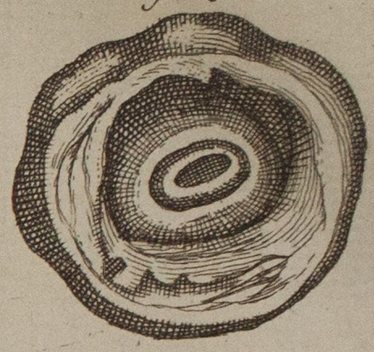


Fig. 155.

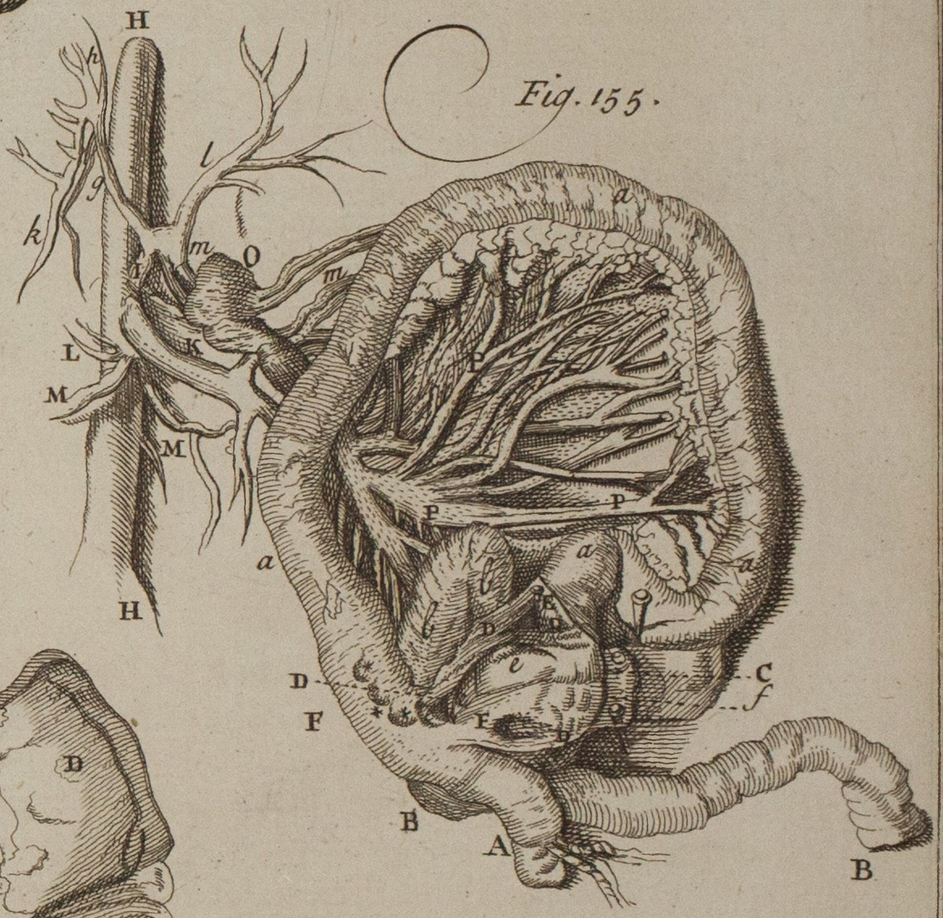


Fig. 156.

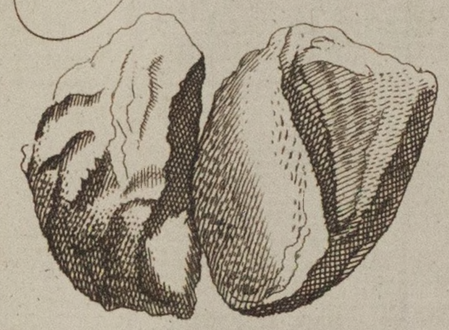


Fig. 157.

right Kidney; (the left was wholly degenerated into a kind of Mucilage); and betwixt the Neck of the Bladder and the End of the *Penis* (which was mortified thereby) half a dozen large Stones.

