THE

ANATOMY

OF THE

Humane Body.

With XXXI Copper-Plates.

By W. CHESELDEN,
Surgeon to St. Thomas's-
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Of all GOD's Works that do this World adorn,
There is not one more Fair and Excellent,
Than is Man's Body both for Power and Form.

Spenser.


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TO
Dr. Richard Mead,
Fellow of the College of Physicians in LONDON,
And Fellow of the ROYAL SOCIETY.

SIR,

VERY part of Physick may justly presume on your Protection, to whom it owes so much Improvement. ANATOMY in particular has received such Advantage from your Lectures, that it were a kind of A 2 In-
Injustice, not to Dedicate all Endeavours in that way to you; in me indeed it would be unpardonable not to offer the Fruits of those Studies, which at first began, and have still been carried on with your Encouragement. The kind Reception my Industry has met with, is owing to you, the Authority of whose Opinion has in every Place secur'd me so much Favour; especially in that Seat of Learning, that with distinguis'd Honours rewarded your Merit.

I am,

S I R,

Your most Oblig'd and

Obedient humble Servant,

W. Cheselden.
THE

PREFACE.

HIS Treatise being designed for the Use of those who study Anatomy, I have dispos'd it in the same Order in which it is usually Taught. The Bones first, and then the Muscles, because the Knowledge of the Bones is necessary to the Knowledge of the Muscles, and afterwards the Vessels, because their Situations are chiefly described by the Bones and the Muscles near which they are situated. But before we show...
the Vessels in the Limbs, we find it necessary to shew the Parts in the three Cavities, and that in the Order of the Animal Oeconomy; but the Parts of Generation, and the Five Sences, being fit to be considered separately, they are all done in a distinct Book.

IN describing of the Parts, I have pretty much neglected the Minutiae in Anatomy: Nor have I been very particular about those Things which cannot be understood without being seen, and being seen need little description; but have endeavoured to be more explicit about those Things which are of greatest Use in Philosophy, Physic, and Surgery: And I could wish the Dividing and Distinguishing of Parts was usually carried no farther than is necessary to answer these valuable Ends.
This Impression has been Four Years in the Press, which gave me frequent Opportunities to correct, add, and alter the Sheets, which in some Places has made the Lines and Pages crowded, and in other Places loose; and has too often interrupted the Connection of the Sentences, without leaving me room enough to add all that I was inclined to. And these Sheets in particular which were first Printed off, are without many Things which I could now add.

I must here acknowledge my Obligations to my Learned Friends Martin Folkes, Esq; Dr. Juryn, and Dr. Oldfield, for assisting me in Revising these Sheets, and particularly Dr. Oldfield, who undertook the greatest Part of them: To whom I am also
also oblig'd for the Discovery of the Mistake in Dr. Keil's Hypothesis about the Advantage of small Bladders composing a Muscle. See Introduction to the Muscles, and Tab. VIII.
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INTRO-
INTRODUCTION.

HE receiv'd Opinion of the Texture of the Animal Body, is, That it is a Compages of Vessels, variously dispos'd, to form Parts of different Figures, for different Uses.

The Ancients suppos'd, That the HEART and BRAIN were first form'd, and that all the other Parts proceeded from them. They distinguished them into Spermatic and Sanguineous; and thought, because the BRAIN was cover'd with Two Membranes, that all the other Parts must be so too; and frequently engag'd themselves in Disputes about the Derivation of Parts; with many other Things of the like Nature, Consequences of their Hypothesis. But the Moderns, assist'd with Glasses, have discover'd, That all the Parts exist in Miniature, from the first Formation of the Foetus, and that their increase, is only the Extension and thickning of their Vessels, and that no Part can owe its Existence to another.
Thus much I thought necessary to premise, that the Reader might have a general Idea of the Body, and that he may see, for what Reason no notice is taken in this Treatise of the Distinctions and Divisions of Parts, made by ancient Anatomists, and those who have copy’d after them.

The Constituent Parts of the Animal Body are, Nerves, Arteries, Veins, Lymphaducts, Excretory Vessels, Fibres, Membranes, Glands, Muscles, Tendons, Ligaments, Bones and Cartilages; to these may be added the Hair and Nails, tho’ they have only a Vegetative Kind of Life.

Nerves are Cylindrical Bodies, of freight Fibres, which arise from the Medulla Oblongata of the Brain, and the Medulla Spinalis, and terminate in all the Sensitive Parts. They are the immediate Organs of Sensation.

The Arteries are Tubes that arise in Two Trunks from the Two Ventricles of the Heart, and thence dividing into Branches, distribute the Blood to every Part of the Body.

Veins, are Tubes to return the Blood from the Extremeties of the Arteries to the Heart.

Lymphæ Ducts, are pellucid Tubes to carry Lymph from all Parts, especially the Glands, to the Vasa Lataea.
Excretory-Vessels, are either Tubes from Glands to convey the secreted Fluids to their respective Places, or Vessels from the small Guts, to carry the Chyle to the Blood-Vessels; these last, are call'd Vasa Lactea.

Fibres, as they appear to the naked Eye, are simple Threads of the minutest Blood-Vessels or Nerves, or both, which enter into the Composition of every Part.

Membranes, are Compages of Fibres, expanded, to cover, or line any other Part.

A Gland secretory, is compos'd of an Artery, Vein, Lymphatic, Excretory-duct, and Nerve. The Use of Glands is to secrete Fluids from the Blood for several Uses. The Artery is longest and makes the greatest part of a Gland, it is convolv'd like the small Guts, the Vein and Lymphatic only return the Blood, the Excretory Duct (which arises in a great many Branches from the sides of the Arteries, as the Lacteal Vessels do from the Guts) conveys the Matter secreted to the Place it is design'd for; nevertheless Secretions may be made from the sides of Vessels in Membranes, without such Excretory Ducts or Arteries thus Convolv'd, and in this manner I suppose all the lesser secretions are made.

Muscles, are distinct portions of Flesh, which, by contracting, perform the Motions of the Body.
Tendons, are the same Fibres of which the Muscles are compo'd, but more closely connected, that they may possess less space in a Limb, and be inserted in less room into a Bone.

Ligaments, are strong Membranes, or Bodies of Fibres closely united, either to bind down the Tendons, or give Origin to the Muscles, or tie together such Bones as have Motion.

Bones, are firm Parts to sustain, and give Shape to the Body.

Cartilages, or Gristles, are hard, elastic, smooth and insensible: Their Use is to cover the Ends of the Bones that have Motion, to prevent their Attrition, &c.

What is call'd Hair and Nails, is sufficiently known; the former seems to be nourish'd from the Materia Perspirabilis, and the latter from the Reticulum Mucosum, betwixt the Cutis and Cuticula.
BOOK I.

CHAP. I.

Of the Bones in General.

The use of the Bones is to give shape and firmness to the Body, to be Levers for the Muscles to act upon, and to defend those Parts from external Injuries that are of greatest Consequence to be preserv'd, as the Brain, Heart, &c.

They are in their first State very soft Fibres, till by the addition of a Matter, which is separated from the Blood into them, they grow by degrees to the hardness of a Cartilage, and then perfect Bone: But this great change is neither effected in a very short time, nor begun in all the parts of the same Bone at once. Flat Bones, such as have their Fibres directed to all sides, begin to ossifie in a middle point; but those flat Bones that have their Fibres nearly parallel, begin in a transverse middle line, that is in the middle of each Fibre; and so the Cylindrical Bones in a middle ring, from which they shoot forth to their extremities; and
by the continual addition of this ossifying matter, the Bones encreafe, till their hardness resists a farther extension; and because their hardness is always encreasing while they are growing, the encrease of their growth becomes flower and flower, till they ceafe to grow at all; and at length in old or weak Persons, if I am not mistaken in my Observations, they decrease as well as the flefhy parts, but not fo fast, by reafon of their hardness. In a Soldier that by a Shot in the left Groin had that Leg extremly wafted, within a Year after the receiving of the Wound, being dead, the Bones of that Limb, as near as I can remember, were two fifths lefs then those of the other; Now this Man muft either have been taken lame into the Service, which cannot be supposed, or these Bones muft have wafted nearly thus much for want of due Nourifhment; for the Bones of the other Limb can't be thought to have grown much in that time. And this ossifying matter of the Bones is fo well directed to them by fome wise Law, that I have never feen but one inftance of a Bone in an adult Body unossified, which was fo much of one fide of the lower Jaw as is beyond the Teeth; but bony excreffences upon the Bones are frequent, and even the flefhy parts, efpecially in old Persons, are sometimes ossified. The moft confequently inftance of this kind that I have ever found, is of part of the Muscular Fibres
Of the Bones in general.

Fibres of the Heart of a Man, nearer its Vertex than the Base, as large as a Sixpence, perfectly ossified. And tho' it might seem that the Bones while they appear Cartilaginous differ from perfect Bones only in hardness, yet in a Child of two Years old that I kept in Vinegar, all the Bones grew near-as soft and pliable as the fleshy parts, tho' the Skin in several places was not taken off, yet the Cartilages and Cartilaginous Epiphyses of the Bones were but little alter'd.

Bones that are without motion, as those of the Scull, the Offa innominata, &c. and also Bones with their Epiphyses when they meet press into each other, and form Sutures, which soon disappear in those that meet, while their ossific matter is soft; but those that gain a greater degree of hardness before they meet, press more rudely into each other, and make more uneven Sutures, some of which in the Scull endure to the greatest Age, and very often the ossific matter not flowing far enough to complete a Bone, the part uncompleted has an ossification begun in its Center, and is form'd into a distinct Bone, which may happen to be of any Figure; these Bones are oftenest found in the Lambdoidal Suture, and are call'd Offa Triquetra. But the ends of those Bones that are intended for motion, are hinder'd joyning in either of these manners by the Cartilages which cover them; for when these Cartilages
Of the Bones in general.

The ends of all the Bones that are articulated for very manifest Motions, or that are not placed against other Bones, are tip'd with Epiphyses, or additional Bones, which in some measure determine their Growth and Figure; for if they had nothing to give Bounds to them, they would shoot out like the Callous from the broken ends of a Bone that is not set, and grow more ragged then the edges of Bones which are joyn'd by Sutures; and sometimes Epiphyses are made use of to raise Processes upon Bones for the insertions of Muscles, as the Trochanters of the Thigh-bones, where it would weaken the Bones too much to have such Processes rais'd out of their Substance.

The Fibres of Bones I have found by careful Experiments and Microscopical Observations, to be connected to each other by the same means that the several parts of a Fibre are connected, that is, by that strong attraction which belongs to Particles of matter in contact; but this cohesion of Fibre to Fibre is not equal to that in the parts of a Fibre, tho' very nearly; indeed, if it was, a Bone would not be a structure of Fibres but one uniform mass like that of pure mettle, the cohesion of the parts of which are every way alike: Nor are the parts of the Bones dispos'd into Lamella, stratum super stratum, as G---di, and others, have painted; for, (not to mention the great disadvantages of such...
Of the Bones in general.

such a structure) they not only appear one solid uniform mass to the naked Eye, but even with a Microscope, till we come to their inner spongy texture, which also appears uniform, and if we examine an exfoliated Carious Bone, we find the under part of it rough and very uneven, which it would not be if it was part of an entire Scale, and we find the ends of Bones after amputations, scale almost as easily as their natural surfaces, not quite so easily, because the longitudinal cohesion of the parts is stronger than the lateral.

The texture of the Bones, when first form'd, is everywhere loose and spongy, but as they increase they become in many places very compact and dense, which results in great measure from the very frequent if not continual pressure of the Bellies of the Muscles, and other incumbent parts, as appears from the Impressions which are made on the Surfaces of the Bones; and the rough Spines that rise on the Bones in the interstices of the Muscles, which are very remarkable in the Bones of Men who have been bred up in hard labour: In those parts of the flat Bones that receive but little pressure, the outer Lamina only, become compact and dense, and the middle part remains spongy; but where the pressure is great, they become one dense Body or Table; and this pressure is so effectual, that some parts of the Scapula, and the middle of the Ilium, are thinner in an adult Body than in a Child before it is born. The Cylindrical or round Bones being press'd most
in their middles, become there very hard and strong, while their extremities grow spongy, and dilate into large Heads, which make stronger Joyns, and give more room for the origins and insertions of the Muscles, and encrease the power of the Muscles, by removing their Axis farther from the Center of Motion of any Joint they move; it also happens from the density of their middles, that they are so much stronger there than towards their extremities, notwithstanding their diameters are less, as the middles of the Bones are more exposed to Injuries than their extremities, which equally secures all the parts of a Bone from external accidents.

All the Bones, except so much of the Teeth as are out of the Sockets, and those parts of other Bones which are either covered with Cartilage, or where Muscles or Ligaments arise or are inserted; are covered with a fine Membrane, which upon the Scull is called Pericranium, elsewhere Periosteum; the use of which is for the Muscles to slide easily upon and to hinder them from being lacerated by the roughness and hardness of the Bones. This Membrane is said to be exceeding sensible of pain, which, I suppose, is imagin’d from the pain that a blow on the Shin gives; but it shou’d be consider’d how much greater the contusion is in that case, from its lying upon a hard Body; for this is certain, that when we cut this Membrane, or separate it from
Of the Bones in general.

from the Bone, as we do, to prepare for the Operation of the Trephine; the Patient never discovers any extraordinary uneasiness, and that great pain that is felt at the Sawing the Bones or a Bone in an amputation, arises from the Teeth of the Saw, tearing the great Nerves that always lie near the Bones, and not from the Periosteum; for if it proceeded from that, the Pain would be at least as great at the first setting on of the Saw, or at the last Stroke, as at any other time; but the greatest pain is when the Bone or Bones are sawed almost half, or more then half, through, just when it comes at the Nerves; which makes the Vulgar think the Pain arises from the Sawing of the Marrow, and indeed their Observation appears to be more exact, though not more true than the other.

In a Body that I Dissected, who died of a Spotted Fever, I found in many of the Bones extravasated Blood, and in several places, particularly on the Os Humeri, and Os Femoris, a large quantity of Blood between the Periosteum and the Bones. I imagine it may be from such extravasations of Blood that carious Bones so often follow violent Feavers, and the Small-Pox.

In Children that have died of the Rickets, I have always found the Nodes on the Bones very spongy and bloody, and in one instance several of the Bones as limber as Leather, and the Periosteum in many places ten times its natural thick.
Of the Bones in general.

thickness, but the Cartilages in all that I have Dissected have had no apparent Alteration in their Texture, tho' they were swell'd to more than four times their natural bigness.

Every Cylindrical Bone has a large middle Cavity, which contains an oily Marrow, and a great number of lesser Cells towards their extremities, which contain a bloody Marrow; this bloody Marrow is also found in all spongy Cells of Bones; the use of the first kind of Marrow is to soften and render not brittle the harder Fibres of Bones among which it is seat-ed, and the other Marrow is to be of the same use to the less compact Fibres, for an oily Marrow would have made them too soft; and for this reason, there is less of the oily Marrow, and more of the Bloody in young Bones than in old ones; every one of these Cells is lined with a fine Membrane and the Marrow in the larger Cells is also contained in thin Membranous Vessicles, in which Membranes I suppose those Vessels lie that secrete the Marrow; and for the Cavities of the Bones they not only contain the Marrow, but, as Galileo has demonstrated, increase the strength of the Bones, just as much as their Diameters, which is about a third part, without encreasing their weight; which Structure being more advantageous to Birds, especially in their Wings, then to other Animals, these Cavities in them are remarkably large. But in a fractured Bone, in which the same kind of matter that
that ossified the Bones at first, is thrown out from the ends of the broken Bone, there is made one solid Mass of Callous Matter, of equal solidity with any part of the Bone, and of equal or greater Diameter; which will make the strength of the Bone in that place proportional to the square of the Diameter; which will be more than a third part stronger than it was before; and if we consider, we shall find this a very wise provision, for Bones when broke are seldom or never set in so good a direction as that in which they were first formed, and therefore they would be more liable to be broke in the same place again, and would be reunited with very great difficulty, and sometimes not at all, because the Callous not being vascular would scarce admit the ossific matter to flow through it to form a new Callous.

C H A P. II.

Of the Articulations of the Bones.

The Names of the Articulations of the Bones being variously used by Authors, and being but of small Consequence, I shall here give the shortest Account that I can of them. An Articulation for manifest Motion is called Diarthrosis, for obscure Motion Synchondrosis, and that kind which is without Motion Synarthrosis.
Of the Articulations of the Bones.

Diarthrosis, is divided into two kinds, viz. Enarthrosis and Ginglymus. Enarthrosis is where a round Head is received into a round Cavity, which Mechanicks call the Ball and Socket, though none of the Articulations in a humane Body fully resemble that, unless the upper end of the Thigh Bone, with the Os in-nominatum. Ginglymus is always described by Authors to be where a Bone receives and is receiv’d, which is right where they are join’d somewhat like hinges, as the oblique Processses of the Vertebra of the Loins, where Authors always take two Joynts to make a Ginglymus, that it may answer their Description, tho’ any one of those Joynts is a true Ginglymus. But in the other Vertebra, and in the Articulation of the Ulna, with the Os Humeri, and that of the Radius with the Ulna, there being only the motion of hinges without the form to give these Joynts this denomination; we may for the same reason call every Joynt a Ginglymus, whose Property is only to bend and extend, as the Knee, Ankle, &c. and what makes it more necessary to bring these Joynts under this Head, is, that they are reducable to no other.

Synchondrosis, is us’d for all obscure Motions, as the Motions of the Bones of the Carpus and Tarsus among themselves, tho’ the term signifies only that kind of obscure Motion that is where Bones are joyn’d by intervening Cartilages or Ligaments, as between the Bodies of the Verterbra.
Vertebra, but the truest Synchondrosis is the joining of the Ribs to the Bone of the Sternum.

Synarthrosis, is of two sorts, viz. Sutura and Gomphosis, the first kind is the mutual Indentation of one Bone with another, as is eminently seen in the Scull, and the other the fastening of the Teeth in their Sockets like a Nail in Wood.

C H A P. III.

Of the Sutures and Bones of the Head.

Those Sutures which have proper Names, are here described; those which have not, derive their Names from the Bones they surround, and are known by them.

Sutura Coronalis, runs a-cross the Scull, Tab. iii. r, and joins the Parietal Bones to the Frontal.

Sutura Sagittalis, joins the Parietal Tab. iii. 2, Bones; it begins at the Os Occipitis, and is continued to the Os Frontis; in Children down to the Nose, the Os Frontis in them being two Bones, and sometimes so in adult Bodies.

Sutura Lambdoidalis, joins the back Tab. iii. 3, part of the Ossa Bregmatis or Parietal Bones to the upper part of the Occipital Bone: In this Suture are frequently observed small Bones, call'd Ossa Triquetra.

Sutura
Tab. iii. 4. **Sutura Squamosa**, is the wrapping of the upper part of the Temporal and Sphenoidal Bones over the lower Edges of the Parietal Bones.

Tab. iii. 5. **Sutura Transversalis**, runs across the Face thro' the bottoms of the Orbits of the Eyes, it joins the lower Edge of the Frontal Bone to the Os Sphenoides, Maxilla Superioris, Os Unguia, Palati, Plana, and Zygomata, or Malarum.

The Scull being thus divided into many Bones, is neither so subject to Fractures, nor to have Fractures so far extended, as it would have been were it compos'd of one Bone only. This Structure is also convenient for the Ossification of the Bones (as has been shewn in the first Chapter) and for the Birth, because these Bones not being perfect at that time, wrap over one another and make the Head less.

Ten of the Bones of the Head compose the Scull to contain the Brain. These shall be first described.

**Ossa Parietalia** or **Bregmatis**, are two large Bones, which compose the superiour and lateral Parts of the Scull: On the inside they are remarkably imprinted by the Arteries of the Dura Mater.

**Os Frontis**, makes the upper and forepart of the Cranium; its lower part composes the upper parts of the Orbits of the Eyes; on its inside are impress'd the external figure of the two Hemispheres of the Brain; in thin Sculls this Bone always has a large thin Spine in the middle of
Of the Bones of the Head.

Of the inside, running from the Os Ethmoides towards the Crown of the Head, but in thick Sculls it is always wanting, and in very thick ones it has a Sinus in its place; the use of this Spine is to strengthen thin Sculls. Immediately above the Os Ethmoides, in this Bone is a small blind Hole thro' which runs a Vein into the beginning of the Longitudinal Sinus of the Dura Mater, under the Eye-brows, near the Nose, in this Bone are two large Sinuses which lead into the Nose, and on the upper edge of each Orbit, a small Perforation, or a Notch through which Nerves and an Artery pass secure to the Forehead. The Sinuses and Spine in this Bone make it very dangerous, if not impracticable, to apply a Trephine on the middle and lower part of the Forehead.

Os Ethmoides or Cribriforme, is a small Bone about two Inches in circumference, seated in the anterior part of the Basis of the Scull, being almost surrounded by the last describ'd Bone; it is full of Holes like a Sieve. In its middle arises a large Process nam'd Crista Galli. The greater part of the Lamina spongiosa in the Nose belong to this Bone.

Os Sphenoides, is of a very irregular Figure; it is seated in the middle of the Basis of the Scull, bounded on its fore-part by the Frontal and Ethmoidal Bones, sideways by the Parietal and Temporal Bones, and backward by the Ossa Petrosa and Occipital Bone. In its inside next the Brain
Brain is a Cavity, nam'd \textit{Sella Turcica}, which is bounded by four Processes call'd \textit{Clinoides}. On the outside of the Scull adjoining to the Upper Jaw, are Two Processes of this Bone on each side, nam'd \textit{Pterygoides}, from which arise One on each side near the Palate, having no Name; over which are reflected the Tendons of the \textit{Pterygoptaphalini externi} Muscles, and nearer towards the \textit{Occiput}, between these and the \textit{Styloid Processes} of the \textit{Ossa Petrosa}, arise Two more small rugged Processes, and under the \textit{Sella Turcica} in this Bone, is a \textit{Sinus} which opens into the Nose. At the inside of the Basis of the Two anterior Clinoid Processes are Two round Holes, which are the First \textit{Foramina} of the Scull; through these the Optick Nerves pass; almost under these towards the Sides of the Scull, are two irregular Slits, nam'd \textit{Foramina lacera}, or the Second \textit{Foramina} of the Scull, through which pass Nerves and Blood-Vessels into the Orbits of the Eyes; and under these towards the \textit{Occiput} are Two round Holes, which are the Third \textit{Foramina}, thro' which pass Nerves to the Face; about half an Inch nearer the \textit{Occiput}, are Two more of an oval figure, which are the Fourth \textit{Foramina}, thro' which pass the largest Branches of the Fifth pair of Nerves; and a Straw's breadth farther Two very small ones, call'd the Fifth \textit{Foramina}, thro' which those Branches of the Carotid Arteries enter that are bestow'd upon the \textit{Dura mater}. These small Arteries have been
Of the Bones in the Head.

been mistaken for Nerves. Between this last descript'd Bone and the Osse Petrosa, are two large rough holes, not commonly descript'd, in Tab. iv. 13, which I have seen large Veins; and from these Holes thro' part of the Os Sphenoides, under the Pterygoid Processses are small holes observ'd by Dr. Douglas, thro' which pass Nerves and Arteries to the back part of the Nose.

Ossa Temporum, are situated below the Parietal Bones, at the middle and lower parts of the sides of the Scull; they have each at their back-parts, one large Process, call'd Mamil- laris, or Mastoideus, and from the lower and middle parts of each a Process which joins the Ossa Malarum; nam'd Jugal is or Zygomaticus. Tab. iii. 13.

Ossa Petrosa, lie between the former Bones and the Occipital Bones, or are truly Portions of the former Bones, being never found separate in adult Bodies. They have each in their outside One long slender Process, call'd Styliformis, and from the side of this Process a Foramen, which runs obliquely forwards into the Scull; these are the Sixth Foramina; and Tab. iv. One Foramen in the inside of the Scull leading to the Organs of Hearing, which are the Sev- enth Foramina. The ridge on the upper parts of each of these Bones in the inside of the Scull, as also one on each side rais'd by the Os Frontis and Sphenoides, help to keep the Brain steady, (See Chapter of the Dura Mater) and are admir-
rable supports to the thin and flat parts of the Scull, which else wou'd be exceeding weak.

(For what remains of this Bone, see Chap. Of the Organs of Hearing.)