There was little Moisture in the Bladder; the Ureters being broken off, and almost wholly consumed.

Experiments *relating to the* Cure *of the* Stone, *proposed by Dr* F. Slare. *n.* 157 *p.* 533.

XXV. In order for the Improvement of the *Therapeutick* Part of the Distemper of the *Stone*, it would be highly proper,

To search after innocent *Menstruums* that may dissolve the *Stone*.

To examine the Condition of the *Urine*, sometimes before a *Paroxysm*, both as to it's *specific Gravity* and Contents.

And also during the *Paroxysm*, to retard the painful Water sometimes transmitted.

To enquire into the *Nature* of *Nephritic* Medicines.

To examine *Lithontriptics*, so as to exclude those from that *Class* and *Character*, which have no relative Virtue that way; and to lessen the *Catalogue* of those mistaken *Specifics*.

To enquire into the *Nature* of the *Hop*, which is so much (and perhaps innocently) condemn'd, for it's Aptness to generate the *Stone*.

To explain the Manner of the *Operations* of some *Medicines*, which, tho' they are not *Lithontriptics*, yet may be good *Nephritics*.

Of a Triple Bladder; *by Mr* Bussiere. *n.* 268. *p.* 752.

XXVI. If the Bodies of Persons that die of extraordinary Distempers were often opened, perhaps it would be found that those Effects which had been attributed to the Alteration of the Blood or Humours, might depend merely on an extraordinary Conformation of the Parts of the Body; an Instance of which we have in the *Triple-Bladder*, found lately in the Body of Mr *Booth*, which was a very remarkable Case: We have been told of a Double Bladder found in the Bodies of some Men, (as there was in the Body of the famous *Casaubon*) but I never met with any Author who mentions any thing of three Urinary Bladders found in one Person.

This Gentleman in his best Health could not make his Water in a full and continued Stream, the Urine running out by little and little, and with great Efforts of Inspiration, chiefly when there was but little Quantity of it in the Bladder, which did fatigue him very much, tho' the passing of the Urine through the Neck of the Bladder was not painful: Except the two or three last Years of his Life, because of a thick *Mucus*, which then was discharged with the Urine.

That *Mucus* growing in greater Quantity of late, made him apprehensive it had been caused by a Stone in his Bladder; upon such Thoughts he apply'd himself to one, in order to be searched by him, who accordingly introducing his Catheter, and meeting with some Resistance in his *Urethra*, did force the Catheter thro' the Membranes, and made such a Dilaceration in them, that the Patient lost immediately

a great Quantity of Blood; which Bleeding continuing for ten Days, without his ſeeking for any Help, brought him under very great Torments by reaſon the Blood being grumulous in the *Urethra*, could not be forced out but by very violent Efforts and acute Pain, which cauſed a Mortification in the Part, of which he died.

The next Day after his Death I opened the Body in the Preſence of Drs *Dawes*, *Chamberlain*, *Woodward*, Mr *Bernard* the Chirurgeon, and ſeveral others; in which the natural Urinary Bladder was found lying on the left Side of the *Pelvis* upon the *Ilium* Bone; then ſearching what ſhould be the Cauſe of an unnatural Situation, we found one large and round Bag, lying under the *Pubis* upon the *Rectum*, filling up all the Cavity of the *Hypogaſter*: In order to examine the thing more exactly, I diſſected the *Penis* and the *Rectum*, and having taken them out of the Body, and laid them upon a Table, laid open the *Urethra*, to examine whether there was any Carnoſity, as the Chirurgeon, who firſt introduced the Catheter had ſuſpected; but there was none: And that *Ductus* was as plain and ſound as could be, except the Dilaceration which the Catheter had made in it; then having introduced a Conductor into the Bladder, I divided it quite; and firſt it was obſerved, that the round Bag, which was made up of two Bladders, or rather two *Ciſtis*'s, divided one from the other only by a Membrane; that which was next to the true Bladder was ſomething bigger than the Bladder, the other which was lying on the right Side being much
Fig. 157. leſſer; each of theſe two *Cyſtis*'s had it's Orifice open in the Neck of the natural Bladder, which was longer than it is naturally.

Neither of the *Ureters* were inſerted into any of theſe *Ciſtis*'s; but they were inſerted into the Neck of the true Bladder, by the Orifices of the two *Ciſtis*'s, inſomuch that the Urine could be equally received by them and the Bladder.

Secondly, It was obſerved that the Glandules of the true Bladder were extraordinarily big and red; that Colour being, very likely, the Effect of the Inflammation cauſed by the Dilaceration of the *Urethra*. I have often-times obſerved, that a thick *Mucus*, which runs out of the Bladder, and which ſome think to be the Matter of an Impoſtume or Ulcer in the Kidneys, is only produced by thoſe Glandules of the Bladder grown ſcrophulous; and that when that *Mucus* groweth thick and clammy, it cauſeth the ſame Pain on the Neck of the Bladder, as if it were a Stone.

The Glandules of the great *Cyſtis* were very ſenſible, but very ſmall; they were not all ſenſible in the ſmaller *Cyſtis*.

Now it is eaſy, by the Deſcription of theſe Bladders, to give a Reaſon of the Symptoms this Gentleman did undergo; for by the Situation of the Great *Cyſtis*, it is plain, that the Water could not come out but by the Force of the Inſpiration, it's own Muſcles being not able to force it out, and conſequently could not come out but by little and little; and theſe Efforts of Inſpiration were to be the greater

when

when there was but little Quantity of Urine, because it required greater Force to make it ascend from the Bottom of the *Cystis*, which could not be done but with great Labour and Fatigue.

A, A, The Body of the *True Bladder*; 1, 2, 3, 4, 5, 6, it's *Glandules*. Fig. 157. B, B, The Great *Cystis*. C, C, The Smaller *Cystis*; 1. 2. 2. it's *Wrinkles*. D, Part of the *True Bladder* overturned. E, The *Neck* of the *Bladder*. F, F, F, F, The two *Urethra's*. G, The *Insertion* of the *Spermatick Vessels* in the *Urethra*. H, H, The *Prostrates*. I, I, The *Vesiculæ Seminales*. K, K, The *Vasa Deferentia*. L, The *Urethra*. M, M, The *Musculi Erectores*. N, The *Penis*.

XXVII. I opened a Maiden Lady 52 Years of Age, who complained, about six Weeks before, of a Circonscript hard Swelling on the *Hypogastrica regio*, on the right Side; from that time her Belly grew by degrees to an exorbitant Bigness, the great Weight whereof was the most considerable Symptom, and at last suffocated the Lady. The Body was mightily emaciated, and the Legs swelled a few Days before her Death. *An Account of the* Dissection *of a* Dropsical *Body*; *by Mr* J. Lafage, *n.* 299. *p.* 1977.

I expected Water, but there was only a viscous darkish Humour, to the Quantity of 18 Gallons: After the Evacuation of that Matter, I perceived a large Heap of Vesicles arising from a thick Membrane covering the Guts, it being the *Peritonæum* separated from the Muscles: I took it out, to examine the better those Vesicular Bodies disposed on the outward Surface of that Membrane, as also them that were on it's Inside, towards the Guts. The Vesicles were of different Magnitude; some of the largest had been broken and sunk, others were broken and almost empty, and the others very much distended and full; the Matter of all of them was of the same Nature with the extravasated Humours. What was contained in the lesser ones proved to be of different Colour and Consistence, not unlike Jelly, White of Eggs, Gall, and Honey; in some it was much like the Humour of a true *Melicéris*.

There was but little Matter extravasated in the Cavity of the *Abdomen*; most part was contained betwixt the *Peritonæum* and the Muscles.