Between the last describ'd Bones, and the following Bone, are Two large Holes, which are the Eighth Foramina. Thro' these Holes pass the Par vagum and Lateral Sinuses; sometimes there are two on each side, one for the Nerve and one for the Sinus. To these we may add another very small One on each side, thro' which pass the Portiones dura of the Auditory Nerves; and sometimes there is another for an Artery.

Os Occipitis, makes all the back-part of the Scull, it is bounded by the Sphenoidal, Temporal, Petrofal, and Parietal Bones; it has two small Apophyses, by which it is articulated to the Spine; near those Apophyses are two small Foramina, which are the Ninth of the Scull, thro' these pass the Ninth pair of Nerves; and between these is the great, or Tenth Foramen, thro' which the Medulla oblongata descends into the Spine, the Cervical Arteries enter, and the Cervical Veins and tenth pair of Nerves pass out. In the inside of this Bone is a crucial Spine impress'd by the Longitudinal and Lateral Sinuses; and on the outside opposite to the middle of this Spine, in some Bodies, is an Apophysis, and from that down to the great Foramen, a small thin Spine. The Spines in this Bone are of the same use with those in the Os Frontis.
Of the Bones of the Head.

Frontis, &c. viz. to strengthen it, which they do here in a greater degree than in any other Bone of the Scull. The thinner parts of this Bone are also defended by the Muscles that cover them. This extraordinary Provision is very necessary; because we can least defend this part, and blows here are of worse Consequence than on any other part of the Scull, because Wounds in the Cerebellum, which is underneath, are Mortal.

I have observ’d in most Sculls, a Foramen behind each Apophysis of the Occipital Bone to the Eighth Foramen; through which pass Sinuses, from the lateral Sinus’s, to the external cervical Veins: By means of these Communications, as in all other Communications of the Sinus’s, the Blood passes from those that happen to be surcharg’d by any Posture of the Head, into those that from the same Posture would else have been almost empty. Such Sculls as want these Foramina, have two Sinuses for the same purpose within the Scull.

The remaining Bones of the Head compose the Face, Orbits of the Eyes, and the Jaws.

Ossa Nasi, are small oblong Bones which make the upper part of the Nose; they make that kind of arch which is fittest to sustain such Injuries as the Nose is most exposed to.

Ossa Malarum, these Bones compose the Cheeks, and the anterior, lower and outer parts of the Orbits of the Eyes; they have each a short
short Process, which Processes join the Processus Fugales of the Temporal Bones, and form Arches, which, by some Authors, have been call'd Ossa Fugalia.

Tab. iii. 17. Ossa Ungues, are small Bones about as large as Thumb Nails, seated immediately below the Os Frontis towards the Nofe in the Orbits of the Eyes, whose anterior and inner parts they help to Compose. To these belong some of the Lamella in the Nofe; and between each of them and the upper Jaw is a Foramen as large as a Goose Quill, into which the Puncta Lacrymalia lead to carry off any superfluous moisture from the Eyes into the Nofe.

Tab. iii. 18. Ossa PlanA, are thin smooth Bones seated immediately beyond the foregoing Bones, in the Orbits of the Eyes, and are near thrice as big. To these also belong some of the Lamella in the inside of the Nofe.

Tab. iii. 20. Maxilla Superior is always describ'd single, though it is manifestly divided by a Suture which I have never seen wholly obliterated. It runs up with two Processes to the Os Frontis between the Ossa Nasi and Ungues. Its upper and outer parts make the lower parts of the Orbits of the Eyes, its lower side, all that part of the Face under the Cheeks, Eyes and Nofe to the Mouth, and two Thirds of the Roof of the Mouth. A little below the Orbits of the Eyes, in this Bone, are two Holes, and behind the Dentes Inscifores one more, which divides
vides into two, as it opens into the Nose, one on each side the Septum Nasi. Between the Posterior Grinding-Teeth and the Orbits of the Eyes are two great Sinus's, called Antra Maxilla superioris. They communicate with the Nose; and in the lower Edge of this Jaw are the Alveoli, or Sockets for the Teeth. The Sides of these Cavities, as also those in the Sphenoidal and Frontal Bones that lie next the Nose, are only Membranes which make the Cavities like Drums, to give a grave Sound to the Voice when we let Part of it through the Nose; but Brutes not needing such Variety of Sounds, have all these Spaces fill’d with Lamellæ, which are covered with Membranes in which the Olfactory Nerves terminate, for a more exquisite Sense of Smelling, which is not necessary for Men.

I have seen an Imposthumation from rotten Teeth in one of these Cavities, which has been cur’d by drawing some of the last Grinding Teeth, and by making a Perforation into it through their Sockets. Mr. Cowper has admirably described this Case. The Signs of it are rotten Teeth, flinking Breath, and great Pain about the Part: The drawing one or two of the last Grinding-Teeth, generally, if not always, in this Case, opens a Passage into the Antrum; but if not, or if the Passage is not large enough, it may be made, or enlarg’d with a Car-

C 2 penter's
Ossia Palati, are two small Bones that make the back Part of the Roof of the Mouth, and a small Part of the Bottom of each Orbit, unless these Portions may be accounted distinct Bones. Between the Ossa Palati and the Pterygoid Processes of the Sphenoidal-Bone are two small Foramina, through which Arteries and Nerves pass to the Palate.

Os Vomer, is seated between the Bones of the Palate, and the Sphenoidal Bone. Its Fore-Part is spongy, and is continued to the middle Cartilage of the Nose. This Bone and Cartilage are the Septum Nasi.

Os Spongiosum, is always treated as a distinct Bone, tho' it is only the spongy Lamina in the Nose, of the Ethmoides, Ungues, Plana and Maxilla Superior, but chiefly the Ethmoides. In considering this as a distinct Bone, we follow the Method of the Ancients who did not distinguish the Bones of the Skull only as they are divided by Sutures, but according to the Differences of their Texture, Figure, Scitation, or Use. Thus they called these Parts, Os Spongiosum, a Process of the temporal Bone, joined to the Os mala, Os Jugale; the temporal Bone which is one with the Petrosum in Adults, Os temporis, because it is seated under the Temples. And the other Part Os petrosum, from its Hardness or Ruggedness, and
and the upper Jaw one Bone, though it is always two.

**Maxilla Inferior**, is articulated with loose intervening Cartilages to the temporal Bones, by two Processes, named *Condyloides*. Near these arise two more, very acute, called *Coronales*, and at the Inside of the Chin a small *Processus Innominatus*. In the Inside of this Bone under each *Processus Coronalis*, is a large *Foramen* which runs under the Teeth through this Bone, and passes out at the Chin. In this *Foramen* or Channel, the Vessels pass that belong to the Teeth, and in the upper Edge of this Jaw are the *Alveoli*, or Sockets for the Teeth.

**Dentes**, the Teeth seldom exceed Sixteen in each Jaw, the Four First in each are called *Incisores*, the Two next *Canini*, and all the rest *Molares*. The Four last of these are named *Dentes Sapientia*, because they do not appear till Men arrive at Years of Discretion. The *Incisores* and *Canini* have only one single Root, but the *Molares* more, the Eight first, Two, and the rest, some Three, some Four, especially in the upper Jaw, because the upper Jaw being more spongy than the other, the Teeth need more Fangs to fix them. Each of these Fangs, or Roots, has a *Foramen*, through which pass an Artery, Vein, and Nerve, which are expanded in a fine Membrane lining a Cavity.
in each Root of a Tooth. This Membrane is the Seat of the Tooth-Ach.

The Teeth of Men cast off, and don’t change entirely while they are growing; the succeeding ones always rising larger than the former, for the Jaws encreasing faster than the Teeth, must otherwise of Necessity have left Chasms between em, such as there are in the Mouths of Brutes; but whenever an entire Tooth is drawn, the Socket closes, and none succeeds.

I extirpated a Tumor from a Woman’s Cheek about as large as a Hen’s Egg, which was judg’d Schirrous; but when I cut near the middle of its Basis, there came out a large Quantity of Lympid Matter, and upon searching with a Probe, I found the Os Mala, part of both Jaws, and the Os Sphenoides at the Basis of the Skull, Carious, which being impracticable to exfoliate, I endeavour’d to heal the Wound, which I did to a very small Compass, but could not quite, because of the Gleet which came from the Bones, till I made a Passage from the Inside of the Mouth to it, and turned the Matter that Way; and after, about Three Months, this Passage also closed, and then the Cavity began to fill again, and in two Years Time grew as large as before. Then I made an opening into the Mouth, and discharg’d the Matter with but little Trouble; since that Time it has fill’d in Two or Three Months Time; sometimes it breaks of it self in-
to her Mouth, and sometimes I launch it. When I consider this, and the many Bones I have found Carious in dead Bodies, without any Mark of Disorder in the fleshy Parts, some of which I have known the Persons, when living, have never complain'd of, I cannot but think (tho' it is the best Practice if it can be done safely to exfoliate a Caries) that there is not so great Necessity of doing it, as is commonly believ'd.

C H A P. IV.
Of the Bones of the Trunk.

The Bones of the Trunk are those which compose the Spine or Chain of Bones from the Head down to the Rump, the Ribs and Sternum.

The Spine, is composed of Twenty Four Vertebra, (each of which in a young Child is Three Bones) besides those of the Os Sacrum and Coccygis; seven belong to the Neck, the first of which is called Atlas, the Second Dentata, from a Process in that Bone bearing the same Name: Twelve to the Back, Five to the Loins. The Os Sacrum is sometimes Five, sometimes Six Bones, and the Os Coccygis Four. If this Chain had been compos'd of fewer Bones, they must have either not been capable of bending so much as they do, or have bent at less obtuse Angles, which would have press'd the Spinal Marrow.
In all these *Vertebrae*, except the first, is a middle Anterior Spongy Body, by which they are firmly articulated with a very strong intervening Ligament, and from the Middle of the hind Part of each except the first, stands a Process nam'd *Spinalis*, and from every one a Process on each Side, called *Transversalis*, and two superior, and two inferior short ones, by which the back Parts of the *Vertebrae* are articulated, nam'd *Obliqui, Superiores*, and *Inferiores*.

The Fore Part of the Seven *Vertebrae* of the Neck, and two upper of the Back, are flat forwards, to make Room for the *Aspera Arteria* and *Gula*: the Third and Fourth of the Back very acute, to give way to the Division of the Vessels of the *Lungs* and *Heart*, which makes that Side of the Breast somewhat more convex than the other, and therefore stronger, which is an Advantage to the right Arm, because its Motions depend upon the Support it receives from the Breast; besides, the right Arm, by Reason of this Curve, will be nearer the Axis of that Part of the Spine which lies below the Arm, and therefore better supported by the Spine. Hence, I think, it appears that the almost universal Preference of that Arm is not an arbitrary thing, but founded upon right Observation, that it is capable of more perfect Actions than the other.

The Spinal Processses of the Second, Third, Fourth and Fifth *Vertebrae* of the Neck are
forked, the two last of the Neck long and horizontal, the Three or Four upper ones of the Back like them, only a little declining, the middle ones of the Back run obliquely downwards, and the Processes of the remaining *Vertebra* become successively thicker, stronger, and less declining; those of the Loins being Horizontal, like the last of the Neck. The Muscles that are inserted into the spinal Processes of the *Vertebra* of the Neck and Loins, will act at more Advantage than those of the Back, because their Processes being perpendicular to the Spine, they are longer Leavers; besides, those of the Back touch one another, and prevent much Motion, because it would interrupt Respiration; and much Motion being necessary in the Neck and Loins, their Processes are made fit for it.

The transverse Processes of the *Vertebra* of the Neck are perforated, for the Admission of the Cervical Blood-Vessels, and bowed downwards, and hollowed, for the Passage of the Cervical Nerves. The Eight or Nine upper ones of the Back, receive the upper Ribs; and the rest, with those of the Loins, serve only for Origins and Insertions of Muscles. The Shape of the Spine is like an *Italian* bending inwards at the Loins, and outwards at the Shoulders; therefore when Women that are either very young or very weakly, breed, the Child by a continued Pressure against the Loins, makes them
them freighter, which necessarily makes the Shoulders or Back so much more convex, and the Pressure upon the Abdominal Muscles at the same Time bringing the Ribs downwards, they grow round-shouldered and flat-breasted.

Tab. ii. 13. Os Sacrum has two upper oblique Processes, some small spinal Processes, and two Foramina in each Interstice of the Bones it is composed of, both before and behind.

Tab. ii. 14. Os Coccygis has none of these Parts.

Through every Bone of the Spine, the Os Coccygis excepted, is a large Foramen, which, together make a Channel through the Spine, in which is contained the Medulla Spinalis; and in each Space between the Vertebrae are two large Holes for the Nerves to pass out.

'Tis worth considering, the wonderful Provision Nature has made to prevent Luxations in this Chain of Bones. In the Neck the oblique Processes of the receiving Bone are wrap'd over those of the receiving Bone, which forbids their Luxating forwards. The transverse Processes with a small Apophysis of the Body of the same Bone, in like Manner secures them from flipping backwards, and an Apophysis on each Side of the Body of the receiving Bone, hinders them from slipping to either Side. The Vertebrae of the Back are hinder'd from dislocating forwards by the same Provision with those of the Neck; and from Luxating backwards, by the Ribs which are fasten'd to the transverse Processes
cesses of the inferior Vertebral, and against the Back-part of the Body of the next superior; they also hinder 'em from dislocating to either Side; but the Ribs at the two or three last Vertebral of the Back are not fix'd to the transverse Processess, and therefore it is that Luxations are most frequently seen in this Part; but the Vertebral of the Loins are receiv'd into deep Cavities, and are ty'd with much stronger Ligaments for their Security. Each Joint of the Vertebral, except the two uppermoft, has two Centers of Motion, one upon the Bodies of the Vertebral, when the Body is bow'd forwards; and the other at the Articulations of the oblique Processess, when the Body is bow'd backwards; from which Structure the Extensors will have about twice the Lever to act with, and consequently twice the Power to raise the Trunk into an erect Posture, that they have to carry it beyond that Posture; for then the oblique Processess begin to be the Center of Motion, and give the same Advantage to most of the Benders. Without this Contrivance it would have been vastly difficult, if possible, to have kept the Body erect for any Length of Time, or to have recovered an erect Posture with considerable Strength or Quickness after a Bend of the Body.

The Ribs are Twelve in Number on each Tab. Side; the Seven uppermoft are called True Ribs, because their Cartilages reach the Sternum; and the
the Five lowest are called Baftard-Ribs. They are articulated to the Twelve Vertebrae of the Back. They defend the Parts contained in the Breast, and when they are drawn upwards, the Cavity of the Breast is enlarged for Inspiration, and so the contrary. In two Children which I have dissected, I found the Ribs broke inwards, and on the outside a plain Print of a Thumb and Four Fingers, which had been made by their Nurses hoisting them up on one Hand, taking hold of their Breasts, which being very often repeated, had broke the Ribs inwards like a green Stick, without separating the broken Ends of them; and I have very frequently seen the Shape of Childrens Breasts quite spoiled by such Tricks, which has occasion'd Weakness of Body, Crookedness, and other Diseases.

Tab. i. 2. STERNUM, or Breast-Bone, is generally made up of Three Bones, to this the True Ribs are articulated by their Cartilages.

Tab. iv. C. OS HYOIDES (I choose to mention it in this Place, because I know none more proper among the Bones) is a small Bone at the Root of the Tongue; it serves only for Muscles to arise from, and be inserted into. It is made of Three Bones, the middle one is called Basfis, the other Cornua.

I have seldom found fewer than Four and Twenty Vertebrae in the Spine, besides the Os Sacrum, but often more; sometimes Thirteen of the Back, with as many Ribs of a Side; and
and sometimes Six in the Loyns: And in some Bodies Two ribs from the first Vertebra of the Loyns; but then it has wanted transverse Processes.

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**CHAP. V.**

**Of the Bones of the Upper Limbs.**

**CLAVICULA,** is of the Figure of the Italick $f$, one End is articulated to the Sternum, and the other to the Processus Acromion of the Scapula; it serves to fix the Scapula, and to determine its Motions. This Bone is ossified as early as any Bone in the Body, and is the soonest united, when broken.

**SCAPULA,** its Parts are the Acetabulum, which is a shallow Cavity to receive the Os Humeri: A large Spine from whose Fore-Part stands a Process call’d Acromion, and another Process from the Fore-part of the upper Edge of the Scapula nam’d Coracoides; its upper Edge is nam’d Costa superior, and its lower one Costa inferior, and the posterior Edge its Basis. I have seen a Scapula of a Man which Dr. Douglas dissected, in which the Inside of the Acetabulum Scapula was broke all to Pieces, and the Os Humeri displac’d, which Fracture, I believe, cou’d not by any Means be certainly known while the Man was living, or if it cou’d have been known, cou’d not have been cured; yet I doubt
doubt not but the Surgeon, whoever he was, did not escape Censure for not making a Cure.

Whenever the *Processus Acromion* is broke, the Arm can never after be raised to Advantage; for no Care of the most skilful Surgeon can reduce such a Fracture; for the Deltoid Muscle will draw the Ends of the broken Process a-funder, and will want a middle fix'd Place to act from.

Os Humeri, this Bone has at its upper End a round Head for its Articulation, and near that an *Apophysis*, which is divided by a Sulcus, in which runs a Tendon of the *Biceps flexor Cubiti*. At its lower End are two *Apophyses*, named the outer and inner. Between these *Apophyses* on the Fore-Part of the Bone, is a small Sinus, which receives a Protuberance of the *Ulna*, and behind a large and deep one, which receives the *Olecranon* of the *Ulna*. This Bone being more liable to be broke by a Blow than any other Way, and it being uncertain where that shall fall, it is made of almost equal Strength through the whole Length of it; and its lower End having a very small Joint, for the sake of a quick Motion, the Sinus's are form'd there, to receive the Processes of the *Ulna*, to prevent Dislocations.

*Ulna*, at its Articulation to the former Bone has two Processes, one large and thick, named *Olecranon*, and one small one, named
Processus anterior, and at the lower End of this Bone is a small Process, named Styloides.

When about two Inches or less of this Bone is broke off at the lower End, it is scarce possible to raise it into its Natural Situation till the Arm be turned prone; because in a Supine Posture the Tendon of the Tensor Ulnaris rides over it and presses it down.

Radius, is received at the upper End by the Os Humeri and Ulna; at its lower End it receives the Ulna and Carpus. By its turning upon the Ulna, are performed the Prone and Supine Motions of the Cubit. About an Inch below its upper End is an Extuberaance for the Insertion of the Biceps Muscle.

Carpus, the Wrist, is compos'd of Eight Bones of irregular Figure; they are distinguish'd into Four of the first Order, and Four of the second. The two first of the first Order are articulated with the Radius, the first of the Second Order is articulated to the Thumb, and the remaining three to the Metacarpal Bones. The inside of these Bones leave a semilunar Cavity for the Tendons of the Muscles which bend the Thumb and Fingers to pass through.

What other Reasons there may be for this particular Composition of Bones, I know not; but this is plain, that by being moveable, one among another, they gradually give way, and lessen the Shock which any Force against the
Of the Bones of the Lower Limbs.

the Hand would give, as the Box of Springs does the jolting of a Coach, and thereby make the Force less in each Moment of Time upon every Bone of the Arm, which greatly preserves them from breaking; and the Shoulder’s being fixed by Muscles, contributes very much to this Purpose. This is an Advantage that cannot be exactly computed; but it is certainly very great.

**Metacarpus**, is composed of Four Bones. **Pollex**, the Thumb is made of Three Bones.

**Digití**, The Fingers are each composed of Three Bones. For the Figure of these, see the Table, which will give a better Idea of them than a verbal Description.

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**CHAPTER VI.**

Of the Bones of the Lower Limbs.

**Os Innominatum**, is, before Puberty, composed of Three Bones; the uppermost is named **Ilium**, the lower and anterior **Os Pubis**, the lower and posterior **Os Ischii**. The upper Edge of the **Ilium** is called its Spine, the anterior Part of the Spine its **Apex**, and lower than this is the **Processus Innominatus**. The **Ischium** has Two Processés, the one called **Acutus**,
cutus, the other Obtusus. In the Center of these Bones is the Acetabulum, or Socket, to receive the Thigh-Bone; in the Bottom of which Socket is another Cavity, in which lies the lubricating Gland of this Joint; and between the Os Ischiium and Os Pubis, is a large Foramen.

Os Femoris, at its upper End has a round Head, which is receiv'd into the Acetabulum of the Os Inominatum. A small distance from this are two Processes, nam'd Trochanter major, and Trochanter minor. The Space between the greater Process and the Head of this Bone, is call'd its Neck, and from the lesser Trochanter down the back-part of this Bone till within Four or Five Inches of the lower End, is a Ridge, call'd Linea Aspera. At the lower End of this Bone are two Apophyses, one exterior, and one interior. The chief Use of the Linea Aspera is, to strengthen the Thigh-Bone; it is therefore so ordered, that it is always large, proportionally to the Bend of the Thigh-Bone, and largest in that Part of every Thigh-Bone that is most bent.

In two Bodies which I have Dissected, I have found this Bone broke at its Neck, and by that means the Limb shorten'd, and the Case mistaken for a Luxation of the Hip; and if we consider the depth of this Articulation, and the wonderful strength both of the Muscles and Ligaments, we cannot but suspect that this Bone is much oftner so broke, than out. This
is certain, that if by an external Accident the Thigh is made shorter, and yet is useful, that must needs be from a Fracture, and not a Dislocation; for it cannot be, that the Head of the Thigh-Bone shou’d form it self a Socket among the Muscles, to bear the whole Weight of the Body: Or supposing this cou’d happen, tho’ it is contrary to what we know, in other like Cases, yet even then we must have new Muscles made, or these we have altered; for their Directions with the Thigh-Bone being changed, their Uses wou’d too, and almost all pull to the Side contrary to which the Bone is Dislocated.

It often happens, that from a Flux of Humours upon the Hip, this Joint appears Dislocated; for when it is attended with Pain, the Muscles contracting alter the Posture of the Limb, and make it appear shorter, as the Limb which is lifted from the Ground is when we stand on one Leg: But if the Fluxion is without Pain, the Muscles relax, and the Limb falls into the same Figure, which that Limb is in, which we stand on in that Posture, and appears longer; which makes the common way of comparing of the Limbs a very uncertain, if not impossible way to discover the Case; therefore to know certainly, apply a straight Rule from the Apex of the Spine of one Hip to that of the other, then from the Middle of that Rule draw a perpendicular Line between the Legs;
then measure the Limbs at that Line in the same Plane, and if their Lengths are equal, they are most certainly right.

**Patella**, the Knee-Pan is seated upon the Joint of the Knee; its Use is for the Extensors of the Tibia to be inserted into, least passing over that Joint, they might be too much exposed to external Injuries; it also gives an Advantage to the Muscles, by removing their Axis farther from the Center of Motion of the Knee.

**Tibia**, the Shin-Bone is in its middle almost triangular, which it seems to owe to the Pressure of the Muscles, for it is Cylindrical in a Foetus. In its upper End are two shallow Sockets, between which is a Process for the cross Ligament of the Knee to arise from; a little below its Head is another Process, to which the Ligament of the Patella is fixed, and at its lower End another, which makes the inner Ankle.

A Boy of seven Years old was brought to me with both the Epiphyses at the upper Ends of the Tibia, so far separated from the Tibia, that not more than half each Tibia was joined to half the Epiphyses, which made the Legs wholly useless. This had been occasioned by the Nurse holding him out to Stool by the Heels and Back, when very young, which is among them too common a Practice. I Distracted the Leg of a Man that had broke the Tibia through the Flesh, by a Fall from the Top of a House; no Extension that was made...
mov’d this compound Fracture at all, which I afterwards found to be occasion’d by a simple transverse Fracture above, which always gave way to the Extension; that Bit of Bone whose End came thro’ the Skin, being discontinued from the Parts by which the Extension was made. In the Foot of the same Leg, Four of the Bones of the Tarsus were crack’d, two more of them, viz. the Os Calcis and Naviculare, had large Pieces separated, which were broke into a Mafh; and all this without any Dislocation among these Bones, or any the least external Wound or Bruife.

Tab. i. 16. **Fibula**, is a long small Bone, its upper End is articulated to the outside of the Tibia, an Inch below its Joynt, and the lower End makes the outer Ankle, and part of that Joynt; Its chief Ufe is for Origins of Muscles; for it has no share in supporting the Body. A Strain of the worst kind happens often to this Joynt from the mighty Force of the Peronei Muscles, when we. endeavour to prevent a Fall; for they being turn’d over the End of the Fibula, as on a Pulley, part of their Force lies against this Bone, and streins the Ligaments that hold it, and sometimes the Bone it self is broke by them; which wants no Care to fet, and can seldom be discover’d till the Swelling is fallen.