The right *Kidney* was affected with a particular Dropsy; all the *Viscera* besides were in a natural State; two *Polypus*'s were found in the *Heart*, and two pretty big Stones in the *Gall-Bladder*.

2.] Some time ago I dissected a poor emaciated Creature that died of a *Dropsy*, from whom I took about ten Gallons of Liquor measured. —*Another*— *by Mr* H. Vaughan, *n.* 281. *p.* 1245.

XXVIII. Mrs *Dyer* was about 30 Years old, a Mother of several Children, and was very healthful till *January* 1711; when after frequent Watching upon an extraordinary Occasion, she was vexed *An Account of an* Hydropical *Case with the*

Gall-Bladder *very much* diſtended; *by Mr* J. Yong, *n.* 333. *p.* 426.

with a Pain in the Belly like the *Cholic*, which proved to be the Dropſy *Aſcites*; which increaſed ſo faſt, in ſpite of all I could do to help it, that on *March* the 9th, ſhe being almoſt ſuffocated, I was forced to tap her with a hollow Needle in the uſual Place; and to repeat the Operation as often as ſhe filled: And by that way I diſcharged the ſeveral Quantities of Water at the Times here mentioned.

		Pints.
March	9th I drew off	9
	14	8
April	2	12
	16	10
May	17	14
	31	14
June	14	14
	24	14
July	7	17
	21	16
	30	16
Aug.	6	14
	17	14
	26	13
Sept.	1, 6, & 22	$11\frac{1}{2}$
Octob.	1	3
	30	15
		$214\frac{1}{2}$

In the Space of eight Months I drew two hundred and fourteen Pints and a half of Water. All the while I was pumping that out, I endeavoured by all the Means I could to ſtop the Leak within, but in vain: She died *November* 4, 1711, and opening her Belly, we found the following remarkable Things.

From the Belly iſſued fourteen Pints of a greeniſh *Serum*, mixed with a very purulent Matter, not a little fœtid.

The *Inteſtines*, eſpecially the *Colon*, almoſt every where livid, and adhered in many Places to the *Peritonæum*, although they had been ſo long immerſed in Water.

The *Omentum* was alſo black, and almoſt conſumed.

The *Liver*, which I expected to be indurated, was free of all Faults, only two ſuperficial Ulcers on the left Lobe.

Both that and the *Peritonæum* (which are ufually full of *Hydatides* in Dropſical Perſons) were wholly free of them: But on the Stomach and Guts were many ſuch.

We found a great Bladder, diſtended like that of an Ox, filling up almoſt the whole Region of the *Liver* and *Ventricle*, and adher-

ing

ing to the adjacent Parts ſo firmly, that we could not ſeparate them without difficulty and get it out whole; which proved to be the *Gall-Bladder*, and by it's Diſtention had torn the *Liver* aſunder, one Part of which adhered to the left Side of this monſtrous *Cyſtis*, and another Part behind it, towards the Back; and both expanded with it, and faſtened to it, like as the temporal Muſcle to the *Skull.*

The whole weighed ten Pounds and twelve Ounces. It had no Paſſage to let out the Matter it contained, although we ſqueezed it hard to that Purpoſe; nor could we find any by Probes: So that we were forced to make way by a Knife, and ſo let out of it ſeven Pints of a black Liquor, like *Coffee*; which having ſtood one Night in a Baſon, near a Quart of thick yellow *Fæces* ſubſided.

The Liquor in this Bladder, and what we found in her Belly after her Death, added to what was evacuated before by *Parucenteſis*, amounts to 235 Pints.

Beſides the prodigious Quantity of Matter which filled this great Bag, we found ſeveral Pieces of Membranes, like Gut, or Bladder cut into Pieces.

It was very wonderful, that during the whole Time of her Sickneſs, ſhe ejected by Urine near as much as ſhe drank; and yet by Computation, ſhe leaked into the *Abdomen* near a Pint every twenty four Hours, from *March* to *November.*

When her Belly was near full, her Thighs and Legs uſed to ſwell, and grew diſcoloured, like an approaching *Gangreen*; but both went off after Tapping, by the help of Friction and a warm Lotion.

An Account of a prodigious Dropſical *Woman* diſſected, &c. *by Dr* Hollings. *n.* 348. *p.* 452.

XXIX. A married Woman, near *Haman*, above three Miles from *Shrewſbury*, about the 40th Year of her Age, had then firſt the common Reaſons to believe ſhe was with Child; at the Time of her Account ſhe had the uſual Signs of Labour; and a good Midwife, though miſtaken, aſſured her it was ſo; but the Child was ſo big, ſhe could not be delivered without bringing it away in Pieces. She not ſubmitting to that, her Pains ſoon went off, and ſhe continued without any other Diſorder nine Months longer, when ſhe again had the Signs of Labour; and the ſame Midwife aſſured her as before; and ſhe perſiſting in her former Reſolution, her Pains, after a Day or two, went off. Soon after her Belly ſwelled to a ſurprizing Size. I ſaw her firſt above twenty Years ſince, when her Belly was almoſt even with her Chin; the Weight of it ſo great, that ſhe was obliged to ſupport it with a Stool. She could not ſtand without the Help of a Rope from the Cieling, which aſſiſted her in changing her Poſture of Sitting. She ſlept commonly with her Arms folded on her Belly, and her Head reſted between them. She had no Swelling in her Legs: Every other Part emaciated as uſual in the like Caſes. Thus this Creature lived, without any other conſiderable Complaints, above thirty Years. She died in *May* 1715, when this appeared to be an *Aſcites.*

I need

I need not mention the State the common Teguments muſt neceſſarily be in, from ſo great a Diſtention, which had diſtorted many of her Ribs, and forc'd the Diaphragm ſo high, that it was ſurprizing to find her Breathing could be ſo long continu'd. The Water was all contain'd in the Duplicature of the *Peritonæum*, thirteen Gallons, beſides a Quart that was ſpilt: It was ſaltiſh, with ſome little Fat upon it, and towards the latter Running ting'd with Blood, as uſual. There was not any Water in the Cavity of the *Abdomen*, except what was contain'd in a kind of Bladder of the Shape in *Fig.* 158, which lay a-croſs the *Fundus Uteri.* This was divided by a Cartilaginous Subſtance into two Cavities; in one there was a Pint and a half, in the other three Parts of a Pint of Water. I believe it was this (I know not how) impos'd on the Midwife. The *Uterus* was of the natural Size, without any Alteration, except that the *Os Tincæ* and *Collum Minus* were fill'd with a gritty Subſtance, hard as Stone, which I take to be the Humour ſeparated there, and coagulated by Time. Mr *Cooper*, *Tab.* 15. *Fig.* 4. ſays, he found the ſame Parts fill'd with a glutinous Matter, which he thinks is uſeful to prevent Abortion; which, if vitiated, Impregnation is hinder'd.

Fig. 158.

The Liver, and other Parts contain'd in the *Abdomen*, were forced into an incredible ſmall Compaſs (and by that Preſſure a little chang'd in Shape) to perform their Office ſo long: To which the Muſcles of the *Abdomen*, diſtended ſo as to be ſcarce diſcernible, could give but little, if any Aſſiſtance.

Her Friends would not let me make any farther Enquiry; ſo that I can ſend no Account of any other Part. I was hinder'd too from examining another Woman, who died here about a Week after of an *Aſcites*, which ſhe had had forty Years, any farther than to be ſatisfied ſhe had ſeven Gallons of Water contain'd between the Duplicature of the *Peritonæum*, and none in the Cavity of the *Abdomen*.

An Account of an Hydrops Ovarii. *With a* Figure *of the* Glandulæ Renales, *and of the* Uterus *in a* Puerpera; *by Dr J.* Douglas. *n.* 308. *p.* 2317.

XXX. I lately open'd the Body of a Woman, aged Twenty-ſeven, who died the third Day after Delivery, on which I made the following Remarks.