Tab. iv. I. **Tarsus**, is made up of Seven Bones, which are call’d Aastragalus, Os Calcis, Naviculare, Cuboidea,
Of the Bones of the Lower Limb.

Boides, Cuneiforme majus, Medium, and Minimum. The Bones of the Tarsus have the same kind of elastic Structure with those of the Carpus, and for the same Ends, but in a much greater Degree; because here the whole Body is sustain'd. This Sort of Contrivance, and the Use of it, are both very evident in the last Joints or Patterns of the Legs of Horses; for Horses that have long Patterns, and much elastic Motion in them, must necessarily trot high, and yet they always trot easy; but a Horse with short Patterns, that trots high, always trots hard.

Metatarsus, is compos'd of Four Bones. Tab. iv. L &. Pollex Pedis, is compos'd of Three Bones.

Digit Pedis, each is compos'd of Three, but the two last of the little Toe often grow into one.

For the Figure and Situation of these Bones, see the Table.

Ossa Sesamoidea, are said to be found to the Number of Forty-eight: But we commonly find no more in the Feet than two under the Ball of each great Toe; and in the Hands sometimes two very small ones at the middle Jjoint of each Thumb; and sometimes one at the lower End of each Thigh-Bone at the Beginning of the Plantaris Muscle. Their Use is the same with the Patella.
Of the Cartilages.

I find also in some Bodies the little Cartilages at the receiving Ends of the Bones of the Fingers ossified, which those Authors have reckon'd among the Sesamoid Bones; who, say they, are found to the Number of Forty-eight.

CHAP. VII.
Of the Cartilages.

Every Part of a Bone which is articulated to another Bone for a sliding Motion, is cover'd or lin'd with a Cartilage, as far as it moves upon, or is mov'd upon by another Bone in any Action; for Cartilage being smoother and softer than Bone, it renders the Motions more easy than they would have been, and prevents the Bones wearing each other in their Actions. These Cartilages in the largest Joynts, are as thick as a Shilling, and in the smallest, as thin as Paper.

In the forepart of each Articulation of the lower Jaw, there is a loose Cartilage upon which the Condyloid Process moves on one Side, while the Jaw is mov'd to the other; and the two Processes being thus rais'd at once, the Jaw is thrust forward.

In the Joyn of the Knee are two loose, almost anular Cartilages, which being thick at their outer Edges, and thin at their inner ones, they
they make the greatest parts of the two Sockets in this Joint. The use of these Cartilages is to make variable Sockets to suit the different parts of the lower end of the Os Femoris, for none but a round Head and a round Cavity can suit in Motion, unless the shape of one or the other alters; and it is plainly necessary, that this lower end of the Os Femoris should be flatfish, and projected backward, to give advantage to the Muscles that extend the Tibia, by setting the center of Motion backward; which Mechanism, tho' it equally lessens the Power of those Muscles which bend this Joint, is yet of great Service, because the extending Muscles move this Joint under the Weight of the whole Body, but the Flexors only raise the Leg; and as no Head and Socket move so easily as round ones, here is provision made against the inconvenience of a flatfish Head and Cavity, by having the Friction made upon two Surfaces, the Os Femoris upon the loose Cartilages, and the loose Cartilages upon the Tibia. This Contrivance is always found necessary by Mechanicks, where the Friction of the Joynets of any of their Machines is great, as between the parts of Hook-hinges of heavy Gates, and between the Male and Female Screws of large Vices, where they always place a loose Ring.

There are other Cartilages which serve to give shape to Parts. Of this Sort are the Ciliary Cartilages at the Edges of the Eye-lids,
the Cartilages of the outer Ears, and those which compose the lower part of the Nose; which have this particular Advantage in these Places, that they support and shape the Parts as well as Bones could do, without being liable to be broke.

The Ribs have Cartilages of a considerable length, which articulate the Seven uppermost, and sometimes Eight on each side to the Sternum; which Cartilages being very pliable, suffer the Ribs to move easily in Respiration, and the Body to twist or bend to either side without difficulty. But the Cartilages of the lower Ribs do not reach the Sternum. And at the bottom of the Os Pectoris or Sternum, is a Cartilage which is nam'd from its commonest Figure, Ensilformis.

There are other Cartilages which compose the Larynx and Aspera Arteria. The Larynx is form'd of Five: The foremost is like a Saddle, but is nam'd Thyroides, behind this are Two call'd Arytanoïdes; they compose the Rimula of the Larynx. Over these is the Epiglottis to cover the Rimula while the Aliment passes to the Pharynx; and under them One like a Seal Ring, nam'd Cricoides. The Cartilages which compose the Aspera Arteria, or remaining part of the Wind-pipe, are not quite Annular, but connected by Membranes at their back-part, to give way to the Aliment descending thro' the Pharynx.
There are other Parts that Authors call Cartilages, which I rather chuse to rank with the Ligaments: And therefore will describe them in that Chapter, as those between the Bodies of the Vertebra, &c.

I have several times found supernumerary Cartilages from the Sternum, running between the Ribs; and frequently the Cartilago Ensiiformis double. I do not remember that I have ever seen a Cartilage scale like a Bone or Slough like softer Parts, tho' I have often seen them eat thro' by Matter that has been collected in a Joint, which has sometimes occasion'd the Bones to grow together.

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CHAP. VIII.

Of the Ligaments.

Every Bone that is articulated to another for Motion, is ty'd to that it moves upon, by a Ligament, whose thickness and strength always bears a proportion to the quantity of Motion in the Joint, and the force with which it is liable to be exerted; and the length of the Ligament is never more then is sufficient to allow a proper quantity of Motion.

The Bones of the Limbs that move to all Sides, have Ligaments like Purfes, which arise from
from or near the Edges of the Sockets of the receiving Bones, and are inserted all round the receiv'd Bones, a little below their Heads.

The beginnings of these Ligaments from the edges of the Sockets of the Scapula and Os In-nominatum are very hard, almost Cartilaginous, which serves in the Scapula, to make a larger Socket, and such a one as will alter its Figure as the Bone moves, for the reason that I have mention'd in the loose Cartilages of the Knee; for the Head of the Os Humeri is a Segment of too large a Sphere to fit any but a variable Socket of so small a size, in such a quantity of Motion as is in that Joynt; and the hard part of this Ligament of the Socket of the Os In-nominatum makes the Socket deeper than the Semidiameter of the Socket, without any hindrance to Motion, because it will give way to the neck of the Os Femoris, when it presses against it.

The Ligaments of those Articulations which admit only of Flexion and Extension, differ from the former in this only; That they are much shorter and stronger at the sides of the Joynts, and thinner backward and forward.

At the upper part of the Articulation of the Os Femoris and Os In-nominatum, is a strong Ligament of great Consequence; it contributing very much to preserve that Joynt from being luxated by the weight of the Body. And from the
Of the Ligaments.

Of the Ligaments.

the lower Edge of the Acetabulum of the Os
Innominatum, runs a Ligament to the middle
of the Head of the Os Femoris, about two In-
ches long (which the Motion in this Joint re-
quires) call'd Teres, or Rotundum, whose Use is
to prevent the Os Femoris from being luxated
upwards, but downwards it will let it go far
out of the Socket; which fully shows, that in
Men it is particularly contriv'd to prevent the
Thigh-bone from being dislocated upwards; but
in Brutes the head of the Os Femoris being ob-
long, and the Cavity suitable, there can be
very little more then that kind of Motion
which is call'd Bending and Extending; and
that never removing the end of the Head of
the Bone far in the Socket; a short Ligament is
enough for that, and will better keep the Bone
in its place, and therefore it is that theirs
is so short; this Ligament in Men also serves
to press the Gland in the bottom of the Aceta-
bulum or Socket.

Towards the great Foramen of the Offa In-
nominata the Acetabulum has a deep Notch,
from one side of which to the other, runs a
Ligament, which I have seen Ossify'd. Such a
Ligament there is also running from one Pro-
cess of the Scapula to the other, which hinders
the Os Humeri from dislocating upward.

In the middle and back-part of the Joint of
the Knee are two very strong Ligaments which
arise from a Process at the end of the Tibia;
they cross each other in such a manner, as is best to secure the joint from being displaced in any way; they also hinder the extensors of the Tibia from pulling that bone too far forwards.

All the bodies of the Vertebrae, and every joint that is without motion, and not jointed by a suture, as the Ossa Inominata with each other, and the Os Sacrum with the Ossa Inominata, are all jointed by intervening ligaments, commonly called cartilages.

The Processus Dentatus of the second Vertebra, is tied to the skull by a ligament, and kept close to the forepart of the first Vertebra by another, in that Vertebra, that it may not bruise the spinal marrow; and when either this ligament or process is broke, it makes that sort of broken neck which is attended with sudden death.

The bones of the Carpus and Tarsus are tied together by ligaments running promiscuously upon their surfaces from one to another, which at the under side of the Tarsus are vastly strong, because they support the whole body. There is also to the Carpus, a strong ligament which runs from the fifth bone to the eighth, and the process of the fourth bone. The proper use of this is, to bind down the tendons of the muscles that bend the fingers.

The Os Hyoides to the Processus Styliformis of the Os Petrosum; the Patella to the Tibia, and the
the Sesamoid Bones in their places, are all ty’d by Ligaments.

From the Edge of the Ilium to that of the Os Pubis, runs a Ligament which is contiguous to, and appears to be a part of, the Tendons of the oblique Muscles of the Abdomen; its use is to cover the Iliack Veisels as they descend to the Thigh: Under this Ligament, together with the Veisels, I have often met with a Rupture of Matter, and, I think, sometimes the Gut, (however I dare affirm that to be a possible Case) from the Abdomen into the anterior part of the Thigh immediately below the Groin. Such Cases are well worth the Observation of Surgeons; because Opening such Tumors may be of very bad Consequence.

The Tendons of all the Muscles that are not involv’d in Fat, are either ty’d down to the Bones they pass over, by Ligaments which contain a lubricating Mucus, or have sometimes communications with the Joynt they move: As has been curiously observ’d by Dr. Douglas, particularly in the Joynt of the Hip. The Use of these Ligaments is to confine them to their proper Directions, and contain the Mucus that lubricates their Surfaces, to make their Motions more easy.

From the Tibia to the Fibula, and from the Ulna to the Radius, are transverse Ligaments which help to keep these Bones together, and give Origins to a great many Muscles. There
Of the Lubricating Glands of the Joints.

is another of this Sort in the great Foramen of the Os Inominatum; and One between the Os Sacrum and Processes of the Os Ischii; and some more in the Body, too small to have a particular Account given of them in this Place.

Authors agree, That the Ligaments are insensible; and give for their Reason, That they would else be injur’d by ordinary Motions. But the All-Wise is a better Architect! For none of ’em, except those which lie between the Bones, are subject to Attrition; and those they have call’d Cartilages. I do not think that these last are sensible; but the other I have had frequent Experience are capable of very acute Pains, there being not any thing our Patients more grievously complain of, than collections of Matter within these Parts, or sharp Medicines apply’d to ’em when laid bare.

CHAP. IX.

Of the Lubricating Glands of the Joints.

Every Joynt, where the Bones are fac’d with a Cartilage for a sliding Motion, is furnish’d with small Glands which separate a mucilaginous Matter for the lubricating of the Ends
Of the Lubricating Glands of the Joints.

Ends of the Bones, that they may move easily upon one another; and that there may be no waste of this necessary Fluid, it is contain'd in the investing Ligaments, which for this very reason are no where divided, except to communicate with the Ligaments of Tendons.

These Glands are generally seated near the insertions of the Ligaments, that they may be compress'd by them when the Joints are in Motion, which is a proper time to have their fluid press'd out.

There is One large Gland of this Sort, seated in a Sinus at the bottom of the Acetabulum of the Os Inominatum, which is compress'd by the Ligamentum Teres. The other Glands are so small, even in the largest Joints, that they can scarce be discern'd with the naked Eye; but with a Microscope they may be seen in great plenty in the Place before mention'd.

When from violent Bruises, or any other Cause, these Glands are Ulcerated, they throw off a corrosive Matter, which erodes the Cartilages of the Bones 'till it insinuates itself into their spongy Heads, and renders their whole substance Carious. When this Disease happens to the Hip, in time it makes its way thro' the Ligament, because the Socket in that Jjoint is depending; and then it gets under the Gluteus Maximus to the outside of the Thigh under the flat Tendon of the Fascialis Muscle, and sometimes to the forepart of the Thigh,
Of the Lubricating Glands of the Joynts.

Thigh, where the great Blood-Vessels run: In this Case, which is very rare, I apprehend that the surrounding Ligament is perforated before as was mentioned in the last Chapter. These Cases are generally, if not always, incurable.

The Number of the Bones being very different at different Ages, more then thrice the Number in young Children, (counting the Epiphyses distinct Bones) that they are in adult Bodies, and being different in Number in different young Bodies of the same Age, because the Bones in some unite much earlier than in others:

I have made this Scheme, according to the natural Divisions, from a Body as soon as full Grown, at which time the Number of the Bones are the same in most Bodies: But the Number of Cartilages, Ligaments and Glands of the Joynts is unassignable.

| Parietalia | 2 |
| Frontis | 1 |
| Ethmoides | 1 |
| Sphenoides | 2 |
| Temporums | 2 |
| Petrea | 3 |
| Auditorys | 1 |
| Occipitis | 2 |
| Nasi | 2 |
| Malarum | 2 |
| Ungues | 2 |
| Planis | 2 |
| Maxilla superior | 2 |
| Palati | 2 |
| Vomer | 2 |
| Spheniofum | 1 |
| Maxilla inferior | 1 |
| Dentes | 32 |
| Vertebræ | 24 |
| Sacrum | 6 |
| Coccygis | 4 |
| Coxa | 24 |

| Sternum | 1 |
| Hyoïdes | 1 |
| Clavicula | 1 |
| Scapula | 1 |
| Humeri | 2 |
| Ulnæ | 2 |
| Radii | 3 |
| Carporum | 1 |
| Metacarporum | 4 |
| Pollicium | 2 |
| Digitorum | 24 |
| Inominata | 2 |
| Femorum | 7 |
| Patella | 2 |
| Tibia | 2 |
| Fibula | 2 |
| Tarzorum | 14 |
| Metatarzorum | 10 |
| Digitorum Pedis | 24 |
| Sesamoidea | 1 |

Total 259
A CASE of a Fractur'd Scull, in a Girl Nine Years of Age. Vide Tab. XI.

THIS Girl being brought into the Hospital the 27th of May, Seven Days after the Scull was Fractur'd, having had all that Time very bad Symptoms. I immediately open'd the Scalp, and let out about Two Ounces of Grumous Blood, and laid the Scull bare about Four Inches one way, and Three the other; and tied the Blood Vessels, that I might make the Operation without much difficulty, the next Morning. The Fracture extended across the Os Bregmatis, from the Sagittal Suture, to the Temporal Bone; that part next the Os Frontis was depres'd equal to its thickness, and a great deal of extravasated Blood, partly turn'd to Matter, lay under the other part of the same Bone. I made Two Perforations with the Trephine, close to the Fracture, that I might raise it up steadily thro' both, and have more room for the extravasated Blood to discharge from under the Scull; which had discharge'd before in great quantity through the Fracture. But nevertheless Ten Days after the former Operation, I was oblig'd to make another Perforation, to discharge the Matter more freely; for during a Month, the Matter ran through all her dressings down her Face, twice
every day, and was exceeding Foetid; and for the space of Five Months the Matter decreas'd very little in quantity, but grew less and less offensive, 'till September the 13th, when the least of the Bones was taken out; and on September the 29th, the large one; after which time the Matter was good, and not too much in quantity. Both these Bones are through both Tables, for the Motion in the Brain was seen; and besides these, there were many little bits of Bone came away in the Dressings; but the Cure not being yet finish'd, I can say no more about it.

To this Case I'll add another, of an old Man, who having had the under part of the Os Calcis laid bare, as large as a Half Crown, by a Mortification, and being brought to the Hospital, about Two Years after the Bone was first bare, and all endeavours to scale it having prov'd in vain, I par'd it with a Chiffel, 'till the Bone bled, and it cover'd with Granules of Flesh in about Three Days, and afterwards Heal'd very easily.
THE Muscles are moving Powers, or Cords, apply'd to perform the several Motions of the Body; which they do by contracting their length; and thereby bringing the Parts to which they are fix'd nearer together. The immovable or least mov'd part any Muscle is fix'd to, is call'd its Origin, and the other its Insertion: but Muscles that have their two Ends equally liable to be mov'd, may have either call'd their Origins or insertions.

Each Muscle is apparently made of a number of small Fibres, which are generally suppos'd (and by some affirm'd from Microscopical Observations) to be Strings of small Bladders, which being distended contract the Muscle, and being emptied suffer it to relax: But supposing this is the Structure, which I think is highly probable, it yet remains a Secret how these Bladders are so sud-
Introduction to the Muscles.

...denly distended: The Influx of Blood we are sure is not sufficient, and what the Nerves do we know not; but we find by Experiments, that the Artery or Nerve of a Muscle being divided, that Muscle wholly looses its Motion; which clearly shows, they are both necessary to that Motion; but what share each has in it, whether they each bring a Fluid, (if the Nerves have a Fluid) which being mix’d, expands and produces this effect, (as appears most likely to me) or whether it is done by some other means, is not yet determin’d. It is certain, that if these Bladders were distended with Blood only, a Muscle could act with no more Moment in any given time than there is in the Blood of the Artery that serves it; which would not be enough to support the Body, or give it a visible Motion; nor will the smallness of the size of the Bladders, of which the Fibres of a Muscle are compos’d, at all answer this Objection, for whatever Moment one Bladder, whose Diameter is an Inch, will have in a given time, from the Force by which the Arterial Blood is press’d into it, a thousand Bladders, the sum of whose Cubes are equal to the Cube of that one, will from the same given Force act with but the same Moment, however they are constructed; and though a Hundred Bladders constituting one String or Fibre, will raise a weight as high as one Bladder, whose Diameter is equal to the Diameter of the Hundred taken together,
yet the one Bladder will raise Ten thousand times more weight than the Hundred can, and not one String or Fibre, but Ten thousand such Strings of Bladders will produce aMoment equal to the one Bladder, and they together will be equal in bulk to the one Bladder: Or it would be easy from such Mechanism to contrive a Perpetuum Mobile of prodigious Force (See Tab. VIII.) If the Distention of these Bladders is made by any kind of Explosion or Expansion of a Fluid (which is the only kind of Power that exceeds Mechanick Laws, which we are acquainted with), and if this Expansion is made by the mixture of two Fluids, the smallness of these Bladders seem plainly necessary, that the Fluids which are to be expanded, may be the better and more suddenly mix'd.

The quickness and quantity of Motion in a Muscle will be, ceteris paribus, as the length of its Fibres; for if a Fibre four Inches long will contract one Inch in a given time, a Fibre eight inches long will contract two Inches in the same time, and the strength of a Muscle or Power to raise a Weight, ceteris paribus, will be as the number of its Fibres; for if one Fibre will raise a Grain weight, twenty Fibres will raise twenty Grains.

The Muscles are of two Sorts, viz. Recti-\(\text{al}\) and Penniforme; the former have their Fibres parallel or almost parallel in the same or near the same direction, with the Axis of the Muscle, and the latter have their Fibres join'd...
in an oblique direction, to a Tendon passing in or near their Axis, or on their outsides.

The Rectilineal Muscles, if their Origins and insertions are in little compass, are never of any considerable thickness, unless they are very long, because the outer Fibres would compress the inner ones, and make them almost useless; and therefore every Rectilineal Muscle, whose inner Fibres are compressed by the outer, have their inner Fibres longer than the external, that they may be capable of equal quantity of Contraction; for the Bladders which compose the inner Fibres not being capable of being distended as much as those which compose the outer ones, they must to have equal motion, be longer than the outer, in a reciprocal proportion to the degrees of their Contractions.

The Penniforme Muscles, that they are in a manner free from the inconvenience of one Fibre compressing another, and tho' by the Obliquity of their Fibres, nothing is abated of their Moment, as is clearly demonstrated (See Table xxxi.) by an Experiment of Mr. Hawsbee's, where it is shown, that in all Cases, just so much more weight as Rectilineal Fibres will raise than Oblique ones, the Oblique ones will move their weight with just so much greater Velocity than the Rectilineal, which is making their Moments equal; yet the Fibres of the Penniforme Muscles becoming more and more Oblique as they contract, their Strength decreases, and their Velocity
city increases, which makes them less uniform in their actions than the Rectilineal Muscles; wherefore it seems that Nature never uses a Penniforme Muscle where a Rectilineal Muscle can be used; and the Cases in which a Rectilineal Muscle cannot be used, are where the shape of a Muscle is such as that the inward Fibres would be too much compress'd, and where Rectilineal Fibres could not have a Lever to act with, suitable to their quantity of Contraction, which is the case of all the long Muscles of the Fingers and Toes; for every Muscle must be inserted or pass over the Center of Motion of the Joint it moves, at a distance, proportionable to its quantity of Contraction, and the quantity of Motion in the Joint move'd; for if it was inserted too near, then the Motion of the Joint would be perform'd before the Muscle is contracted all that it can; if too far off, the Muscle will have done contracting before the whole Motion of the Joint is made: So that two Muscles of equal magnitude, one Long, and the other Short, will both move the same Weight with the same Velocity when applied to a Bone; because the Levers they act with must be as their Lengths, and therefore the Penniforme and short thick Muscles are never made for the sake of Strength, nor long Fibred Muscles for Quickness; for whatever is gain'd by the form of the Muscle, whether Strength or Quickness, must be lost by their insertions into the Bone, or else the Muscles must
Of the Membranes of the Muscles.

not act all they can, or the Bones have less Motion than they are fitted for.

In the Limbs several Muscles pass over two Joynets, both of which they are liable to move at once, with Force proportionable to the Levers they act with upon each Joynet; but either Joynet being fix’d by an Antagonist Muscle, the whole Force of such Muscles will be exerted upon the other Joynet, which in that Case may be mov’d with a Velocity equal to what is in both Joynets, when these Muscles act upon both at once. This Mechanism is of great use in the Limbs, as I shall shew in the proper Places.

CHAP. II.

Of the Membranes of the Muscles.

MEMBRANÆ MUSCULORUM. All the External Muscles are either cover’d with a strong tendinous Expansion, or with a thin lax Membrane, and some with both. The former is either the flat Tendon of some other Muscle or Muscles, as may be observ’d upon the Abdomen and Loyns, or a Fascia detach’d from the Tendons of other Muscles, as may be seen in the Limbs, or not deriv’d from any, as may be observed upon the Infraespinati of the Scapula. Most of the other are of the latter Sort; but those that adhere to the the Skin, as in the Face, have only a Membrana adiposa. The inte-
Of the Muscles.

Of the Muscles.

OB LIQUUS DESCENDENS, arises fleshy from near the Extremities of the eight inferior Ribs, the upper part of its Origin being indented with the Serratus major anticus, and the lower laying under a small portion of the Latissimus Dorsi; it is inserted fleshy into the upper part of the Spine of the Ilium, and by a broad flat Tendon (which firmly adheres to a like Tendon of the following Muscle as they pass over the Rectus) into the Os Pubis, and Linea alba, which is a strong tendinous Line extended from the Os Pubis to the Sternum, between the Musculi Reëti.

OB LIQUUS ASCENDENS, arises fleshy under the former Muscles from the Spine of the Ilium, and is inserted fleshy into the Cartilages of the Three lowest Ribs, and by a flat Tendon into the Sternum and Linea alba, together with the Tendon of the foregoing Muscles; the line in which these two Tendons joyn on the out-side of the Rectus Muscles, is call'd Semilunaris: And tho'
Of the Muscles.

Tho' so much of this Muscle as is inserted fleshly runs obliquely upward, yet the middle and lower part is directed transverse and downward; and beside the Tendon which it unites with the Obuliquus descendens, it often detaches another near the Sternum to be inserted with the Transversalis under the Rectus.

Tab. ix. 11. \textit{Pyramidalis}, arises from the Os Pubis, and is inserted into the \textit{Linea alba} about three or four inches below the Navel: This and its fellow are often wanting.

Tab. ix. io. \textit{Rectus}, arises somewhat tendinous from the \textit{Os Pubis}; but fleshly when the Pyramidalis are wanting, and is inserted into the lower part of the Sternum near the \textit{Cartilago Enisformis}. This Muscle is divided into four or five portions by transverse tendinous Intersections, that it might not press the contain'd Parts only in one Place; but these Intersections are chiefly above the Navel, a larger Belly being convenient below to support the \textit{Viscera}.

\textit{Transversalis}, arises by a flat Tendon from the transverse Processes of the lumbal \textit{Vertebrae}, and fleshly from the inside of the Ribs below the Diaphragm, and from the Spine of the \textit{Ilium}, then becoming a flat Tendon, it passes under the \textit{Rectus} to its Insertion into the \textit{Linea alba}. Between this Tendon and the \textit{Peritoneum}, Water is often found in great quantities. This Distemper Authors call the Droply in the Duplicature of the \textit{Peritoneum}; which clearly shows, that:
Of the Muscles.

that they mistook this Tendon for part of the Peritoneum.

These five Pair of Muscles all conspire to compress the Parts contain'd in the Abdomen. The Obliquus descendens on the Right Side, and Ascendens on the Left acting together, turn the upper part of the Trunk of the Body towards the Left, & vice versa; but the Trunk of the Body is chiefly turn'd upon the Thighs; the Recti bend the Body forward, and pull the Sternum downward in Expiration; the Two oblique Muscles and the Transverse on each side near the Groins, are perforated to let thro' the Processus Vaginalis, with the Spermatick Vessels. These Perforations are distant from each other, so as to suffer the Vessels to descend conveniently into the Scrotum; this way the Intestines or the Omentum, descend in Ruptures. A Man whom I cut for a Rupture in the Hospital, had the Ilium, and Omentum both in the Scrotum, together with a great quantity of Water; the Ilium I easily reduc'd through a large Aperture which I made in the Abdomen; but the Omentum having been long in the Scrotum, adher'd to it; I cut it off, first tying it close to the Abdomen, to secure the Blood Vessels. After he was recover'd, the Ileum would sometimes present it self as far as the place where the Ligature was made, on the Omentum, without much Inconvenience, but no farther, being hinder'd by the Cicatrix.

Cre-
**Of the Muscles.**

**Cremaster Testis.** is a small portion of Fibres which arises from the Ilium, and appears to be part of the Obliquus Ascendens Muscle, till it meets with the Spermatick Vessels at their coming out of the Abdomen, where it begins to descend with them by the side of the Processus vaginalis, to the Testicle, over which it is loosely expanded. This Muscle is too small to be plainly discover'd in Emaciated Bodies.

**Erector Penis,** arises from the Os Ischium, and is inserted into the Crus Penis near the Os Pubis: It is said, by pressing the Penis against the Os Pubis, to compress the Vena Ipsius Penis, and hinder the reflux of Blood, whereby the Penis becomes extended and erect, but it does not appear to me to be well contriv'd for that use.

**Accelerator Urinæ.** This, with its fellow, are but One Muscle; it arises Tendinous from the Ossa Ischia, and fleshly from the Sphincter Ani, and thence being Expanded over the Bulb of the Urethra; it afterwards divides, and is inserted into the Penis. The use of this Muscle is not to accelerate the Urine, for that is propell'd by the Detrusor Urina, or Muscular Coat of the Bladder, but to eject the Semen, which is done only by this; and it being seated opposite to the Os Pubis, it seems to be much better fitted to be a relaxer of the Penis by pulling it from the Os Pubis, than the Erector is for the office assigned it.

**Sphincter**
Sphincter vesicæ urinæ, is a small portion of muscular fibres, not easily to be distinguished, running round the neck of the bladder to prevent the involuntary effusion of urine.

Detrusor urinæ, is the muscular coat of the bladder; its fibres are differently disposed, but chiefly terminating in the sphincter vesicæ, whereby it not only presses the urine forward, but when the bladder is full, becomes an antagonist to the sphincter, acting almost at right angles.

Here I had fallen into a mistake, (for the correction of which I am obligéd to Mr. Bamber, lythotomist to St. Bartholomew's-Hospital) in supposing that in the common operation for the stone, the wound had been made into the bladder, as in cutting upon the gripe. Of this method I should have said more, but that our present attention is engagèd on another method first practiz'd by Mr. Douglas, which he has hitherto done with such success, that I am inclinèd to think it will be found the best way. He fills the bladder with water, and cuts above the os pubis, nearly the same way as was long since described by monsieur Dionis; but I refer my reader to Mr. Douglas's own account.

Erector clitoridis, arises from the ischium, and is inserted into the crus clivo-
Of the Muscles.

ridis, like the Erector Penis in Men, and is said, to cause Erection in the same manner.

**Muscles of the Vagina.** Sphincter Vaginæ, is an Order of Muscular Fibres intermix'd with Membranous Fibres surrounding the Vagina Uteri near its Orifice; it is connected to the Ossa Pubis and Sphincter Ani; its Use is to constringe the Orifice of the Vagina, to press out a Liquor from the Glands of the Vagina, and embrace the Penis in coition.

**Muscles of the Anus.** Sphincter Ani, is a Muscle near two Inches in breadth, surrounding the Anus to close it, and to prevent involuntary falling out of the Feces. Part of this Muscle is connected to the beginning of the Urethra, and is by some Anatomists divided and call'd Transversalis Penis.

**Levator Ani,** arises from the inside of the Os Pubis, and Ischium, and is inserted into the foregoing Muscle. The Use of it is to support and dilate the Anus while the Excrement is ejected.

Fistula's in Ano, that are within this Muscle, generally run in the Direction of the Gut, and may be laid open into the Gut within the greatest safety; but those that are on the out-side of the Sphincter cannot be open'd far into the Gut, without totally dividing the Sphincter, which, Authors say, renders the Sphincter ever after uncapable of retaining the Excrement. One instance of this kind I have known; but Mr.
Of the Muscles.

Berbeck, of York, an excellent Surgeon, a man of great Integrity, and particularly favour'd me, that has often been forc'd to divide the Sphincter, which has made the Patients unable to hold their Excrements during their Cure, but the wounds being heal'd, they have retain'd them well as ever.

Coccygeus, arises from the acute Processus of the Os Ischii, and is inserted into the Os Coccygis, which it pulls forward.

Occipito-Frontalis, is a Muscle muscles of the Scalp, Tab. x. A. which Four fleshly Bellies, commonly nam'd frontales and Occipitales; it arises behind each from the Os Occipitis, and soon becoming odinous, passes under the Hairy-scalp to the rethead, where it becomes broad and fleshly, adhering to the Skin, and is insert'd into the per part of the Orbicular Muscles of the e-lids, and by two Processes into the Bones the Nose. When this Muscle acts from the back-part, it pulls the Skin of the Forehead ward, and wrinkles it transverse; but when the fore-part of it acts, it draws the Skin with the Eye-brows downward, and towards the Nose seen we Frown. The Tendon of this Muscle has been mistaken for a Membrane, and been call'd Pericranium, and the true Pericranium, crionium.

Elevator Auriculæ, arises by a thin muscle from the Occipito-Frontalis, and is insert'd
ferted into the upper part of the Ear that connected to the Head.

**Retractor Auriculæ**, arises by one, two or three small portions from the Temporal Bone above the Mamillary Process, and is inserted into the Ear to pull it backward.

**Orbicularis Palpebrarum**, surrounds the Eye-lids on the Edge of the Orbit, and fix'd to the *Sutura Transversalis* at the great Corner of the Eye; it shuts the Eye-lid especially in Winking. That part of this Muscle that lies under the Eye-brow is very much intermix'd with the *Occipito-Frontalis*, and under it from the *Os Frontis* near the Nose, arises a small portion of distinct Fibres which end in this Muscle, and, I think, are a part of it; nevertheless, from the effect of their Action are not improperly call'd *Muculus Corrugator*.

**Ciliaris**, is a very small portion of this Muscle, next the Ciliary Cartilages of the Eye-lids.

**Elevator Palpebræ Superioris Rectus** arises from the bottom of the Orbit of the Eye above the Optick Nerve, and is inserted into the Ciliary Cartilage of the upper Eye-lid by a very thin flat Tendon; it draws the Superior Eye-lid up, and inward over the Ball of the Eye.

**Elevator Oculi**, arises from the bottom of the Orbit, between the Optick Nerve and the foregoing Muscle, and is inserted into the
upper part of the *Tunica Sclerotis* of the Eye, near the Cornea.

**Depressor Oculi**, arises, and is inserted Tab. x. R. directly opposite to the last describ'd Muscle.

**Adductor Oculi**, arises from the bottom Tab. x. s. of the Orbit, near the Optick Nerve internally, and is inserted into the *Tunica Sclerotis* on the side next the Nose.

**Abductor Oculi**, has both its Origin and Insertion, directly opposite to the Adductor.

**Obliquus Superior Seu Trochlearis**, Tab. x. N. arises between the Elevator and Adductor Oculi at the bottom of the Orbit, thence ascending by the *Sutura Transversalis*, becomes a round Tendon, which passing through a Pulley at Tab. x. O. the upper and inner part of the Orbit near its Edge, is inserted near the bottom of the Globe of the Eye, which it pulls upward and inward, and thereby directs the Pupil outward and downward.

**Obliquus Inferior**, arises from the *Os Maxilla Superioris*, at the edge of the Orbit; thence passing over the *Depressor*, is inserted near the *Abductor* at the bottom of the Eye, but not so low as the Insertion of the *Obliquus Superior*: It turns the Pupil upward and outward.

These Muscles are inserted with great Advantage to move a small Weight, and are very long, that the Eye may be mov'd with sufficient quick-
ness. The two oblique Muscles are an Axis to the Motions of the other four, and acting against them, (which action is vulgarly call'd straining the Eye) while we look at Objects at a great distance shorten the Axis of Vision, or else distant Objects would be seen much more confusedly than they are; and for this end it is that there are six Muscles thus dispos'd, when three would be sufficient to turn the Eye every way, if it was in a fixed Socket; and it seems to me, that while the Muscles are all thus in action, the superior oblique in each Eye sets the Pupil further from the Nose, while the inferior oblique directs it upward; the first of which actions is always necessary, and the latter generally so, when we look with both Eyes at very distant Objects; and when the two oblique Muscles grow weak by Age or Disease, or cease to act at all, as in paralitick Cases, and Death, then the Eye sinks in the Socket.

**SPHINCTER OR CONSTRICTOR ORIS**, surrounds the Mouth about three-fourths of an Inch broad. This Muscle is very much intermix'd with all the Muscles that are insert'd into it.

**ELEVATOR LABII SUPERIORIS PROPRIUS**, arises from the Bone of the upper Jaw under the anterior and inferior part of the Orbicularis Palpebrarum, and passing down by the side of the Nose, is inserted into the upper part of the
the **Sphincter Oris**. This raises the upper Lip, and helps to dilate the Nostrils.

**Depressor Labii Superioris Proprius**, is a small Muscle arising from the upper Jaw near the **Dentes Inscisorii**, and is inserted into the upper part of the Lip and Root of the Cartilages of the Nose; hence it is also a Depressor of the Nose, which action constricts the Nostrils.

**Depressor Labii Inferioris Proprius**, arises Tab. x. L broad from the Lower Jaw at the Chin, and is soon inserted into the **Sphincter Oris**; the Order of Fibres in this is not so conspicuous as in the other Muscles of the Face.

**Elevator Labii Inferioris Proprius**, arises from the Lower Jaw, near the **Dentes Inscisorii**, and is inserted into the lower part of the Lip.

**Elevator Labiorum Communis**, arises from Tab. x. G from a depress'd part of the superior **Maxilla** under the middle of the Orbit, and is inserted into the **Sphincter Muscle** near the Corner of the Mouth.

**Depressor Communis Labiorum**, arises late- Tab. x. H rally from the Lower Jaw near the Chin, and is inserted into the **Sphincter**, opposite to the former.

**Zygomaticus**, arises from the anterior Tab. x. K part of the **Os Zygoma** or **Mala**, and generally derives a Portion of Fibres from the **Orbiculavis Palpebrarum**, thence running obliquely downwards, it is inserted into the **Sphincter at**
the Corner of the Mouth, betwixt the Elevator communis and Buccinator, it draws the Corner of the Mouth outward and upward. When this Muscle grows weak, the Corner of the Mouth sinks, as may be observ'd in Old Persons.

**Tab. x. L.**

**Buccinator,** arises from the Processus Corono of the Lower Jaw, and passing contiguous to both Jaws, is inserted into the Sphincter Muscle at the Corner of the Mouth. It serves either to force Breath out of the Mouth, or thrust the Aliment between the Teeth in Mastication, or to pull the Corner of the Mouth outward.

**Platysma Myoides,** arises loosely from over the Pectoral and part of the Deltoid Muscle, and running obliquely forward, is inserted into the Chin, and Depressor Muscles of the Lips: This Muscle being exceeding thin (a mere Membrana Carnosa) serves to cover the unequal surface of the subjacent Muscles; and render the Neck even; it also pulls down the Corner of the Mouth, and from its insertion at the Chin, may contribute to the pulling down of the Lower Jaw.

**Retractor Alae Nasi,** is a very small Muscle arising from the Bone of the Nose, and is inserted into the Skin and Cartilage at the side of the Nose.

**Mylohyoideus,** with its Fellow, may be esteem'd a Digastrick Muscle: It arises from the
the Linea Aspera on the inside of the Lower Jaw and Processus Innominatus, both sides meeting at Right Angles in a middle Line upon the following Muscles. It is inserted by a small portion of Fibres into the Basis of the Os Hyoïdes; it moves the Tongue upward and forward, and also compresses the following Muscles, whereby they raise the Tongue more commodiously, and also hinders them from drawing the Basis of the Os Hyoïdes into a Right Line betwixt the Chin and Sternum at such times as the Stylohyoïdei cannot act.

Geniohyoïdeus, arises from the Processus Innominatus of the Lower Jaw, under the foregoing Muscle, and is inserted into the Basis of the Os Hyoïdes, which it pulls upward and forward. This with its Fellow, are for the most part but one Muscle.

Stylohyoïdeus, arises from the Processus Styliformis near its Root, and passing contiguous to the Horn of the Os Hyoïdes becomes inserted laterally into its Basis: This Muscle is sometimes perforated about the middle by the Tendon of the Diagonal Muscle of the Lower Jaw. Its Use is, to pull the Os Hyoïdes up and backward.

Coracohyoïdeus, arises from the upper Tab. ix. Costa of the Scapula near the Processus Coracoides, and passing under the Mastoïdeus Muscle becomes in that place a round Tendon; thence passing almost parallel to the following Muscle, is inserted toge-
together with it into the Basis of the Os Hyoides; this draws the Os Hyoides downward, and a little backward. I have once seen one of these Muscles wanting, and the Sternohyoideus arising from the middle of the Clavicle on that side.

**Sternohyoideus**, arises from a roughness at the under part of the Clavicula near the Sternum, and is inserted into the Basis of the Os Hyoides, to pull it downward.

**Genioglossus**, arises from the Processus Innominatus of the Lower Jaw, and is inserted broad into the under part of the Tongue, to pull it up and forward.

**Ceratoglossus**, arises from the Horn of the Os Hyoides, and is inserted laterally into the Tongue near its Root, to pull it downward and forward.

**Styloglossus**, arises from the extremity of the Processus Styliformis, and is inserted into the Tongue near the former to pull it up and backward. I have very often found another Styloid Muscle so inserted, that I can't tell whether to call it a Muscle of the Tongue or Pharynx.

The Tongue is a Muscle made of Fibres, Longitudinal, Circular and Transverse, which are necessary to give it all its Motions.

**Hyothyroides** or **Ceratothyroides**, arises from the Horn of the Os Hyoides, and is inserted into the lower part of the Cartilago Thyroides, to pull it upward.
Of the Muscles.

Sternothyroideus, arises from the inside of the Sternum, and is inserted with the former; it pulls the Thyroid Cartilage directly downward.

Cricothyroideus, arises from the anterior part of the Cartilago Cricoides, and running obliquely upward and outward, is soon inserted into the inside of the Cartilago Thyroides, which it pulls toward the Cartilago Cricoides. Both this Muscle and its Fellow, for the most part appear double.

Cricoarytenoideus Posticus, arises from the back-part of the Cartilago Cricoides, and is inserted into the Aryt&noides to pull it backward.

Cricoarytenoideus Lateralis, arises laterally from the Cartilago Cricoides, and is inserted laterally into the Aryt&noides. This with its Fellow, pull down each Cartilage toward their Origin, and thereby dilate the Rimula.

Thyroarytenoideus, arises from the superior, middle, and inner part of the Cartilago Thyroides, and is inserted with the former into the Aryt&noides Cartilage to dilate the Rimula. These two last describ’d Muscles are not naturally divided, and therefore ought to be accounted but one Muscle.

Aryt&noides, is one single Muscle arising from one Aryt&noidal Cartilage, and is inserted into the other to draw them together, and close
Of the Muscles.

close the Rimula. These few small Muscles of the Tongue and Larynx, with only one Pipe, make a greater variety of Notes and Sounds than can be made by artificial Instruments, and that in a manner so little understood by us, and by Organs so little differing from those in Quadrupeds, that for ought we know of them, Brutes are as capable of all these Sounds as Men.

Stylopharyngeus, arises from near the bottom of the Processus Styloides of the Os Petrosum, and running obliquely downward, is inserted into the Pharynx. This Muscle with its Fellow, pulls up and dilates the Pharynx to receive the Aliment.

Oesophageus, arises like a Wing from several parts of the Scull, Tongue, Os Hyoïdes, the Cricoid and Thyroid Cartilages, and is inserted into the Pharynx. This with its Fellow, constricts the Pharynx, and press the Aliment down the Gullet.

Musculus Vaginalis Gula, is the Muscular Coat of the Gula: Which shall be Treated of in the Chapter of the Ductus Alimentalis.

Pterygopharyngeus, is not a distinct Muscle, but the beginning of the Pharynx near the Processus Pterygoïdes, of the Sphenoidal Bone.

Pterygostaphylinus Internus, arises from the Os Petrosum, near the Iter ad Palatum, or Eustachian Tube, and is inserted into the Uvula, which it pulls up while we breath thro' the Mouth or Swallow.
PTERYGO-STAPHYLINUS EXTERNUS, arises by the side of the last described Muscle, and is also inserted near it; but becomes its Antagonist by being reflected on a Pulley, over a process at the lower part of the Pterygoidal process of the Sphenoidal Bone.

The Palate itself is also a Muscle beset with Glands; and from the Palate to the tongue, are a large parcel of Muscular Fibres, which, I believe, have a greater share in bringing down the Palate to the Tongue than the pterygo-staphylinus Externus.

DIGASTRICUS, arises from the Sinus of the Muscles of the Lower Jaw. Temporary process of the Os Temporis, and from a fleshly Belly, becoming a round Tendon, affies thro', and sometimes under the Stylohyoides Muscle, and then being ty'd down by Ligament to the Os Hyoides, grows fleshly, and is so inserted into the anterior part of the Lower Jaw internally: This Muscle's direction being alter'd by its being ty'd to the Os Hyoides, where it makes an Angle, (and not at its passage thro' the Stylohyoides) pulls the Lower Jaw downward with much greater Force than otherwise it cou'd have done.

TEMPORALIS, arises from the Os Frontis, Tab. x. B. varietale, Sphenoides, and Temporis, and passing under the two Processses, by some nam'd Os lingale, is inserted externally into the Processus coron of the Lower Jaw, which it pulls upward. This Muscle is cover'd with a strong tendinous Fascia.
Of the Muscles.

**Tab. x. C.**

**Masseter**, arises from the lower Edge of the Os Mala or Zygoma, and its Process, and is inserted to the outer part of the Angle of the Lower Jaw, which it pulls up and forward. This Muscle is not to be divided from the Temporal without violence, and therefore should be describ’d with it as one Muscle. These two last describ’d Muscles having different Directions, when they act together, make a steady Motion in the Diagonal of their Directions.

**Pterygoideus Internus**, arises from the Processus Pterygoideus externus, and from the Sinus between the Pterygoid Processes, and is inserted internally into the Angle of the Lower Jaw; this acting singly, pulls the Jaw up forward and to the contrary side.

**Pterygoideus Externus**, arises from the Os Maxillare, and Os Sphenoides, near the Root of the external Pterygoid Process, and is inserted internally to the Processus Corona of the Lower Jaw, which it pulls to one side.

**Subclavius**, arises from the superior part of the Sternum, and is inserted into the inferior part of the middle half of the Clavicula. Its Use is to strengthen the Articulation of the Clavicula with the Sternum, that they may not be sever’d in the Motions of the Scapula.

**Trapezius**, arises from the Os Occipitis, and from a Linea alba Colli, from the Spinous Process of the last Vertebra of the Neck, and
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Of the Muscles.
ELEVATOR SCAPULÆ, arises from the transverse Processes of the Four superior Vertebrae of the Neck, and is inserted into the upper Angle of the Scapula.

SERRATUS MINOR ANTICUS, arises under the Pectoralis, from the third, fourth and fifth Ribs, and is inserted into the Processus Coracoïdes Scapulae, which it pulls forward and downward. This Muscle is always said to be an Elevator of the Ribs, tho' it arises from the Scapula, which is supported by the Ribs.

SERRATUS MAJOR ANTICUS, arises from the anterior part of the Eight superior Ribs, and is inserted into the Basis of the Scapula, which it draws forward, and by that means moves the Socket of the Scapula upward. This Muscle has been always accounted an Elevator Costarum, tho' each Portion of it is nearly parallel to the Rib it rises from.

All the Muscles inserted into the Basis of the Scapula, are also inserted into one another.

PECTORALIS, arises from near two thirds of the Clavicula, next the Sternum, and all the length of the Os Pectoris, and from the Cartilages of the Ribs, and is inserted into the Os Humeri, between the Biceps and the Insertion of the Deltoides. The Use of it is to draw the Arm forward. A small Portion of the lower part of this Muscle is commonly confounded with the Obligus descendens Abdominis, and
Of the Muscles.

In some bodies, neither the upper part, nor the Tendon, can be easily separated from the deltoides; and in others, even that part of it that arises from the Clavicula, is a distinct portion. At the insertion of this Muscle, the fibres cross at acute Angles; those from belowending above in the arm, and those from above below, otherwise the upper Fibres had been too short to act with the lower; but this crossing does not make the Tendon at all stronger, as is commonly said; nor can I see how it came to be thought that this Tendon should want more strength in proportion, than other Tendons.

Deltoides, arises exactly opposite to the insertion of the Trapezius, from one third part of the Clavicula, from the Acromion and Spine of the Scapula, and is inserted Tendinous near the middle of the Os Humeri, which Bone it lifts directly upward. The outermost parts of this Muscle, when the Arm hangs down, are below the Center of Motion of the Joint, and therefore can have no share in lifting the Humerus up till it is raised part of the way by the other part of this Muscle, and the following Muscle; and as the outer parts of this Muscle begin to act, the following Muscle acts with less advantage; and it seems to me, that the sole reason why this Muscle is made of so many parts, is, that they may act independently; for it is demonstrable, that this Muscle, when the whole of it acts, cannot raise the Arm with
Of the Muscles.

with as great Moment as a Right-lin'd Muscle of the same Magnitude wou'd have done.

Supraspinatus, arises from the Dorsum Scapula above the Spine, and passing between the two Processes, is inserted into the upper part of the Os Humeri, which it helps to raise, 'till it becomes parallel with the Spina Scapula.

The Supraspinatus, the Deltoides and Coracobrachialis, assist in all the Motions of the Humerus, except Depression, it being necessary that the Arm shou'd be rais'd and sustain'd, in order to move it to any side.

Infraspinatus, arises from the Dorsum Scapula below the Spine, and is inserted (wrapping over part of it) at the side of the Head of the Os Humeri; it turns the Arm supine and backward; for there is a prone and supine rotatory Motion of the Humerus of near 90 Degrees, which may be evidently seen when the Elbow is bent.

Teres Minor, is a small Muscle arising below the former from the inferior Costa Scapula, and is inserted together with it. This shou'd not be consider'd as a distinct Muscle, but a portion of the last describ'd.

Teres Major, arises from the lower Angle of the Scapula, and is inserted at the under part of the Os Humeri about three Fingers breadth from the Head. This draws the Os Humeri toward the lower Angle of the Scapula; and
Of the Muscles. 79

and turns the Arm prone and backward.

**Latissimus Dorsi**, arises by a flat Ten-

Tab. x. 6.

from the Spinal Processes of the Seven or

ight inferior *Vertebrae* of the Back, and those

if the Loyns, *Sacrum* and *Ilium*, and growing

flesh after it has pass'd the Extensors of the

Trunk, receives another small fleshly beginning

om the Ninth, tenth and eleventh Ribs, and

s inserted into the *Os Humeri*, with the for-

ner. This turns the Arm backward and

prone.