She meaſured round the Waſte a Yard and three Quarters; and from the *Scrobiculus Cordis*, to the *Os Pubis*, a Yard and a Quarter.

All the *Cutaneous* Veins of the *Abdomen* were of a very unuſual and extraordinary Bigneſs, and very much diſtended with Blood. From the largeſt of them, being opened, I extracted ſeveral *Polypous* Concretions.

The *Cuticula*, from the *Umbilicus* downwards, was rough and ſcaly to the naked Eye: In ſeveral Parts it appear'd gangren'd, occaſion'd, probably, by the Sharpneſs of the *Serum*, that always ouz'd out of it, when ſhe ſcratch'd the little Pimples or Wheals that aroſe on it's Surface; theſe, for ſome time, us'd to go off without any Scar; but as her Strength decay'd, they became mortify'd.

Upon

Upon all the *Regio Epigaſtrica* the outward Integuments were very thin, little or no Fat being viſible: But from the upper Part of the *Regio Umbilicalis*, down to the *Os Pubis*, the Skin was almoſt half an Inch thick, of a whitiſh Colour, and hard, ſome of it appearing as if it were granulated, cauſed by ſome Obſtructions in the Miliary Cutaneous Glands.

The Fat under this Part of the Skin did exceed the Thickneſs of an Inch, being diſtinguiſh'd into ſeveral Lobules of an irregular Figure, and lodg'd in ſo many Cells adhering to the *Membrana Adipoſa*, which here alſo was much thicker than it uſually is in a natural State.

Her Thighs, Legs, and Feet were all *anaſarcous*, being extremely big and ſwell'd, eaſily retaining any Impreſſion made by the Fingers: And her Nurſe told me, that ſhe uſed to wet a great deal of Linen in drying up the Water, that would always iſſue out from theſe Parts, on the leaſt rubbing, yet all her ſuperior Parts were extremely lean and emaciated.

The fleſhy Part of the *Abdominal* Muſcles was much extenuated by the great Diſtention, yet their Tendons were as thick as uſual; and being very eaſily ſeparable from one another, I could plainly obſerve, that the Tendon of the *Obliquus Internus* adhered firmly to that of the *Tranſverſalis*, along the Edge of the *Muſculus Rectus*, and was not double, as *Realdus Columbus*, and all Anatomiſts after him, down to *Diemerbroek*, who was firſt aware of this Miſtake, have maintained: However, this ſtreight Muſcle derives the ſame Benefit from this Situation, being, as it were, hemm'd in one Side by this firm Adheſion; and on the other, by what they call the *Linea Alba*, as if it had indeed been incloſed between the two ſuppoſed Tendons of the *Obliquus Aſcendens*; that is, 'tis much ſtrengthen'd thereby in the time of acting. I obſerv'd alſo, that the Tendons of the two oblique Muſcles, and the fleſhy Part of the *Tranſverſalis*, between the Anterior Spine of the *Os Ilium* and the *Pubis*, near it's Commiſſure, did inſeparably join and unite with one another, forming as it were a thick and hard Border, from the Outſide of which, there was continued over the Blood-Veſſels, Nerves, and Muſcles, on the Fore-part of the Thigh, a large *Aponeuroſis*, which braced them down: The two *Laminæ* of the Membrane of the *Abdomen* being expanded on it's Inſide. Now this Border is what Authors call the *Ligamentum Pubis*, and what I have in another Place ſuppoſed to be the firm Union of the Tendons of theſe three *Abdominal* Muſcles with the *Peritonæum*. *Vid Myograph. comparat. Speciim. pag. 5.*

Having perforated the *Abdomen* in the moſt convenient depending Part, there iſſued out, with great Impetuoſity in a riſing Stream, a vaſt Quantity of ſlimy viſcid Water, in Colour and Conſiſtence very much reſembling a brown, thick, and ropy Syrup. This Water meaſured between 16 and 17 Gallons, beſides what was loſt on the Floor, and imbibed in Sponges and Linen made uſe of in drying it up.

When