**Subscapularis**, arises from the hol-

low side of the *Scapula*, which it fills up, and

s inserted into the Head of the *Os Humeri*,

wrapping somewhat over it. This pulls the Arm
to the Side, and prone.

**Coracobrachialis**, arises from the

Processus Coracoides Scapula, in common with

he Insertion of the *Serratus minor anticus*, and is

serted into the *Os Humeri* internally about its

middle. This raises the Arm, and turns it

somewhat outward.

**Biceps Cubiti Flexor**, arises with

Two Heads, (that the Fibres of this Muscle might

not compress one another) one from the *Proces-


Tab. ix. 12.

**Coracobrachialis Muscle**, and the other by a

round Tendon from the edge of the *Acetabulum*

Scapula, which passing in a *Sulcus* of the *Os*

Humeri, afterward becomes fleshly, and joyns the

first Head to be inserted with it into the

Tubercle
Of the Muscles.

Tubercle of the Radius, and sometimes this Muscle has a third Head, which arises from the middle of the Os Humeri. This Muscle lifts up the Humerus, bends the Cubit, and has as great a share as any one Muscle in turning the Cubit supine; the Humerus being fix'd by other Muscles, the whole Force of this Muscle will be exerted upon the Cubit, or the Cubit being fix'd by an Extensor, the whole Force of it will be spent in raising the Arm, and therefore ought to have been reckon'd by Borelli among those that raise a weight at Arms length which would make a very wide difference in his Calculations concerning the Force of the Heart. A puncture of the Tendinous expansion of this Muscle is suppos'd to be always attended with grievous Pain and Inflammation, and has often been Mortal; yet the best of Surgeons, and particularly Mr. Cowper, has given us Instances of larger Tendons being Cut and Stitch'd, without any bad Symptoms; and I have often seen them Ulcerated and Mortified, without any more sign of Pain than in other Parts: So that I cannot see what the great Mischief of pricking this Tendinous Fascia is owing to, unless its lying so much upon the Stretch, which may be wholly avoided by bending the Elbow, and turning the Cubit prone. Since I have consider'd this Case, I have met with only one, which was thus injur'd by an injudicious Blood-letter, who order'd the Patient
to keep her Arm extended for fear of a Contraction, and she was not without the most violent Pain for a whole Fortnight; but upon bending the Cubit, and turning the Arm prone, she grew presently easie, and, in a few Days, well.

Brachius Internus, arises from Tab. ix. i3, below the middle of the Os Humeri, and is inserted into a rough place of the Ulna immediately below the Juncture. This also bends the Cubit.

Triceps Extensor Cubiti, com Tab. x. 9, commonly distinguish’d into Biceps and Brachius externus. The first of these Heads arises from the lower Cofta of the Scapula near the Acetabulum; the second from the outer and back part of the Os Humeri; the third, lower and more internal; and are inserted into the Processus Olecranon of the Ulna. The first of these Heads draws the Arm backward with as long a lever as it extends the Cubit.

Anconeus, arises from the outward Tab. x. 10; Extuberance of the Os Humeri, and is inserted into the upper part of the Ulna: This is also an Extensor; but its proper Use is to draw the Ulna toward that Extuberance, and thereby to keep the Radius up to the Os Humeri when the other Extensors act.

Palmaris Longus, arises small from Muscles of the inner Extuberance of the Os Humeri, and from a short Belly soon becomes a Tendon, which
which is connected to the *Ligamentum Transversale Carpi*, and expanded in the *Palm* of the Hand. This Muscle is often wanting, but the Expansion in the Hand never; but it being connected to the *Ligament of the Carpus*, it must bend the Carpus, and cannot constrict the Palm of the Hand, and when it is wanting the *Flexor Carpi Radialis* is larger.

*Palmaris Brevis* or *Caro Quadrata*, arises obscurely from the *Ligamentum Transversale Carpi*, and seems to be inserted into the eighth Bone of the Carpus and the Metacarpal Bone of the Little Finger. This helps to constrict the Palm of the Hand, and is very different in size in different Bodies.

*Flexor Carpi Radialis*, arises from the inner Extuberance of the *Os Humeri*, and soon forming a large Tendon, is inserted into the fifth Bone of the Carpus.

*Flexor Carpi Ulnaris*, arises from the same Extuberance with the former, and a *Fascia* betwixt this Muscle and the *Tensor Ulnaris*, contiguous to the *Ulna*, and is inserted by a short Tendon into the fourth Bone of the Carpus.

Tab. x. 12. *Extensor Carpi Radiales*; the first arises from the *Os Humeri* immediately below the *Supinator Radii longus*, and is inserted into the Metacarpal Bone of the first Finger; the second arises immediately below this,
Of the Muscles.

this, from the outer Extuberance of the Os Humeri, and is inserted into the Metacarpal Bone of the second Finger. The first of these Muscles is a bender of the Cubit as well as an Extensor of the Carpus, and its often acting with the benders of the Cubit while the other is not in Action, is the Reason why it is so distinct from it.

**Extensor Ulnaris**, arises from the same Extuberance with the former, and half the Ulna below the Anconeus Muscle; then becoming a Tendon, runs in a small Sinus at the bottom of the Ulna, and is inserted into the Metacarpal Bone of the Little Finger. See Ulna. Pag. 30, 31.

The Flexor and Tensor Ulnaris acting together turn the Hand downward, the Tensor and Flexor Radialis upward.

**Perforatus or Flexor Secundi Internodii Digitorum**, arises from the inner Tubercle of the Os Humeri, and from the upper part of the Ulna, and the middle of the Radius; then becoming Four strong Tendons, passes under the Ligamentum transversale Carpi, and is inserted into the beginning of the second Bone of each Finger.

**Perforans or Flexor Tertii Internodii Digitorum**, arises from half the Ulna, and a great part of the Ligament between the Ulna and Radius, then becoming Four Tendons, passes under the Ligamentum transversale Carpi.
Sale Carpi, and thro' the Tendons of the former Muscle to their Insertion into the third Bone of each Finger. The Tendons of both these Muscles are tied down to the Fingers by a strong Ligament.

Lumbricales or Flexores Primi Internodii Digitorum, arise from the Tendons of the last mention'd Muscle; and are inserted laterally toward the Thumb into the beginning of the first Bone of each Finger.

Tab. x. 13. Extensor Digitorum Communis, arises from the outer extuberance of the Os Humeri, and passing under a Ligament, at the Wrist, is divided into four Tendons which communicate upon the first Joint, which keeps them from sliding off the Joints of the Fingers, where they are a little connected to the first Bones, and afterward are inserted into the beginning of the second Bone of each Finger.

Extensor Auricularis or Minimi Digitii, is a portion of the last Muscle passing under the Ligament in a distinct Channel.

Extensor Indicis, arises from the middle of the Ulna, and passing under the Ligament of the Carpus, is inserted with the Extensor Communis into the Fore-finger. This Muscle extends the Fore-finger singly. I have twice seen it wanting.
INTEROSSEI, are six bicipital Muscles in the Interstices of the Metacarpal Bones, arising from their sides, and running obliquely to the Top of each Finger, are inserted into the last Bone of each Finger. These either extend or divide the Fingers, with the assistance of the Two following Muscles.

ABDUCTOR INDICIS, arises from the lower part of the first Bone of the Thumb and the Metacarpal Bone of the first Finger, and is inserted into the last Bone of the Finger, like the Interossei. That part of this Muscle that arises from the Thumb is also a true Ad-ductor of the Thumb, and, I think, the only Muscle in the Body that in any Case acts at an obtuse Angle.

ABDUCTOR MINIMI DIGITI, is always Two distinct Muscles; the first of which draws the Little Finger from the rest, and extends it; it arises from the transverse Ligament and fourth Bone of the Carpus, and is inserted like the Interossei; the other arises from the eighth Bone and transverse Ligament of the Carpus, and is inserted into the Metacarpal Bone of the Little Finger, which it pulls toward the Thumb to constrict the Palm of the Hand.

EXTENSOR PRIMI INTERNODII POL-LICIS, arises from the Ulna below the Anco-nceus Muscle, and the Ligament between the Ulna and Radius, then becoming Two, Three, or
or Four Tendons, is inserted into the fifth Bone of the Carpus, and first of the Thumb. The first of these Insertions can only assist the bending of the Wrist upward, and in turning the Arm supine.

Extensor Secundi Internodi Pollicis, arises immediately below the former, from the Radius and transverse Ligament, and is inserted by a few Fibres into the second Bone of the Thumb, but chiefly into the third.

Extensor Tertii Internodi Pollicis, arises immediately below the last describ'd, from the Ulna and Ligament, and passes over the Radius nearer the Ulna to be inserted at the third Bone of the Thumb: This extends the Thumb more toward the Ulna than the former Muscle.

Flexor Primi Et Secundi Ossis Pollicis, arises from the fifth Bone and transverse Ligament of the Carpus, and from the beginnings of the two first Metacarpal Bones, and is inserted into the whole length of the first Bone of the Thumb, and Tendinous into the beginning of the second; the Sesamoid Bones of the Thumb, in such Bodies as have them, lie in this Tendon, where it passes over the Joynt. This Muscle may, in some Bodies, be divided into Three.

Flexor Tertii Internodi Pollicis, arises large from almost all the upper part of the
the Radius, and becoming a round Tendon passes under the Ligamentum transversale Carpi to be inserted into the third Bone of the Thumb: This Muscle singly acting, draws the Thumb toward the Metacarpal Bone of the Little Finger; but the last mention'd Muscle acting with it, turns it toward the Fore-finger.

Adductor Pollicis, arises from the Carpus, and almost the whole length of the Metacarpal Bone of the Long-Finger, and is inserted into the beginning of the second Bone of the Thumb. This Muscle naturally enough divides into Two, and might better be call'd a Flexor than Adductor.

Abductor Pollicis, arises from the fifth Bone and Ligamentum transversale of the Carpus, and is inserted laterally into the beginning of the second Bone of the Thumb to draw it toward the Radius.

Supinator Radii Longus, arises from the lower and outer part of the Os Humeri, and is inserted into the upper side of the Radius near the Carpus: This Muscle bends the Cubit at a longer lever then either of the Muscles that are appropriated by Anatomists for that use, and is not more a Supinator than the Extensors of the Carpus that lie under it, nor so much a Supinator as any of the Extensors of the Thumb.

Supinator Radii Brevis, arises from the outer Extuberance of the Os Humeri and
and upper part of the *Ulna*, and running half round the *Radius*, is inserted near its Tubercle.

**Pronator Teres**, arises from the inner Apophysis of the *Os Humeri*, and upper and forepart of the *Ulna*, and is inserted Tendinous into the *Radius* below the former.

**Pronator Quadratus**, arises from the lower Edge of the *Ulna* near the *Carpus*, and passing under the Flexors of the Fingers, is inserted into the upper part of the *Radius*.

These Muscles are occasionally assisted in their Actions by Muscles of the Hand; most of the Extensors assisting the Supinators, and most of the Flexors the Pronators, and most of the Extensors of the Hand take a great part of their Origin from the Tendinous *Fascia* that covers them.

**Mastoideus**, arises Tendinous from the *Sternum* near the *Clavicular*, and by a separate fleshy portion from the *Clavicular* which soon unites with the other beginning, and is inserted to the outer part of the Mamillary Process of the Temporal Bone. This with its Fellow, pull the Head and Neck toward the Breast, and act with a much longer lever upon each lower *Vertebra*, than they do upon the next above. This Muscle being inserted into the Head, beyond the Center of Motion of the Head with the first *Vertebra*, has been supposed by Mr. Comper, and others.
Of the Muscles.

Of the Muscles.

others, to pull the Head backward; but passing beyond signifies nothing to that purpose, unless a Line passing thro' its Axis would pass below the Center of Motion: And it is the more to be wonder'd how this Mistake prevail'd, if we consider that this Muscles being added to the Exteriors of the Head and Neck, would make the force of that Action more than a hundred times greater than that of the Benders. And if this is not enough to convince, let any one lying on his Back raise his Head, and he will soon feel this Muscle in action; but bowing the Head forward in an erect Posture will not show this, unless some resistance is made to the Head, because the Center of Gravity of the Head lying before the Center of Motion, there needs no more than a relaxation of the Exteriors to bring the Head forward, in that Posture.

Rectus Internus Major, arises from the anterior part of the Transverse Processes of the third, fourth, fifth and sixth Cervical Vertebrae, and passing over the Two superior, is inserted into a Roughness of the Occipital Bone near the fore-part of the great Foramen. This bends the Head on the Two first Vertebrae off the Neck.

Rectus Minor Internus, arises under the last Muscle, from the first Vertebra, and is inserted under it into the Os Occipitis. This bends the Head on the first Vertebra.

Rectus
Rectus Lateralis, arises from the anterior part of the transverse Process of the first Vertebra of the Neck, and is inserted into the Os Temporis and Occipitis between the Mamilary and Styloid Processes. This turns the Head to one side.

Splenius, arises by a thin Tendon from the Spinal Processes of the Five superior Vertebra of the Thorax, and Two inferior of the Neck, and Linea alba Colli, and is inserted into the Os Occipitis, the upper part of the Mamilary Process of the Temporal Bone, and the Transverse Processes of the Three superior Cervical Vertebra. This pulls the Head and Neck backward, and to the contrary side, but both of these acting together pull them directly backward.

Complexus, arises from the Transverse Processes of the Six or seven superior Vertebra of the Thorax, and Six inferior of the Neck, and is inserted into the Os Occipitis, and back-part of the Os Temporis; which last part in some Bodies is separate. This pulls the Head back.

Rectus Major Posticus, arises from the Spinal Processes of the second Vertebra of the Neck, and is inserted broader into the Os Occipitis. It pulls the Head back on the Two first Vertebra.

Rectus Minor Posticus, arises from the back-part of the first Vertebra of the Neck,
it having no Spinal Process) and is inserted below the former into the same Bone to pull the Head back on the first *Vertebra*.

**Obliquis Superior**, arises from the Transverse Process of the first *Vertebra*, and is inserted into the *Os Occipitis* near the *Raputus major*; either of these acting, assist the *Raputus lateralis* on the same side; but both together, pull the Head back.

**Obliquis Inferior**, arises from the Spinal Process of the second *Vertebra* of the Neck, and is inserted into the Transverse Process of the first. This, with its Fellow, alternately acting, turn the Head with the first *Vertebra* in a rotatory manner on the second, whose *Processus Dentatus* is the *Axis* of this Motion.

**Interspinales Colli**, are Three or Four pair of Muscles between the Bifid Processes of the Cervical *Vertebra*, which they draw nearer each other when the Neck is bent backward.

**Longus Colli**, arises laterally from the Bodies of the Four superior *Vertebra* of the *Thorax*, and from the anterior part of the Transverse Processes of the Five inferior *Vertebra* of the Neck, and is inserted into the forepart of the first and second *Vertebra* of the Neck, which it bends forward.

**Intertransversales Colli**, are portions of Flesh between the transverse Processes.
Of the Muscles.

Cefses of the **Vertebra** of the Neck, like the **Interspinales**, but not so distinct; they draw those Processes together.

**Spinalis Collis**, arises from the transverse Processes of the Five superior **Vertebrae** of the Back, and is inserted into the **Spinal** Processes of the second, third, fourth and fifth **Vertebrae** of the Neck. This pulls the Neck backward.

**Transversalis Collis**, arises from the oblique Processes of the four inferior **Vertebrae** of the Neck, and is inserted into the **Spinal** Process of the second **Vertebra** of the Neck. This Muscle is but a continuation of the **Transversalis** or **Semispinalis Doris**.

The Muscles of the Head and Neck are most of them obliquely directed, which makes them perform the oblique Motions, as well as Extension and Flexion, which is highly convenient in this Case, because the Joints mov'd by these Muscles, being under the weight mov'd; it is necessary that the Head shou'd be kept steady by the **Extensiors**, and Flexors too, when any great weight is upon the Head; and these Muscles from the obliquity of their Directions, not only perform these two Actions at once; but acting by pairs they move the Head and Neck steadily, in a diagonal Direction, which freight Muscles cou'd not have done.

**Scalenus**, arises from the transverse Processes of the second, third, fourth and fifth **Cervical**
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**Intercostales**, are Eleven Pair on each side, in the Intercinges of the Ribs; from their Order of Fibres distinguish’d into External and Internal; they all arise from the under Edge of each Rib, and are inserted into the upper Edge of the Rib below. The External are largest backward, having their first beginnings from the transverse Processes of the Vertebra like distinct Muscles, which some call *Levatores Costarum*. The Internal run all from above obliquely backward; being thickest forward, and thinnest toward the Spine. These are also continu’d betwixt the Cartilages of the Ribs, with Fibres perpendicular to the Cartilages; and between the Cartilages of the lowest Ribs, they are inseparable from the *Obliquus ascendens Abdominis*. These Muscles by drawing the Ribs nearer to each other, pull ’em all upward, (they being sustain’d at the top by the Scalenus and *Serratus superior posticus*) and dilate the *Thorax*. To these Mr. *Cowper* adds some fleshy Fibres, which run from one Rib over a second to a third, near the Spine, which he calls *Depressores Costarum*; but these Fibres must as certainly be *Levatores Costarum*, as the *Intercostales*, unless they arise below, from the transverse Processes of the *Vertebra* of the Back.

**Triangularis Sterni**, arises internally from the Edge of the *Os Pectoris*, and is inserted into the Edge of the second,

third,
Of the Muscles.

Third, fourth, fifth and sixth ribs. This pulls the ribs to the bone of the sternum, and thereby bends its cartilages in expiration.

Diaphragma, arises on the right side tab. A, B, by a process from three lumbal vertebra, and one of the thorax; and on the left, from the one superior of the loyins, and inferior of the thorax; (this last part being less to give way to the great artery) and is inserted into the lower part of the sternum and the five inferior ribs. The middle of this muscle is a flat tendon, from whence the fleshly fibres begin, and are distributed, like radii, from a center to a circumference. When this muscle acts alone, it constricts the thorax, and pulls the ribs downward, and approaches toward a plain; which action is generally perform'd to promote the ejection of the faces. In large inspirations, when the intercostals lift up the ribs to widen the thorax, this muscle acts enough to bring it self toward a plain without overcoming the force of the intercostals; y which means the breast is at once widen'd and lengthen'd: When it acts with the abdominal muscles it draws the ribs nearer together, and constricts the thorax, and the superior force of the abdominal muscles thrusting the parts of the lower belly against it, it becomes at the same time convex upward, and shortens the thorax, which occasions the largest expirations; or acting alternately with the abdominal muscles
Muscles only, a more moderate Inspiration and Expiration is made by shortening and lengthening the Thorax only, which is what we chiefly do when lying down; or acting alternately with the Intercostals only, a moderate Expiration and Inspiration, is caus'd by the widening and narrowing the Breast, which is what we are most prone to in an erect Position, the Muscles of the Abdomen, at such times, being employ'd in supporting the Parts contain'd in the Abdomen. And tho' these Motions of the Ribs require at any one time but very little Force, the Air within the Thorax ballancing that without; yet that these Muscles whose Motions are essential to Life may be never weary, the Inspirators in most Men, have Force sufficient to raise Mercury in a Tube four or five and twenty Inches, in an erect Posture, and the Exspirators six or seven; the first of which will require about Four thousand pound Force, in most Men, and the other proportional. But, I imagine, that lying down, these Proportions will differ by the weight of the Parts contain'd in the Abdomen. In all the Bodies I have Dissected, I have found the Diaphragm Convex upward, which gave me occasion to think, that all Animals died in Expiration, 'till the foremention'd Experiment discover'd, that the Muscles of Inspiration were stronger than those of Expiration; which led me to make the following Experiment. I cut the Wind-pipe of a Dog, and having a String ready
I tied the cork in place, and immediately after inspiration, upon which I observed, that the diaphragm, and the other muscles of inspiration and expiration, were alternately contracted, and distended for some time; but when he was dead, the abdominal muscles were in a state of contraction, the ribs were elevated to dilate the thorax, and the diaphragm was convex upward; which also shews, that the diaphragm is not a muscle of equal force either to the depressors or elevators of the ribs, it neither hindering the elevators from raising the breast, nor the depressors from thrusting it upward, by compressing the parts contain'd in the abdomen, tho' the breast was full of air.

SACER, SACROLUMBALIS, LONGISIMUS DORSI, and SEMISPINALIS, are all that portion of flesh betwixt the os sacrum and the neck, which, seeing there is no membrane to distinguish it into several muscles, and that it is all employ'd in the same actions, I shall give it the name of extensor dorsi & lumborum, and describe it all as one muscle.

EXTENSOR DORSI ET LUMBORUM, rises from the upper part of the os sacrum, the spine of the os ilium, and the back-parts of the lowermost vertebra of the loins; that part of this muscle which is known by the name of sacrolumbalis is inserted into all the ribs near their arti-
Articulations, with the Transverse Processes off the Vertebra, and into the Transverse Processes of the last Vertebra of the Neck; besides, as this passes over the Ribs, it receives an Origin from every Rib, in a manner that cannot well be describ'd: The next portion of this Muscle, call'd Longissimus Dorfi, is inserted into all the Transverse Processes of the Vertebra off the Back, and partly into the Ribs, and the uppermost transverse Processes of the Vertebra of the Loins; and the upper end of it is neither very distinct from the Complexus of the Head, nor Spinalis of the Neck. The rest of this Muscle, known by the Names of Semispinalis Sacer, &c. arises also from all the transverse and oblique Processes of the Loins and Back: every portion, except the lowermost, passing over five Joints, is inserted into the Spinal Process of the sixth Vertebra above its Origin all the way up the Back; and at the Neck commences Transversalis Colli: This passing of each Portion of a Muscle over a few Joints distributes their Force equally enough among all these Joints, without the Fibres being directed more obliquely than those of Penniforme Muscles; but the Neck and Loins not having sufficient Provision of this sort, there are final Muscles between their Processes, which tho' they are of small Importance for the Motions of those parts, are sufficient to distribute the Force of larger Muscles equally among those Joints:
Of the Muscles.

Of the Muscles; and besides the uses of the Extensor Dorfi & Lumborum, which its Name implies, it, and its Fellow, alternately raise the Hips in Walking, which any one may feel by laying Hand upon the Back.

**Quadratus Lumborum**, arises Muscles of the Loins from the upper part of the Spine of the Hium, and is inserted into all the Transverse Lumbal Processes. This, with its Fellow, acting alternately, assist the last mention'd Muscle in raising the Osia Innominata in Progression. Each acting singly, while the lower Limbs are not mov'd, inclines the Body to one side; or both, draw the Body forward.

**Intertransversales Lumborum**, are small Muscles seated between all the Transverse Processes of the Vertebra Lumborum, to bring them nearer together.

**Psoa Parva**, arises laterally from the body of the first Lumbal Vertebra, and soon becoming a small Tendon, is inserted into the Os Innominatum at the joyning of the Hium and Pubis. It either assists in bending the Joyns forward, or raising the Os Innominatum in progressive Motions. This Muscle is often wanting.

**Psoa Magna**, arises laterally from the bodies of the Four superior Vertebra of the Joyns, and is inserted with the following Muscle into the Os Femoris, near the leffer H 2 Tro-
Trochanter. This bends the Thigh, and when the Psoa Parva is wanting this is larger.

ILIACUS INTERNUS, arises from the concave part of the Ilium, and from its lower Edge, and passing over the Ilium near the Os Pubis, joins the former Muscle, and is inserted with it, to be employ'd in the same Action.

PECTINEUS, arises from the Os Pubis or Pectinis, near the joyning of that Bone with its Fellow, and is inserted into the Linea Aspera of the Thigh-bone, for about Four Fingers breadth below the lesser Trochanter. This bends the Thigh and turns the Toes outward.

TRECEPS FEMORIS, the two lesser Heads of this Muscle arise under the Pectineus, and the third from the inferior Edges and back-part of the Os Pubis and Ischium, and it is inserted into the whole length of the Linea Aspera and the inner Apophysis of the Os Femoris. This also bends the Thigh and turns the Toes outward. When the Thigh-bone is mov'd in a plain, which cuts at Right-Angles a plain that passes thro' the Axis of either Head of the last Muscle, that Head rising lower than the Center of Motion of the Hip-Joynt, it will equally assist both the Flexors and Extenors, and that most when the Bone has been mov'd most backward or forward; and as either of these Heads lie more or less out of the said plain, they will give greater assistance to that Motion which is made.
made on the side of the said plain, contrary to their situation, and less on the same side. This Mechanism is frequently made use of to make one Muscle serve different Actions; but I have only explain'd it in this instance, because it is the most considerable one that I know.

**Gluteus Maximus**, arises from the back-part of the Spine of the *Ilium*, and the *Dorsum Ilii*, and side of the *Os Coccygis and sacrum*, and a Ligament extended between these bones, and from a thin *Fascia* spread over that part of the following Muscle, which this does not cover, and is inserted by a strong Tendon into the upper part of the *Linea Aspera* of the Thigh-Bone, and also into the flat Tendon of the *Fascialis* Muscle; which latter Insertion, tho' very considerable, is not often observ'd. This extends the Thigh, and both these together being contracted, occasionally assist the *levator Ani* in supporting the *Anus*. The breadth of the Origin and Insertion (partly into a Tendon) of this Muscle, is very observable, for by that means, tho' it is the largest Muscle in the Body, it is nevertheless Right- 'n'd, without one Fibre compressing another more than in *Penniforme* Muscles.

**Gluteus Medius**, arises from all the interior part of the *Spina* and *Dorsum Ilii*, and under part of the last mention'd Muscle, and is inserted into the upper part of the great *H 3 Tro*.
Trochanter of the Thigh-bone. This extends the Thigh outward.

Gluteus Minimus, arises entirely under the former, from the Dorsum Ilii, and is inserted into the upper and anterior part of the great Trochanter, to extend the Thigh.

Piriformis, arises internally from the inside of the Os Sacrum, and growing in more than half its progress into a round Tendon, is inserted into the upper part of the great Trochanter. This assists somewhat in extending the Thigh, but more in turning it outward.

Quadratus Femoris, arises from the obtuse Process of the Ischium, and is inserted into the upper part of the Linea Aspera of the Thigh-bone, between the two Trochanters. This draws the Thigh inward, and directs the Toes outward.

Obturator Internus, or Marsupialis, arises generally from a strong Membrane or Ligament, which fills up the Hole of the Os Innominatum, and from the Circumambient Bone; thence passing over a Channel in the Ischium between its two Processes, it receives from them two other portions, which are a sort of Marsupium; and is inserted into the Sinus of the great Trochanter. This turns the Thigh outward.

Obturator Externus, arises opposite to the former, from the outside of the Os Innominatum, and is inserted into the Sinus of the
he great Trochanter. This also turns the Thigh outward. These Four last mention'd Muscles acting with the Extensors, prevent their turning the Toes inward, or acting alone they turn them outward, and draw the Thigh inward; and as these direct, the same Extensors will turn the Thigh either outward or backward, with their full force.

**Fascialis or Membranousus**, arises from the fore-part of the Spine of the Ilium, and in about Five Inches progress becomes a flat Tendon or Fascia, which is join'd by a considerable detachment from the Tendon of the Gluteus maximus, and then covering in an especial manner the Vastus externus Muscle, is insert'd at the top of the Fibula, and then proceeds to join the Fascia, which covers the upper part of the Muscles situate on the outside of the Tibia, which about the middle of the Leg grows loose, and is so continu'd to the top of the Foot, being connected there and at the lower part of the Leg, to the Ligaments which tie down the Tendons; this Tendon, where it covers the Vastus externus, receives additional transverse Fibres, which run round the Thigh, but are most conspicuous on the outside. This draws the Thigh outward, and passing over the Knee forwarder than its Center of Motion, it will help to extend that Joyn't.

**Gracilis**, arises from the Os Pubis close to the Penis, and is insert't into the Tibia Four
or Five Fingers breadth below the Knee. This draws the Leg toward its Origin, and passing over the Knee behind its Center of Motion, it will help to bend it.

Sartorius, arises from the fore-part of the Spine of the Ilium, and thence descending obliquely to the inside of the Tibia, is there inserted Four or Five Fingers breadth below the Joint. This at once helps to bend both the Thigh and Leg, (particularly the Thigh) at very long Levers; it directly helps to lift up the Leg in walking up Stairs, or laying the Legs across like Taylors.

Semitendinosus, arises from the obtuse Process of the Ischium, and growing a round Tendon in somewhat more than half its progress, is inserted near the former Muscles into the Tibia; it helps to extend the Thigh and bend the Tibia.

Semimembranosus, arises by a flat Tendon like a Membrane from the obtuse Process of the Ischium, and being continu’d tendinous betwixt the Bellies of the last mention’d and following Muscles, and then growing fleshy, becomes again tendinous above the Joint, and is inserted nearer the Joint than the former Muscle for the same Use.

These Two make the Internal Hamstring, and arising and inserting so near together, they might have been one Muscle, but their Fibres would have been twice as long, which would
you'd have given a Motion twice as quick, and
but half so strong, unless it had been inserted at a
distance from the joints it would be liable to move
proportionable to its length, which could not
well be, therefore NATURE has made them
two Muscles of a Number of Fibres nearly equal
to what one could have been, and about half the
length, and inserted them accordingly, at dis-
cances from the Center of Motion of the Knee,
proportional to the different lengths of their
fibres in the directions of their Axes.

Biceps TIBIÆ, the first Head arises in
common, with the Two preceding Muscles, from
the obtuse Process of the Ischium; the second
from the lower part of the Linea Aspera of
the Thigh-bone; this soon joyns the former,
and is inserted with it into the upper part of
the Fibula to bend the Leg, and the first Head
also extends the Thigh. The Tendon of this
Muscle makes the External Hamstring.

Popliteus, arises from the outer Apo-
bysis of the Os Femoris, and thence running
obliquely inward, is inserted into the Tibia im-
mediately below its Head. This assists the Flex-
ors, and draws the Tibia toward the outer Apo-
bysis of the Thigh-bone, whereby they make
an obtuse Angle, and the Leg becomes per-
tpendicular to the Center of Gravity in pro-
tression.

Rectus Tibiæ, arises with a Tendon
from the upper part of the Acetabulum of the
Os
Os Innominatum, and by another Tendon (which is a sort of Ligament to this) from a Processus Innominatus of the Ilium below its Spine forward, and is inserted together with the Three following Muscles into the Patella. It bends the Thigh, and extends the Tibia.

Vastus Externus, arises from the anterior part of the great Trochanter and outside of the Linea Aspera of the Thigh-bone, and is inserted into the upper and external part of the Patella. It extends the Tibia.

Vastus Internus, arises from the inner and lower part of the Linea Aspera, and is inserted into the upper and inner part of the Patella, to extend the Tibia; and the Fibres of this Muscle being oblique, it keeps the Patella in its place, the other Muscles lying in the direction of the Os Femoris, which makes an obtuse Angle with the Tibia; they would alone be liable to draw the Patella outward. This Contrivance is most obvious in those whose Knees bend most inward.

Crureus, arises between the Two last and under the Rectus, from all the convex part of the Os Femoris, and is inserted in like manner into the Patella; the Patella being ty'd down by a strong Ligament to the Tibia. These three last Muscles extend the Tibia only, and might very properly be call'd, Extensor Tibiae Triceps.
When the *Patella* is so broke transverse that the part into which the Muscles are inserted is distinctly separated from that by which the Ligament is fix'd, the Fracture can never be cur'd, because the Muscles will keep the parts asunder; but when the Fracture is otherwise it admits of Cure.

**Gasterocnemius**, arises by Two small Muscles of the *Tarsus*. Beginnings from the back-part of the *Apophyses* of the *Os Femoris*, which soon becoming large Bellies unite, and then become a flat Tendon which joyns the following Muscles to be inserted into the *Os Calcis*. The two parts of this Muscle, are by some Writers distinguish'd into Two Muscles. Its use is to extend the *Tarsus* and bend the *Knee*.

**Plantaris**, arises under the outer Beginning of the last nam'd Muscle, from the external *Apophyses* of the *Os Femoris*, and soon becoming a small Tendon, is so continu'd betwixt the foregoing and subsequent Muscles, and is inserted with them. It bends the *Knee* and extends the *Tarsus*. Authors derive the Tendinous expansion on the bottom of the *Foot* from the Tendon of this Muscle; But seeing the Expansion is much more than this Tendon could make, and that this Tendon can be trac'd no farther than the *Os Calcis*, and that the Expansion is as large when the Muscle is wanting, which is not seldom, I cannot be of that Opinion.
Gasterocnemius Internus, arises from the upper part of the Tibia, and one third of the Fibula below the Popliteus, and is inserted with the Two foregoing Muscles by a strong Tendon into the upper and back-part of the Os Calcis. This Muscle only extends the Tarsus.

Tibialis Anticus, arises from the upper and exterior part of the Tibia, and is inserted laterally into the Os Cuneiforme majus of the Tarsus. This bends and turns the Tarsus inward.

Tibialis Posticus, arises under the Flexors of the Toes from the upper and middle part of the Tibia, and from the middle of the Fibula, and the Ligament betwixt the Tibia and Fibula; then growing a round Tendon, passes under the inner Ankle, and is inserted into the lower part of the Os Naviculare. This extends and turns inward the Tarsus.

Peroneus Longus, arises from the upper and outer part of the Fibula, and growing a Tendon toward the lower part of this Bone, passes under the outer Ankle, and the Muscles situated on the bottom of the Foot, and is inserted into the beginning of the Metatarsal Bone of the great Toe, and the Os Cuneiforme next that Bone. This turns the Tarsus outward, and directs the force of the other Extensors of the Tarsus toward the Ball of the great Toe.
Of the Muscles.

Peroneus Brevis, arises from the middle of the Fibula, under a part of the former, and growing Tendinous, passes under the outer Ankle, and is inserted into the beginning of the upper part of the Os Metatarsi of the Little Toe, and sometimes beflows a small Tendon on the Little Toe. Its use is to extend the Tarsus, and turn it outward.

These two last Muscles riding over the lower end of the Fibula, are often the cause of a Sprain in the outer Ankle; when they are vehemently exerted, to save a Fall, and sometimes they have even broke the lower end of the Fibula, and Sprain'd the Ankle at once.

Extensor Pollicis Longus, arises from the upper and middle part of the Fibula and Ligamentum Transversale, and soon becoming a strong Tendon, is inserted into the last Bone of the great Toe. This also bends the Tarsus with a much longer Lever than it extends the Toe.

Extensor Pollicis Brevis, arises from the upper part of the Os Calcis, and is inserted into the same place with the former.

Flexor Pollicis Longus, arises from the Fibula, opposite to the Extensor longus, and then passing under the inner Ankle, is inserted to the under side of the last Bone of the great Toe. This extends the Tarsus at a longer Lever than it bends the Toe.

Flexor
Flexor Brevis, and Adductor Polllicis, are the same Muscle, arising from the two lesser Osse Cuneiformia and Os Cuboides, and Calcis; they are inserted into the Osse Sesamoidea, and 't is to the first Bone of the great Toe, reckoning only two Bones to the great Toe. These Muscles bend the great Toe.

Adductor Polllicis, arises pretty large from the inner and back-part of the Osse Calcis, and by a smaller Beginning from the Osse Navicularis; thence passing forward contiguous to the Osse Cuneiforme majus, becomes inserted into the external Sesamoide Bone of the great Toe. This Muscle is less an Abductor than a Flexor Polllicis Pedis, as is evident from its Insertion into the Sesamoide Bone; it also very much helps to constrict the Foot lengthways.

Transversalis Pedis, arises from the lower End of the Metatarsal Bone of the Toe next the least, and is inserted into the internal Sesamoide Bone. This is truly an Adductor of the great Toe, and helps to keep the Constriction of the bottom of the Foot.

Extensor Digitorum Pedis Longus, arises acute from the upper part of the Tibia, and from the upper and middle part of the Fibula and Ligament between these Bones; then dividing into Five Tendons, Four of 'em are inserted into the second Bone of each lesser Toe, and the fifth into the beginning of the Metatarsal Bone of the least Toe,
Of the Muscles.

and sometimes by a small Tendon into the little Toe. This last portion, for the most part, in such Persons as have not been us'd to wear stiff shoes, is separate at its beginning, and in them may be accounted a distinct Muscle. The Four first Tendons only of this Muscle extend the Toes, but all five bend the Tarsus, and that with a longer Lever than any of them bend a Toe.

Extensor 'Digitorum Brevis, rises together with the Extensor Pollicis Brevis from the Os Calcis, and dividing into Three small Tendons, is insert'd into the second Joint of the three Toes next the great one. The long Extensors of the Toes serve not only to extend them, but also contribute to the bending of the Ankle, which Motions are usually perform'd together in Progression; but the short Extensors arising below the Ankle, extend the Toes only; and then the long Extensors are employ'd for that Operation only; the Extensors of the Tarsus must act in the same time, to prevent the bending of the Ankle; this is the reason why the Toes have need, tho' their Motions are less, of more Extensors than the Fingers.

Flexor Brevis of Perforatus, rises from the under and back-part of the Os Calcis, thence passing toward the Three middle Toes, divides into Three Tendons, which are insert'd into the beginning of the second Bone of each of the Three middle Toes. These
Tendons are divided to let thro' the Tendons of the following Muscle. Authors mention another Beginning of this Muscle; but that is a portion of the following Muscle.

**Flexor Longus or Perforans**, arises from the back-part of the Tibia, above the Insertion of the Popliteus, and part of the Fibula; thence descending under the Os Calcis to the bottom of the Foot, becomes Tendinous, which part crosses, and, in most Bodies, communicates with the Flexor longus Pollicis Pedis; then it divides into Four Tendons, (three of which pass thro' those of the Flexor Brevis) which are inserted into the third Bone of each of the Four lesser Toes. This Muscle also extends the Tarsus. The second Beginning of this Muscle arises from the Os Calcis, and joyns the Tendons where they divide. This portion only bends the Toes.

**Lumbricales**, arise from the Tendons of the Perforans, and are inserted into the first Bone of each of the lesser Toes, which they bend.

**Abductor Minimi Digitii Pedis** arises with the Perforatus from the Os Calcis and having a small part of it inserted into the Metacarpal Bone of the least Toe, it receives two more portions, one from the Os Cuboides and one from the Metatarsal Bone of the least Toe, and is inserted into the first Bone of the least Toe, which it bends and pulls outward.
and very much helps to constrict the bottom of the Foot.

**INTEROSSEI**, are seven Muscles which lie like those of the Hands, and arise like them from the Metatarfal Bones, and are inserted like them into the last Joints of the Four lesser Toes. Their Use is to extend and divaricate the Toes; those which bring the Toes toward the great one lying chiefly toward the upper part of the Foot, and the other toward the lower; and if we consider that the first is analogous to the *Abductor Indicis* of the Hand, the Number of these, and those of the Hand, will then be the same.

Tho' a great many Authors have thought it worth while to contend in many Instances which shall be call'd the Origin, and which the Insertion of some Muscles, whose ends have been both liable to be mov'd, yet none of them have consider'd, that every Extensor of the Thigh, *Tibia*, and *Tarsus*, has always had that end which is most mov'd, call'd its Origin, and the other its Insertion; contrary to the Rule which I'll have laid down to judge by.

The Number of the Muscles cannot be adjusted, because Anatomists are neither agreed about some of them, whether they should be counted Muscles or not, nor of others how far they shall be divided; for my own part, I am not for dividing them as far as they can be divided, but as far as is necessary to the Knowledge
ledge of their Uses; accordingly I have made the following List.

<table>
<thead>
<tr>
<th>Part of the Body</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdomen, Penis, Testes, Clitoris, Vagina, Anus, and Os Coccygis</td>
<td>18</td>
</tr>
<tr>
<td>Scalp, outer and inner Ears, Eye-lids, Eyes, Mouth and Nose</td>
<td>50</td>
</tr>
<tr>
<td>Os Hyoides, Tongue, Larynx and Pharynx, Palate and Lower Jaw</td>
<td>47</td>
</tr>
<tr>
<td>Clavicles, Shoulders, Arms and Hands</td>
<td>90</td>
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<tr>
<td>Head and Neck</td>
<td>46</td>
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<tr>
<td>Thorax</td>
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<tr>
<td>Back and Loins</td>
<td>14</td>
</tr>
<tr>
<td>Lower Limbs</td>
<td>84</td>
</tr>
</tbody>
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BOOK III.

CHAP. I.

Of the External Parts, and common Integuments.

The Vulgar Names of the External Parts of the Human Body being sufficiently known for the Description of any Disease or Operation; I shall only Describe those which Anatomists have given for the better understanding of the sub-contain'd Parts.

The hollow on the middle of the Thorax, under the Breasts, is call'd Scrobiculus Cordis. The middle of the Abdomen for about three Fingers breadth above and below the Navel, is call'd Regio Umbilicalis. The middle part above this, Epigastrium. On each side of the Epigastrium, under the Cartilages of the lower Ribs, Hypochondrium; and from below the Regio Umbilicalis down to the Osse Ilia, and Osse Pubis, Hypogastrium.

Cuticula, or Scarf-Skin, is that thin insensible Membrane which is rais'd by Blisters.
Blisters in living Bodies, and by actual Cauteries in dead Bodies: It is extended over every part of the true Skin, unless where the Nails are. That which is rais’d by Blisters appears to me in a Microscope a very fine smooth Membrane, only unequal where the Reticulum Mucosum adheres to it; but that which is rais’d from dead Bodies by an actual Cautery appears like scorch’d Parchment. Lewenboeck, and others, say, it appears Scaly, and compute that a Grain of Sand of the hundredth part of an inch diameter, will cover Two hundred and fifty of these Scales, and that each Scale has about Five hundred Pores; so that, according to them, a Grain of Sand will cover 125,000 Pores, thro’ which we perspire. Its Use is to defend the true Skin that it may not be expos’d to Pain from whatever it touches; and also to preserve it from wearing: On this account it is so contriv’d, as to grow in proportion to the Friction it receives; and is therefore thickest on those parts of the bottom of the Foot which sustain the Body; and in Hands much us’d to Labour; and thinnest of all on the Lips, if that Membrane may be call’d Cuticula.

Between this and the true Skin, is a small quantity of slimy Matter, which was suppos’d, by Malpighi, and others, to be contain’d in proper Vessels, interwoven with one another, and therefore by them nam’d Reticulum Mucosum; but, for my own part, I have never been able.
able to discern in the best Microscopes any such Figure or Vessels; it is most considerable where the Cuticula is thickest, and is black, white, or dusky, such as is the Complexion; the Colour of this, and the Cuticula, being the only difference between Europeans, and Africans or Indians, the Fibres of the true Skin being white in all Men; but the florid Colour of the Cheeks, is owing to the Blood in the minute Vessels of the Skin, and that in the Lips to the Vessels in the Muscular Flesh; for the Cuticula being made of excrementitious Matter, has no Vessels.

Cutis, or True Skin, is a very compact, strong, and sensible Membrane, extended over all the other Parts of the Body, having Nerves terminating so plentifully in all its Superficies, for the Sense of Touching, that the neft pointed Instrument can prick no where without touching some of them. These Nerves are said to terminate in small Pyramidal Papillas, but I can discern no such appearance in the best Microscope; and to me it seems, that a plain Superficies of the Skin (I do not mean Mathematically plain) is much fitter and more agreeable to what we experience of this Sensation; or a plain Superficies exposing all the Nerves like, will give an equal Sensation, while Nerves ending in a Pyramidal Papilla would be exceeding Sensible at the Vertex of that Papilla; and those at the Sides and round the Bafe, which
which would be far the greatest part, would be in a manner useless.

**Glandulae Miliare**s, are small Bodies like Millet Seeds, seated immediately under the Skin in the Axilla's; and are said to have been found under all other Parts of the Skin where they have been look'd for, with Microscopes: As for the first of these, if they are Glands, they are of an extraordinary kind, for they melt like Fat; and those little Bodies that adhere to a bit of Skin carefully Dissected, to me have the very same appearance in a Microscope with bits of Fat of equal Magnitude, taken from any other Part. These Glands, if they are such, are suppos'd to separate Sweat; which Fluid was formerly thought to be only the *Materia Perspirabilis* flowing in a greater quantity, and condens'd, but Santorius has assur'd us, that it is not so, and that more of the *Materia Perspirabilis* is separated in equal times than of Sweat; of the former, he says, usually fifty two ounces a Day at Rome, where his Experiments were made, and of the latter not near so much in the most profuse Sweats; which, I think, favours the Opinion of the existence of these Glands, unless the Sweat being once condens'd upon the Skin, prevents a greater effusion of that Matter. Now that the whole Body, every part of which is most certainly Perspirable, shou'd perspire fifty two ounces in a natural Day, is not at all incredible, and
Of the External Parts, &c.

and perhaps that Mass of Sweat may be these two distinct Fluids, as *Sanctorius* calls them, joyn’d together. I wish those who have more Leisure and Judgment than my self, wou’d examine these Glands, (if they are such) more nicely, because so much Theory of Cutaneous Diseases depends upon their existence.

**Membrana Adiposa**, is all that Membrane immediately under the Skin, which contains the Fat in Cells; it is thickest on the Abdomen and Buttocks, and thinnest nearest the Extremities; and where the Muscles adhere to the Skin, and on the Penis, none. It contributes to keep the inner Parts warm, and by filling the Interfaces of the Muscles, renders the Surface of the Body smooth and beautiful.

**Mammæ, the Breasts**, are of the same structure in both Sexes, but largest in Women. They are a number of small Glands to separate Milk, seated in the Membrana adiposa, with their Excretory Ducts, which are capable of very great Distention, tending toward the Niple, which as they approach, they unite, and make but a few Ducts at their exit. There are to be met with in Authors, Instances, sufficiently attested, of Mens giving Suck, when they have been excited by a vehement Desire of doing it. And it is a common Observation, That Milk will flow out of the Breasts of new-born Children, both Male and Female.
Of the Membranes in general.

I have known an Instance of a Bitch giving Suck to the Puppies of another, when herself has had none, nor given Suck to any for more than a Year before.

CHAP. II.

Of the Membranes in general.

Every distinct Part of the Body is cover'd, and every Cavity is lin'd with a single Membrane, whose thickness and strength is as the bulk of the Part it belongs to, and as the Friction to which it is naturally expos'd.

Those Membranes that contain distinct Parts, keep the Parts they contain together, and render their surfaces smooth, and less subject to be lacerated by the Actions of the Body. And those which line Cavities, serve to render the Cavities smooth, and fit for the Parts they contain to move against.

The Membranes of all the Cavities that contain solid Parts, are studded with Glands, or are provided with Vessels, which separate a Mucus to make the Parts contain'd move glibly against one another, and not grow together. And those Cavities which are expos'd to the Air, as the Nose, Ears, Mouth, and Trachea Arteria, have their Membranes beset with Glands, which separate Matter to defend them from
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Of the Salivary Glands.

From the outer Air. Those Membranes that have proper Names, and deserve a particular description, will be treated of in their proper places.

CHAP. III.

Of the Salivary Glands.

AROTIS or MAXILLARIS SUPERIOR, is the largest of the Salivary glands; it is situate behind the Lower Jaw, under the Ear; its Excretory Duct passes over the upper part of the Masseter Muscle, and enters the Mouth thro' the middle of the Bucinator. This Gland has its Saliva promoted by the Motions of the Lower Jaw. The Duct of this Gland passes over the Tendinous part of the Masseter Muscle that it may not be compressed by that Muscle, which would obstruct the Saliva in it, tho' it is frequently said that it passes over that Muscle that it may be compressed by it to promote the Saliva. In Sheep and Calves, their Jaws being long, this Muscles inserted far from the Center of Motion, that it may have sufficient strength at the end of so long a lever of Resistance, and that distant insertion requiring a greater length of Muscle, that its Motion may be quick enough, no
no part of this Muscle cou'd be allow'd to be Tendinous, therefore, to avoid the inconvenience of Compression from the Muscle, this Duct in those Animals goes quite round the lower end of it. When this Duct is divided by an external Wound, the Saliva will flow out on the Cheek, unless a convenient Perforation be made into the Mouth, and then the external Wound may be heal'd. I have seen Two Patients with this Gland Ulcerated, from which there was a constant effusion of Saliva, 'till the greatest part of the Gland was consum'd with Red Mercury Precipitate, and then it heal'd with little trouble. Hildanus mentions the same Case, which for Two Years had been under the Care of a Surgeon without Success; and was at last cur'd by the Application of an actual Cautery.

Maxillaris Inferior, is situate between the Lower Jaw, and the Tendon of the Digastrick Muscle; its Duct passes under the Musculus Mylohyoideus, and enters the Mouth under the Tongue, near the Dentes Scissorii. I was at the opening of a Woman who was Suffocated by a Tumor which begun in this Gland; it extended itself from the Sternum to the Parotid Gland on one Side in Six Weeks time, and in Nine Weeks kill'd her. It was a true Schirrous, and weigh'd Twenty six Ounces. In a Man which I Dissected, I found a quantity of Pus near this Gland, and a Bundle of
Of the Salivary Glands.

Matter not unlike Hair, as large as an Hen's Egg.

Sublingualis, is a small Gland situated under the Tongue, between the Jaw and the Gerataglossus Muscle; it sends its Duct into that of the Maxillaris Inferior.

Tonsilla, is a Globular Gland about the bigness of a Hazel-Nut, situate upon the Pterygoideus Internus Muscle, between the Root of the Tongue and the Uvula; it has no Duct continued from it, but empties all its small Ducts into a Sinus of its own, which Sinus, when the Gland is inflam'd, may easily be mistaken for an Ulcer. This Gland with its Fellow, direct the masticated Aliment into the Pharynx; and also serve for the Uvula to shut down upon when we breathe thro' the Nose. They are compress'd by the Tongue and the Aliment, when the former raises the latter over its Root, and thereby opportunely emit their Saliva to lubricate the Food for its easier descent thro' the Pharynx. A Schirrous Tumor of either of these Glands is a common Disease, and it admits of no Remedy but Extirpation; yet it must not be perform'd upon the whole Gland, but so much of it as is become supernaturally eminent; because that would be very dangerous as well as difficult, and render it unfit for the afore-mention'd Uses. I once saw them totally destroyed by Venereal Ulcers, and the Palate, which was whole, hav-
ing nothing to shut against, the Patient snuffled almost as much as if the Palate had been gone.

The Gland in the Orbit of the Eye has been esteem'd a Salivary Gland, but I take it to be the Lachrymal Gland; and shall treat of it with the Eye.

Pressure upon the Surface of a Gland very much promoting the Secretion that is made in it, these Glands are so seated as to be press'd by the Lower Jaw, and its Muscles, which will be chiefly at the time when their Fluid is wanted; and the force with which the Jaw must be mov'd, being as the dryness and hardness of the Food masticated, the Secretion from the Glands depending very much upon that force; it will also be in proportion to the dryness and hardness of that Food, which is necessary; for all Food being to be reduced to a pulp, by being mix'd with Saliva before it can be swallow'd fit for Digestion, the drier and harder Foods needing more of this Matter, will from this Mechanism be supplied with more than moister Foods in about that proportion in which they are drier and harder; and the drier Foods needing more Saliva than moister, is the Reason why we can eat less, and digest less of these than those. What quantity of Saliva these Glands can separate from the Blood, in a given time, will be hard to determine, but in eating of dry Bread it cannot be less than the weight of the Bread; and many
many Men, in a little time, can eat more dry Bread than twice the size of all these Glands; and some Men, that are not us’d to Smoaking, can spit half a Pint in the smoaking one Pipe of Tobacco; and many a Man, in a Salivation, has spit, for Days or Weeks together, a Gallon in Four and twenty hours; and yet, I believe, all these Glands put together, do not weigh more than four Ounces.

The Membrane which lines the Mouth and Palate, and covers the Tongue, is every where beset with small Glands, to afford Saliva in all parts of the Mouth to keep it moist; for those more remote, are chiefly concern’d in time of Mastication. These small Glands have Names given ‘em according to their respective situations, as Buccales, Labiales, Linguales, Fauciales, Palatina, Gingivarum, Uvulares.

C H A P. IV.

Of the Peritoneum, Omentum, Ductus Alimentalis and Mesentery.

Peritoneum, is a Membrane which lines the whole Cavity of the Abdomen. It contains the Liver, Spleen, Omentum, Stomach, Guts and Mesentery, with all their Vessels and Glands; the upper part of it is no other
other than the proper Membrane of the Diaphragm, and, but for compliance with Custom, there is no more reason for calling that, part of the Peritoneum, than there is for calling the Membrane on the other side of the Diaphragm part of the Pleura, or Mediastinum. The forepart, next the Muscles of the Abdomen, and their Tendons, is as much a single Membrane as any whatever of equal Solidity; and those Authors who call it double, have always plainly describ'd the Tendons and proper Membranes of the Abdominal Muscles for part of it; that part of it next the Back and Loins, may be said to be double: In its Parts are contain'd the Pancreas, the Kidneys, the great Artery and Vein, with their Iliac Branches, all the Spermatic Vessels, the Ureters, and other Parts of less Note; and to the middle of it, upon the Loins, is join'd the Mesentery in such a manner, as made the Ancients look upon it to be a production of the Peritoneum, agreeably to their Hypothesis of Generation. The lower part of this Membrane lines the Pelvis of the Abdomen, and covers, and in a manner incloses the Bladder of Urine, and part of the Intestinum Rectum; but in all these Places where it is double it is so indistinctly so, that we cannot say precisely where one Lamina ends, and the other begins, except in those Places where Parts are contain'd. In the Dropsie of the Peritoneum, the Water is contain'd between the Peritoneum, and the Muscles
Of the Peritoneum, Omentum, Ducus

Drople of the Abdomen, with their Tendons: This kind of Dropsie may be always known, by being least prominent about the Navel, for there the Tendon and the Peritoneum will not separate; and the Water, in those that I have Distracted, had made the Parts where it was contain'd as foul as any Ulcer; therefore none of them cou'd possibly have been cur'd by Operation.

For the Umblical Vesses, See Chap. Of the Status. For the Processus Vaginalis, Chap. Of the parts of Generation in Men.

Omentum, or Caul, is a fine Membrane larded with Fat, somewhat like Net: It is situated on the surface of the small Guts, and resembles an Apron tuck'd up; its outer or upper part, nam'd Ala superior, is connected to the bottom of the Stomach, the spleen, and part of the Intestinum duodenum; and hence descending a little lower than the Navel, reflected and ty'd to the Intestinum Colon, the spleen, and part of the Duodenum: This last part is call'd Ala inferior; and the Space between the Alae is nam'd Bursa. This Cavity is very distinct in most Brutes, but seldom so in Men. Sometimes both Alae are ty'd to the Liver, and in diseas'd Bodies, to the Peritoneum. Its Use is, to lubricate the Guts, that they may better perform their Peristaltick Motion, in Dponses of the Abdomen, and in Persons who from any other Cause have dy'd Tabid; is generally rotten and decay'd; and sometimes
times the Guts in these Cases adhere to one another. But whether these Adhesions proceed from the Omentum's ceasing to perform its Office, or from the Peristaltick Motion of the Guts, being long discontinu'd thro' Abstinence, or both, I cannot determine. I have seen one instance, from Distention, of a very large Rupture of the Omentum, or Epiploon, into the Groin, together with one of the Guts; the Rupture of the Omentum, is call'd by Authors Epiplocele.

Ductus Alimentalis, is the Oesophagus, Stomach, and Guts, viz. Duodenum, Jejunum, Ilium, Colon, Cæcum or Apendicula Vermiformis, and Rectum.

Oesophagus, or Gullet, is the Beginning of the Alimentary Duct; its upper part is wide and open, spread behind the Tongue to receive the masticated Aliment; it begins from the Basis of the Scull, near the Processus Pterygoide of the Sphenoidal Bone, which part is call'd by some Anatomists Musculus Pterygopharyngeus; this descending becomes round, and is call'd Vaginalis Gula; it runs from the Tongue close to the Spine, under the left Subclavian Blood-Vessels, into and thro' the Thorax on the left side under the great Artery, then piercing the Diaphragm, it immediately enters the Stomach. It is compos'd of a thin outer Coat, which is no more than a proper Membrane to the middle or Muscular Coat. The middle Coat, is compos'd of a Spiral Order of Muscular
Alimentalis and Mesentery.

Fibres, abundantly thicker than the same coat in the Guts; because this has no foreign power to assist it, as the Guts have, and because it is necessary the Food should make a shorter stay here than there. The inner Coat, a pretty smooth Membrane, beset with many islands, which secrete a mucilaginous Matter, which defends this Membrane, and renders the descent of the Aliment easy.

Ventriculus, the Stomach, is rated under the left side of the Diaphragm, its left side touching the Spleen, and its right is cover'd by the thin Edge of the Liver; its Figure nearly resembles the pouch of a jag-pipe, its left End being most capacious, the upper Side concave, and the lower convex; has two Orifices, both on its upper part; the left (thro' which the Aliment passes into the Stomach) is nam'd Cardia, and the right thro' which it is convey'd out of the Stomach to the Duodenum) is nam'd Pylorus; where there is a circular Valve which hinders a return of Aliment out of the Gut, but does not wholly hinder the Gall from flowing into the Stomach.

The Coats of the Stomach are but Three; the external Membranous, the middle Muscular, those Fibres are chiefly Longitudinal and circular, the inner Membranous, and beset with Glands, which separate that Mucous, which fallly call'd Membrana Quarta or Villosoa; the Muscular Coat of the Stomach contracts.
tracts, the inner Coat falls into folds, which increase as the Stomach lessens, and consequently retard the Aliment most when the Stomach is nearest being Empty.

The manner in which Digestion is perform’d, has been matter of great controversy. The Ancients generally supposed the Food concocted by a fermentation in the Stomach: But the Moderns more generally attribute it to the Muscular force of the Stomach, which Dr. Pitcairne has computed to be equal to a Hundred and seventeen thousand and eighty-eight Pound weight, to which being added the absolute force of the Diaphragm and Abdominal Muscles; (but for what reason I am at a loss to conceive, when so small a part of that force can be exerted this way) the Sum then will be more than twice as much; a force indeed equal to the end for which he assigns it. Now this force of the Muscular Coat of the Stomach is near Forty times greater than what Borelli has assign’d to the Heart, which is much stronger; and Dr. Keil has undertook to prove, that the force which the Heart exerts is not Thrice as many Ounces as Borelli computes it to be Thousand Pounds weight. And this is as certain as that action and reaction are the same; that the Abdominal Muscles and the Diaphragm, compriseth the Stomach with no greater force than they do the Liver and all other parts contain’d in the Abdomen; and that
that the Fætus in Utero, and all the Viscera in the Abdomen, receive as much more of this force, during the time of Gestation, as the sign of the Angle, at which the Muscles of the Abdomen act, is increased during that time; and yet neither the Fætus, nor any other contained part, is digested by that force; and for the force with which the Stomach itself acts, will be just the same with the reaction of the Food upon it, and therefore should be as much more liable to be digested by this and the other force than the Food, as it oftener feels these forces than that, (only that living bodies are not so liable to digestion as dead ones): Besides, I think it may be demonstrated, that the force with which the Stomach compresses any part of its contents, is not greater than what is given to equal parts of the contents in the small Guts; for if the moment of a Muscle is as its weight, and if the Muscular Coat of the Stomach does not bear a greater proportion to the Muscular coat of a small Gut, than their Diameters bear; a Section of the Stomach, having so many more equal parts to press than a like Section of a Gut; it will require just so much more force to give each part the same pressure. Mr. Drake has supposed, that Digestion is performed in the Stomach, as in Papins Digester, which Hypothesis are contained all the absurdities of that of Pitcairnes, with this Addition, that
that the Stomach must be as irresistible to distention at that time, as his Iron Pot, and the Orifices as forcibly secured; but then indeed it shews how bits of Bones, which Dogs swallow may be retained in the Stomach without tearing it; which difficulty, in my Opinion, Dr. Pitcairne has not sufficiently accounted for, tho' it is one of the greatest in his Hypothecis. In Granivorous Birds, where Digestion is made by Muscular force, their second Stomach is plainly contriv'd for comminuting or digesting their Food that way; for besides that it is much the strongest Muscles of their Bodies, its inside is defended with an prodigious hard and strong Membrane that it may not be torn; and these Birds always Eat with their Grane the roughest and hardest little Stones they can find, which are necessary for grinding their Food, notwithstanding it is first soaked in another Stomach, and is also Food of very easie Digestion; in Snakes, some Birds, and several kinds of Fish, which swallow whole Animals, Digestion seems to be performed by a Menstruum, for we frequently find in their Stomachs Animals so totally Digested, before their form is destroy'd, that their very Bones are made soft. In Horses and Oxen, Digestion is but little more than extracting a Tincture; for in their Excrements, when voided, we see the Texture of their Food is not totally destroy'd, tho' Grass in particular seems to be of as easie digestion as any Food whatever; and
and the Corn they eat is often voided unbroke, and in the Excrements of Men, are often seen the skins of Fruits undigested. Now if in Men digestion was made either by Attrition, or a Menstruum, or Fermentation only, I neither see how the Stomach and Guts could escape being injur'd, and Worms in these Viscera digestion: All which considerations lead me to think that it is effected in Men by a very moderate share of each of these, and perhaps assisted by that principle of Corruption which is in all Dead Bodys.

Duodenum, is the first of the Three small Guts; it begins from the Pylorus of the stomach, and is thence reflected downward, first passes by the Gall-Bladder, and then under the following Gut and Mesentery, and coming in sight again in the left Hypochondrium, there commences Jejunum, which is the second of the small Guts; but the place where this ends and the other begins, cannot be precisely determin'd. This great length of small guts is evidently for the convenience of a greater number of Lasteals, that the Chyle whichiss their Orifices in one place, may be sent into them in another.

Jejunum, is so call'd from its being Tab. xii. 7. and for the most part empty; it's situated in the Regio Umbilicalis, and makes some-what more than a third part of the small Guts. may be known from the following Gut by its Coats, which are a small matter thinner, and less pale.
ILEUM, is the Continuation of the former, situated in the Hypogastrum, and very often some part of it in the Pelvis of the Abdomen; upon the Bladder of Urine especially. In Women, it enters the Colon on the right Side, near the upper Edge of the Os Ilium.

Colon, is the first of the great Guts; it begins at the upper Edge of the right Os Ilium; thence ascending, passes under some part of the Liver, and the bottom of the Stomach, from the right Hypochondrium to the left, and thence descends to the Pelvis Abdominis.

Cecum, or Appendicula Vermiformis, is situated on the Beginning of the Colon; it is less than an Earth-worm, with a small Orifice opening into the Colon. This Gut has seldom any thing in it. In Men it is called one of the large Guts, tho' it is the smallest by far; but this Mistake arises from Authors Copying the Ancients, whose descriptions of all the Parts contained in the Abdomen, are evidently taken from Dogs, for in them and in many other Animals, it is very large: And some Fish have them in great numbers; I have counted in a Mackarell above 150.

Rectum, is the Continuation of the Colon thro' the Pelvis to the Anus.

The Guts have the same Coats with the Stomach; the Fibres of their middle or Muscular Coat, are Circular, or Spiral, and Longitudinal, of the latter but very few. The
Antagonists to these Muscular Coats of the Stomach and Guts, are the Muscles of the Abdomen, for these pressing upon them alter their form, into one less capacious; which necessarily extends their circular Fibres. The great Guts have three Membranes, or Ligaments, on the outside running their whole lengths, and supporting the Saculi, into which those Guts are divided. The lesser Guts, have at very small distances Semilunar Valves placed opposite to the Interstices of each other; they prevent the Aliment from passing too speedily through the Guts; and the better to answer that end, they are larger and more numerous near the Stomach, where the Food is thinner, than they are towards the Colon, where the Food is continually made thicker in its progress, by a discharge of part of the Chyle. But Brutes have 'em not, because they are not necessary to an Horizontal Posture. At the Entrance of the Ileum into the Colon, are Two very large Valves, which effectually hinder the regress of the Fæces into the Colon; but Clysters have been frequently known to pass them, and be Vomited up, but the Excrement that is sometimes Vomited up, I am inclined to think, is such as had not pass'd into the great Guts: The other Valves in the Colon, are placed opposite (but not in the same Plate) to each other, and make with their anterior Edges an Equilateral Triangle;
but as the Gut approaches the *Anus*, they become less remarkable, and fewer in number.

All the Guts have in their inner Membrane an almost infinite number of very small Glands: These Glands will, some of them especially in the large Guts, appear to the naked Eye when they are diseased: They are call'd *Glandula Pyeriana*.

The length of the Guts to that of the Body is as Five to One, in a middle-sized Man; in taller Men, the proportion is less, and in short Men greater.

The following Case I had thus related (in presence of a great many Gentlemen who had seen the Case) from Mr. Punt of Cambridge, a Gentleman, when Living, well known for his great Skill in Surgery.

"I was call'd to a Poor Woman, a few Years since, with a Mortification upon the Abdomen. I cut away the Mortified part, and found some of the small Guts Mortified. I cut off so much of them as could not be saved, and stitich'd the sound part of the Gut, to a sound part of the Wound, near the Navel; to which it afterward adher'd, and she recovered and voided her Excrement that way, without any notable inconvenience; and at every Stool part of the Gut would thrust out, without any Pain, like a *Prolapsus Ani*: But about a Year after..."
"after the Cure, she died of the Stone," I do not remember that he told me what caused his Mortification, but my Honoured Friend Mr. Folkes, who lets nothing Curious escape his Observation, and was at that time of Clare-Hall in Cambridge, has inform'd me, 'That the Mortification was made by laying hot Bricks to her Belly, for the Colick, some of which Burnt her, and when the Slough cast off a Gut appearing, a Female Surgeon took it for a Blister and clip'd it, upon which the Excrement came out of the Wound, and then they sent for Mr. Punt.

The following Case, was of a Patient to Mr. Walter, a Surgeon, at Lewis in Sussex, whom I have heard relate it; but for this Account, as well as the Cut, I am obliged to his successor in that Town, my Ingenious Friend Mr. Ruffel; but I cannot be of Mr. Walter's Opinion, that it was the Colon that was Mortified.

SIR,

Mrs. Stonestreet, of Lewis in Sussex, had the Exomphalos above Twenty Years, before it was attended with the following Accident. In the Year, 1700, the 28th of May, She was taken with a Colick, and a total Suppression of Stools; the Intestine Mortified, and part of it was taken off by Mr. Walter, a Surgeon, who gave me an account of the Case, and assured me it was
the Colon; the other part was thrust out daily by the Peristaltick motion of the Guts, when the Excrements were voided, till it adher'd to the Wound; and had the just appearance of what is express'd in the Picture I sent you. I had a perfect Examination of it in her Life-time, but no opportunity of Opening her after Death; the Sides of the Intestine firmly adhered to the Belly, and the part which hung out, looked like a pale Scarlet Strawberry, that had not its full Ripeness; and the Coats of it were extremely Thickened; she lived in this Condition Twelve Years, and Died of a Fever, with Scorbutick Swellings in her Leggs.

I am Sir, &c.

RICH. RUSSEL.

But for a Case nothing inferior to either of these, I am oblig'd to a Farrier, or Dr. for Cattle, as he styles himself: The Truth of this Case is known to Numbers of Persons; as Mr. Hunt, a Gentleman of unquestionable Veracity, has informed me, before whom the following Account was given upon Oath.

THomas Brayn, of Teaton, in the Parish of Baschurch, and County of Salop, a Doctor for Cattle, maketh Oath, That about Ten or Twelve Years ago, he
was sent for by a Farmer or Husbandman, who lived near the Village called Maesbrooks, and very near to the River Verney, in the said County of Salop, to have his Advice about an Ox he had, which was there Sick by reason he could not Dung; he had been drenched by several Beast Doctors, before this Depo-

ten came to him; this Deponent seeing this Ox in the Condition he was in, told the Owner, that if he would venture his Ox, he would do him what Service he could, in the Curing of him; which the Owner consented to, and thereupon this Deponent opened the Ox in the Flank, and took out great part of his Bowels, upon Searching of which, he found there was a perfect Stoppage in the Guts; and the Gut was about the Stoppage putrefied for about three quarters of a Yard, whereupon this Deponent Cut off so much of the Gut as was putrefied, and took it quite away, and then drew the ends of the Guts which remained Sound after what was Cut off, together upon a hollow keck, which was about Three or Four Inches long, and Sewed the said ends of the Guts together upon the said keck, leaving the keck within the Guts; and then Sewed up the hole cut in the hide upon the Flank of the said Ox; and this Deponent further faith, that within the space of one Hour after this Operation was performed, the Ox Dunged; and the piece of the keck which
Of the Peritoneum, Omentum, Duodens

which the said ends of the Gut were Sewn
upon and left within the Guts, came away
from the Ox with the Dung, whereupon the
Ox recovered, and lived to do the Owner
Service, several Years.

Jurat Decimo Septimo
Die Julij Anno
Dom. 1716. coram
Thomas Hunt.

The Mark of
Thomas Brayn.

Mesentery, is a Membrane beginning loosely upon the Loins, and is thence produced to all the Guts: It preserves the Jejunum and Ileum from twisting in their Peristaltick or Vermicular Motion, and confines the rest to their Places; it sustains all the Vessels going to and from the Guts, viz. Arteries, Veins, Lymphaduits, Lacteals and Nerves, and also contains many Glands, called from their situation Mesenterica. The beginning of this Membrane from the Loins, is about Three or Four Inches broad, but next the Guts of the same length, with the side of the Guts they adhere to, which is in the small Guts about a fourth Part shorter than the other side; but when this Membrane is separated from the small Guts, it shrinks, and measures about two Thirds less.
I open'd a Boy about Twelve Years Old, that died of the Iliac Passion; the Guts, Stomach, Duodenum and Jejunum were distended, with Vapour and Air, to near Ten times their natural capacity, which so compressed the Intestinum Ileum, that nothing could pass through it. The Relations of this Boy could give no other account of the Cause of this Disease, than that of his having eaten a large quantity of raw young Carrots. This Case happens very frequently to Lambs that have been Housed, and turn'd out early in the Spring to Grasps, when the Grasps is very Rank and Succulent; and also to Horses, Oxen and Sheep, when they happen to Feed by any accident, upon young Beans or Peas, or rich Clover Grasps, which are full of Air, and very apt to Ferment, and expand in their Stomachs: In these Animals this Case is commonly Cured by running a Knife into their Guts; some instances of which I have seen, and have heard a great many reported; but this Case happening very rarely to Men, and being to be Cur'd sometimes by the swallowing of Crude Mercury, I believe that Practice has never yet been us'd; tho' the Instrument which is used for Tapping in a Dropse of the Abdomen, would do it with great ease and safety. Some Anatomists, who have consider'd the impossibility of a Twisting of the Guts, (which is the Vulgar name of this Disease) have imagi-
ned that it proceeded from one Gut being involv'd in another, but these involutions, are found in most Bodies that Die a natural Death, and without any Inflammation, or any other Symptom of Pain.

CHAP. V.

Of the Liver, Gall-Bladder, Pancreas and Splene.

The Liver, is the largest Gland in the Body, of a dusky-red Colour, it is situated immediately under the Diaphragm in the right Hypochondrium; its exterior side is convex, and interior concave; backward toward the Ribs it is thick, and thin on its forepart, where it covers the upper side of the Stomach, and some of the Guts; the upper side of it adheres to the Diaphragm, and is also ty'd to it and the Sternum by a thin Ligament, which is describ'd commonly as Two; the upper part call'd Suspensorium, and the anterior Latum; but either of these Names is sufficient for it all: It is also ty'd to the Navel by a round Ligament call'd Teres or Umbilicale, which is the Umbilical Vein degenerated into a Ligament; it is inserted into the Liver at a small Fissure in its lower Edge.
Of the Liver, Gall-Bladder, &c.

Edge. The Ligamentum Latum or Suspendorium, sustains the Liver in an erect posture, or rather fixes it in its situation, while it is supported by the other Viscera, they being compress’d by the Abdominal Muscles; in lying down, the Teres prevents it from pressing on the Diaphragm; and in lying on the Back, they both together suspend it, that it may not compress and obstruct the ascending Vena Cava. Its Blood-Vessels, that compose it as a Gland, are the Porta (which receives Blood from all the Parts contain’d in the Abdomen (Vid. Vena Porta) and here re-distributes it to have the Bile secreted from it), and the Branches of the Cava in the Liver, which return the redundant Blood into the Cava ascendens; it has also Arteries call’d Hepatica, and several Branches of Nerves, and a great number of Lymphaticks: Of which I shall treat in their respective Places. Dogs and rats, and other Animals, that have a great deal of Motion in their Backs, have their Livers divided into many distinct Lobules; which by moving one upon another, comply with those Motions, which else would break their Livers into Pieces.

The Gall-Bladder, is a receptacle of bile, seated in the hollow-side of the Liver; it is compos’d of one dense Coat somewhat Muscular, which is covered with a Membrane like that of the Liver; and is also lin’d with another, that cannot easily be separated.
Modern Anatomists have describ'd a parcel of small Ducts leading from the Liver to the Gall-Bladder, by which they suppose the Gall-Bladder is fill'd, and these I thought I had seen in a Body that died of a Jaundice, when I was a very young Anatomist; but never being able to see any since in any Animal, tho' I have made very diligent enquiry by Experiments and Dissection. I begin now to be very much perswaded that there are no such Ducts, for if they are too little to be seen or fill'd by Injections, I think they are much too little for the end for which they are assign'd: As to the Argument for the existance of such Ducts, which is fetch'd from the difficulty of the Gall-Bladders, being fill'd thro' the Ductus Cysticus, from the Ductus Hepaticus, I think it is of no weight, because the Vesicula seminales, we know are fill'd with a thicker fluid thro' a less direct passage. From the Gall-Bladder towards the Duodenum, runs a Duct call'd Cysticus; and from the Liver to this Duct, one call'd Hepaticus, which carries off the Gall this way, when the Gall-Bladder is full; then the Ductus Cysticus and Hepaticus being united, commence Ductus communis Choledocus, which enters the Duodenum obliquely about Four Inches below its Beginning. The Orifice of this Duct in the Gut, is somewhat eminent, but has no Caruncle, as is commonly said. As the Liver from its situation in the same Cavity with the Stomach, will be most press'd and
and consequently separate most Gall when the Stomach is fullest; which is the time when it is most wanted. So the Gall-Bladder being seated against the Duodenum, it will have its Fluid press'd out by the Aliment passing thro' that Gut, and consequently at a right Time; and in due Proportion; because the greater that quantity of Aliment is, the greater will be the Compression; and so the contrary.

Pancreas, the Sweet-Bread, is a large tab. xiii. C. gland of the Salivary-kind, lying a-cross the upper and back-part of the Abdomen, along-side the Duodenum; it is what the Antients call'd a conglomerate Gland; it appearing so (without dissection) to the naked Eye; it has a short secretory Duct; not more than half so large as Crow-quill; tho' it is commonly painted as large as the Ductus communis Choledocus, and on the surface of this Gland; tho' it lies in the middle of it, it always enters the Duodenum together with the Bile Duct. But in Dogs some distance from it, and I think always in two Ducts distant from one another. The Juice of this and, together with the Bile, serves to attenuate the fluid Part of the digested Aliment; and render it fit to enter the Lacertals.

The Spleene, is seated in the left Hypocæcum, immediately under the Diaphragm, above the Kidney, between the Stomach and the Ribs; it is supported by the sub-termin'd Parts, and fix'd to its Place by an adher-
On to the Peritoneum; it is also connected to the Omentum; as has been observ'd. The Figure of it is a sort of depressed Oval, near twice as long as broad, and almost twice as broad as thick. Sometimes it is divided into Lobules, but for the most part, has only one or two small Fissures on its Edge, and sometimes none; in its Colour it resembles Cast-Iron. The inner Texture is Vesicular, like the Penis; in which Vesicles are found Grumous Blood, and small Bodies, which, I believe, are rightly judged to be Glands.

Now if the Coats of these Vesicles and Glandular appearances make half the Splene, and if the square of a Section, of the Splene Perpendicular to the Course of the Blood, in the Splene, is anywhere Three Hundred times greater than the Squares of the like Sections of the Cavities of the Splenick Arteries, and Veins; and if the Square of the Section of the Vein is twice that of the Artery, then the Blood moves a Hundred and Fifty times slower in the Splene, than it does in the Artery and Vein, (they going in and out at the same Place) or a Hundred times slower than it does in the Artery, and Fifty times slower than it does in the Vein. I believe these are not the exact Proportions, nor can they be exactly found, though without doubt they may much nearer than these, which are made in a great measure by Guess; but they sufficiently show the Mechanism of this Part, which is singular and wonderful, and without doubt
Doubt contriv'd for great Ends; tho' what they are we have not yet been so happy as to be certain of; but it has given Occasion to Two ingenious Hypotheses, one of my Honoured Friends, Sir Richard Blackmore, M.D. (whom it would be Vanity in me to commend) and the other of Dr. Keill's.

I know no way of computing with any exactness, the quantity of Bile that is usually secreted by the Liver in a given time; but if it is Four times as much as all the Salivary Glands Secrete, it cannot be less than Twenty Four Ounces for every Meal; to which being added Six Ounces of Saliva, which, from what I have observ'd in the Chapter of the Salivary Glands, I think will appear a very moderate Computation. And supposing the Pancreas in the same time secretes Three Ounces, there will then be Thirty Three Ounces of Fluids separated for the digestion of one Meal; and that these necessary Fluids may not be wafted in such quantities, they pass into the Blood with the Chyle, and may be soon separated again for the same use; and very likely, some of the same Bile may be employ'd more than once, for digesting Part of the same Meal; And as the Liver exceeds all the Glands in the Body in Magnitude, and its excretory Ducts ending in the Duode-nun, it seems to me to be much more capable of making those large separations from the Blood, which are procured by Catharticks, than the scarce visible Glands of the Guts.
The Liver, ordinarily weighs, in a middle-fiz'd Man, about Three Pounds; Twelve Ounces, the Pancreas Three Ounces, and the Splene Fourteen Ounces. The Splene I have taken out of a Dog, without any remarkable inconvenience to him. And I have twice, in a Humane Body, seen Three Splenes, twice Two, and once Four; some of these were very small, others nearly equal, but altogether in any of these bodies, were not greater than the one which is usually found. I have seen a diseas'd Liver in a Man, that weigh'd Fourteen Pounds, Four Ounces: And in a Boy but Nine Years old, that dy'd Hydropick, I found the Liver full of Hydatids, and Cyfts of Hydatids adhering to it, which together weigh'd Seven Pounds, One Ounce and a Half, tho' several Pints of Water had been let out of it before. The Splene, in the same Boy, together with the Hydatids contain'd in its Membrane, weigh'd Three Pounds: In a Man I found a diseas'd Splene, weighing Five Pounds, Two Ounces; and in an old Man Six Foot high, I found a found Liver, weighing no more than Twenty-eight Ounces, and the Splene but Ten Ounces: and in a Man that was Cured of a Dropfy, I found a Polypus very solid, almost filling the large Branches of the Porta in the Liver, and a Stone between the Liver and Gall-Bladder, larger then a Nutmeg, and in a Man that dy'd of a Jaundice, I found the Ductus communis Choledocus, constricted by
Schirous Pancreas, the Gall-Bladder extended to the size of a Goose-Egg, and all the Ducts to twice their natural bigness. This is the Case in which I thought I had so plainly seen the Cystic bile Ducts; I once saw the Ductus Cysticus obstructed without the Gall-Bladder, being distended so much as is usual, which, I think, furnishes us with a very probable Argument against the existence of Cystic bile Ducts.

C H A P. VI.

Of the Vasa Lactea.

V A S A L A C T E A, are the Vena Lactea, Receptaculum Chyli and Ductus Tho-

X I C U S.

V E N Æ L A C T E æ, &c. are a vast number of very fine pellucid Tubes, beginning from the small Guts, and proceeding thence thro' the Mesentery they frequently unite, and form fewer and larger Vessels, which first pass thro' the Mesenterick Glands, and then into the Re-

P t aculum Chyli; these Vessels e'er they arrive at the Mesenterick Glands, (or in Dogs the Pan-

C reas Assellii, which is these Glands collected) are call'd Vena Lactea, primi generis; and hence to their entrance into the Receptacu-

L m Chyli, Vena Lactea, secundi generis. The Office of these Veins, is to receive the Fluid part of the digested Aliment, which is called Chyle,
Chyle, and convey it to the Receptaculum Chyli, that it may be thence carry'd thro' the Ductus Thoracicus into the Blood-Vessels.

Receptaculum Chyli, is a Gift of irregular Make, into which the Vena Lactea empties the Chyle; it is seated between the Diaphragm and Emulgent-Vessels, on the left side of the first and second Lumbal Vertebra.

Ductus Thoracicus, is a delicate pellucid Tube, large as a Swans-Quill, beginning from the Receptaculum Chyli, and ending in the left Subclavian-Vein. This Duct as it ascends thro' the Thorax, first passes on the left side of the great Artery under the Beginnings of the Intercostals, and about the middle of the Thorax, divides for the space of Three or Four Inches, and uniting again, runs on the side of the Pharynx into the left Subclavian-Vein. It has many Valves at unequal distances, (more in Men than Brutes) to prevent the regress of the Fluid it contains, and One very large Valve there is in the Subclavian-Vein to cover its entrance. Now supposing there ordinarily passes Five Pounds of Chyle, in a Natural day, through the Lac[tals, and that Five Ounces of this only is added to the Blood, (though it may be any other quantity for ought I know) and that a Man neither decreases nor increases during this time, then all the separations from the Fluids and Solids must be just Five Pounds; Five Ounces of which must be those Fluids and
Particles of Solids, which are become unprofitable; and the remaining Four Pounds Eleven Ounces, will serve as a Vehicle to carry the Five Ounces off: So that we see for what Reason more Fluids are carried into the Blood than are to be retain'd there, and how the Body is by the same means both Nourish'd and Preserv'd.

The Chyle is diluted in its passage by the Lymph. Vid. Chap. Of the Lymphaticks.

CHAP. VII.

Of the Mediastinum, Pleura, Luncre, Pericardium, and Heart.

Pleura is a fine Membrane which lines the whole Cavity of the Thorax, except on the Diaphragm, which is cover'd with no other than its own proper Membrane; the back part of it is extended over the great Vessels, like the Peritoneum; and in regard this Membrane passes partly under these Vessels, as the Peritoneum does, in the Abdomen, they may be said to lie in a duplicature of it; it serves to make the inside of the Thorax smooth and equal.

Mediastinum, is a Membrane that divides the Thorax lengthways, from the Sternum to the Pericardium and Pleura, which is a very short space, but in many Brutes very considerable. This Membrane may be easily
divided into Two, in fat Men, but in Brutes it is always single; it is so dispos'd, that the Two Cavities into which it divides the *Thorax*, do not end toward this Membrane in an Angle, but a segment of a Circle; it hinders one Lobe of the Lungs, from incommmoding the other, as in lying on one side, the uppermoft would frequently do; and prevents the Disorders of one Lobe of the Lungs from affecting the other.

The *Lungs* are compos'd of Two Lobes, One seated on each side of the *Mediaffinum*, each of which Lobes are sub-divided into Two or Three Lobules, which are most distinctly divided in such Animals as have most Motion in their Backs, for the same end that the Liver is in the same Animals; they are each Compos'd of very small Cells, which are the Extremities of the *Aspera Arteria* or Bronchos. The Figure of these Cells is irregular; yet the sides of 'em are exactly fitted to each other, so as to have common sides, and leave no void space: Dr. *Willis* has given a very particular description of the inner Texture of the Lungs, but it is wholly imaginary and false, as he, and they who have Copied his Cuts and Descriptions could not but have known, if they had ever made the least enquiry into the Lungs of any Animal; nor is his account of the Lymphaticks on the surface of the Lungs, at all more true than that of their Texture: In the Membranes of these Cells are distributed the Branches of the Pulmona-
Artery and Vein. The known uses of the Airs entering the Lungs are to be instrumental in Speech, to convey Effluvia into the Nose, as it passes, the Sense of Smelling; but the great use of it, which Life is preserved, I think, we do not understand; by some the force of the Air is thought toparate the Globuli of the Blood, that have coher'd the slow Circulation through the Veins, and its Opinion seems to be favoured by the many samples of Polypus's (which are large Concreations of the Globuli of the Blood) found in the bins near the Heart, and in the right Auricle and Ventricle of the Heart, and their being seldom found in the Pulmonary Veins, or in the left Auricle or Ventricle of the Heart, or in any of the Arteries; but if it is true that while Blood passes thro' the Lungs, many cohering Globuli are separated, yet it remains to be prov'd that these Separations are made by the Air: Dr. Keill has computed the force of the Air in Expiration against the forces of all the Vesicles, to be equal to Fifty thousand Pound Weight, yet if we consider we'll still find the Moment of the Air in the lungs exceeding small in any small space. For the Velocity with which the Air moves in the lungs, is as much less than that with which moves in the Wind-Pipe, as the Square of a Section of the Cells in the Lungs is greater than the square of a Section of the Wind-Pipe; therefore if the square of all the extreme Blood Vessels

Pericardium and Heart.
Vessels in the Lungs, do not bear a greater proportion to the square of the large Pulmonary Vessels than the square of the Cells do to the Wind-Pipe; and if the Blood in these large Vessels moved as fast as the Air in the Wind-Pipe; all which I think may be easily granted, then the Blood moving in the smallest Vessels of the Lungs with a velocity equal to that of the Air in the Cells, the Blood will have as much more pressure from the Power that moves it in its own Vessels than the Air can give upon them, as Blood is heavier than Air.

Besides, we must consider that Air pressing equally to all Sides, and the Globuli of the Blood swimming in a Fluid; this pressure, be it what it will I think, can be of little use to make such separations: Others have thought that the Air enters the Blood Vessels from the Cells in the Lungs, and mixes with the Blood; but this Opinion, though very probable, wants sufficient Experiments to prove it, Air being found in the Blood, as there certainly is, is no Proof of its entering this way, because it may enter with the Chyle, nor is the impossibility which has been urg'd of its entering at the Lungs without the Blood being liable to come out the same way into the Vesicles of the Lungs, a good Argument to the contrary; for if a pliable Duct passes between the Membranes of a Vessel, thro' a space greater than the square of its Orifice, no Fluid can return, because the pressure which should force it back will be greater against the sides of
that Duct than its Orifice; which is the 
exit of the Bile Duct entering the Duodenum, and 
the Ureters entering the Bladder. I think the 
first Arguments for the Airs entering into the 
blood by the Lungs, or rather some particular 
part of the Air, may be fetch'd from what the 
learned Dr. Halley observ'd in a Diving Bell, 
a Man wanting near a Gallon of fresh Air 
a Minute, for if nothing but pressure had been 
anted from the Air in the Lungs, he had near thrice 
much pressure without any supply of fresh Air, 
a Man hath upon the surface of the 
lobe; and Animals dying so soon in Air that 
has been burnt, and their being so easily intox- 
icated by breathing Air much impregnated with 
the Effluvia of Wine or Brandy, are also, in my 
opinion Arguments, of a passage this way into 
the Blood; Besides, if pressure of the Air in 
the Cells of the Lungs is the only use of it, I do 
ot see but enough of that may be had while a 
Man is Hanging, if the Muscles of the Thorax 
do but Act upon the Air which was left in the Tho- 
ax, when the Rope was first fix'd, and yet Death 
brought about by Hanging no other way than 
interrupting of the Breath, as I have found 
by certain Experiments. Dr. Drake has endeav-
oured to shew, that the use of Respiration is 
not a lift the Syctole of the Heart, but this use 
requires that the Syctole and Diaftole of the 
heart, should keep time with Expiration and 
Inspiration, which is contrary to experience; 
Besides,
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Besides, if his Hypothesis was true, it could only serve the right Ventricle of the Heart. The Lungs of Animals before they have been dilated with Air, are specifically heavier than Water, but upon inflation they become specifically lighter and swim in Water; which experiment may be made to discover whether a Dead Child was Still Born or not; but if the Child has Breath'd but a little, and the experiment is made long after, the Lungs may be Collaps'd and grow heavier than Water, as I have experimented, which may lead a Man to give a wrong Judgment in a Court of Judicature; but then it will be on the Charitable side of the Question.

Adhesions of the Lungs to the Pleura are so common, I know not how to call it a Disease; they being found so more or less in all adult Persons, and without any inconvenience, if the Lungs are not rotten.

Pericardium or Heart-purse, is an exceeding strong Membrane which covers the Heart; its side next the great Vessels is partly connected to them, and partly to the Basis of the Heart; but, I think, not at all perforated by those Vessels, and its lower side is inseparable from the Tendinous part of the Diaphragm, but not so in Brutes. It encloses all the Heart except its Basis, its uses are to keep the Heart in its place, without interrupting its Office, to keep it from having any Friction with the Lungs, and to contain a Liquor to lubricate the surface of
The Heart, and abate its friction against the Pericardium, and to contain a quantity of lymph sufficient to lubricating the external fibres of the Heart.

The Heart, is a Muscle of a Conic Figure, with Two Cavities or Ventricles; its Basis fix'd by the Vessels going to and from it, on the fourth and fifth Vertebrae of the Thoax, and its Apex, or Point is inclin'd, downward and to the left side, where it is receiv'd a Cavity of the left Lobe of the Lungs, as may be observ'd the Lungs being extended with it: This Incumbrance on the left Lobe of the Lungs, I imagine is the Cause of that Side being most subject to Pluritick Pains.

At the Basis of the Heart, on each side, are fix'd the Two Auricles to receive the Blood; the right from the Two Cava's, and the left from the Pulmonary- Veins: In the right, at the meeting of the Cava's, is an Eminence call'd Tuberculum Loweri, which is partly rais'd by the incumbent Pulmonary Artery and Vein. Its use is to prevent the Blood in both these Vessels from obstructing each other, and to direct the Course of the Blood in both of 'em into the Tricle; immediately below this Tubercle, in the ending of the Cava ascendens, is the vestigi of the Foramen Ovale; (Vid. Chap. Of the Titus) and near this, in the Auricle, is the mouth of the Coronary-Veins. The left Auricle is abundantly less than the right; but the difference is supply'd by a large Muscular Cavity
ty, which the Two Veins from the Lungs afford in that place; the sides of this Muscular Cavity are thicker than the sides of the right Auricle, in about that Proportion in which the left Ventricle of the Heart is stronger than the right; their uses being to receive Blood from the Veins, that lead to the Heart, and press it into the Ventricles; a strength in each Auricle proportionable to the strength of the Ventricle that it is to fill with Blood, seems plainly necessary. And this different thickness of the Coats of the Auricles makes the Blood in the left, which is thickest, appear thro’ it of a paler Red; but when it is let out of the Auricles it appears alike from both; which they would do well to examine, who affirm the Blood returns from the Lungs of a more florid Colour than it went in; and offer it as an Argument of the Bloods being mix’d with Air in the Lungs: In both Auricles are Muscular Columna, like those in the Ventricles, but smaller.

The Ventricles or Cavities in the Heart which receive the Blood, are hollow Muscles, or Two Cavities in one Muscle, whose Fibres intersect one another, so as to make the pressure of the Heart upon the Blood more effectual, and are also less liable to be separated than they would have been if they had lain parallel; both these Cavities are of the same bigness; tho’ the left appears the smallest, and is often describ’d so; but this happens from a greater Contracti-
Pericardium and Heart.

in the left than the right, in the Article of death, the left being abundantly thicker and stronger, because a greater force is requir'd to drive the Blood through the whole Body, which is the Office of the left, than thro' the Lungs, which is the use of the right Ventricle. Over the Entrance of the Auricles in each Ventricle, are plac'd Valves to hinder a return of Blood while the Heart contracts. Those in the right Ventricle are nam'd Tricuspides, those in the left Mitrales. One of these seem to do further service, by covering the Mouth of the Aorta while the Ventricle fills; which suffering none the Blood to pass out of this Ventricle into the Aorta before the Ventricle Acts, it will be able to give greater force to the Blood than it otherwise might have done, because a greater quantity of Blood more fully distending the Ventricle, and making the greater resistance, will be capable of receiving the greater impact force from the Ventricle. The inner fibres of each Ventricle are dispos'd into small orbs, which are call'd Columns. From some of these hang small portions of Flesh call'd Papilla; these Papilla are ty'd to the Valves by slender Fibres, whereby they keep the Valves from being press'd into the Auricles, by the action of the Blood against them in the Syftole of the Heart, and when that is over, the Blood, owing in between them opens them, as the reffure of Blood on the other side shut them in the
In the beginning of each Artery from the Heart, are placed three Valves, which look forward, and close together to hinder a regress of Blood into the Ventrices. Those in the Pulmonary-Artery, are named Sigmoidales; those in the Aorta, Semilunares. Canalis Arteriosus. (Vid. Chap. Of the Fatus.)

In a Boy I found a great quantity of Pus in the Pericardium, and the Basis of the Heart Ulcerated. In Persons that have dy'd of a Dropsy, I have always observed the Heart large, its Fibres lax, and the Vessels about it immoderately distended, and Polypus sometimes in both Auricles and Ventrices, and in the large Veins; but more frequently in the right Auricle and Ventricle. I dissected a Man that dy'd of Tabid, in whom the Pericardium universally adher'd to the Heart, and a portion of the Muscular part of the Heart was Sclerify'd as large as a Six-pence. The beginning of the Aorta, has been frequently seen Sclerify'd, especially in Aged Persons. In a Woman that dy'd of a Dropsie, I found the Valves of the Aorta quite cover'd with Chalk Stones, which not suffering the Valves to do their Office, the left Ventricle of the Heart was constantly overcharged with Blood, and distended to above twice its Natural bigness which I imagine destroyed the Economy of the Body, and occasioned the Dropsie.
CHAP. VIII.

Of the Arteries and Veins.

From the right Ventricle of the Heart arises the Pulmonary Artery, which soon divides into two branches, one to each lobe of the Lungs, and then they sub-divide into smaller and smaller branches, until they are distributed into every part of the Lungs. And from the extreme branches of the Pulmonary Artery, arise the small branches of the Pulmonary Veins, which as they approach the left Auricle of the Heart, unite in such a manner as the Pulmonary Artery divides going from the Heart, only that the Veins enter the Muscular Appendix of the left Auricle in several branches, and the Blood being brought back from the Lungs by these vessels to the left Auricle, and Ventricle of the Heart, it is from the left Ventricle of the Heart thrown into the Aorta.

Aorta, or Great Artery, arises from the left Ventricle of the Heart, and deals out branches to every part of the body. The first Trunk of this vessel, is called Aorta ascendens; it passes over the left Pulmonary Artery, and Veins and branch of the Aspera Arteria, and being reflected under the left lobe of the Lungs, it commences Aorta descendens, which name
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Name it keeps thro' the Thorax and Abdomen where it descends on the left side of the Spine, till its division into the Iliac Arteries between the third and fourth Vertebræ of the Loyns.

From under Two of the Semilunar Valves of the Aorta, which is e'er it leaves the Heart, arise Two Branches (sometimes but One) which are bestowed upon the Heart, and are call'd Coronarie Cordis. From the curv'd part of the Aorta, which is about Two or Three Inches above the Heart, arise the Subclavian and Carotid Arteries, the right Subclavian and Carotid in One Trunk, but the left Single. By some Authors these Vessels have been describ'd in a different manner, but I believe their descriptions were for want of Humane Bodies taken from Brutes; for I have never yet seen any variety in these Vessels in Humane Bodies, tho' I have in the Veins nearer the Heart; and indeed there seems to me to be a Mechanical necessity for their going off in the Manner here describ'd in Humane Bodies; for the right Subclavian and Carotid Arteries necessarily going off from the Aorta at a much larger Angle than the left, the Blood would move more freely into the left than the right, if the right did not go off in one Trunk, which gives less Friction to the Blood, than two Branches equal in Capacity to that one, so that the Advantage the left have by going off from the Aorta, at much acuter Angles than the right, is made up to the right by their going off at first in but one Branch. The
The Carotid Arteries run on both sides the Larynx to the sixth Foramina of the Scull, thro' which they enter to the Brain; but as they pass thro' the Neck, they detach Branches to every part about 'em, which Branches are call'd by the Names of the Parts they are bestowed upon; as, Larynges, Thyroides, Pharynges, Linguales, Temporales, Occipitales, Faciales, &c. but just before they enter the sixth Foramina of the Scull, they each send a small Branch thro' the fifth Foramina of the Scull to that part of the Dura Mater which contains the Cerebrum. It is these Arteries which make those impressions which are so constantly observ'd on the inside of the Nafs Bregmatum. The Internal Carotids, send Two branches to the Back part of the Nose, and several branches thro' the first and second Foramina of the Scull to the Face and parts contain'd within the Orbits of the Eyes, and then piercing the Dura Mater, they each divide into Two Branches, one of which they send under the Falx of the Dura Mater, between the Two Hemispheres of the Brain, and the other between the Interior and Posterior Lobes of the Brain. These Branches take a great many turns, and divide into very small Branches in the Pia Mater before they enter the Brain, as if large Trunks would make by their Pulse too violent an impression on so tender and delicate a Part. And perhaps it may be from an increase of the Impulse of the Arteries in the Brain, which strong
Liquors always produce, that the Nerves are so much interrupted in their uses throughout the whole Body, when a Man is intoxicated with Drinking; and it may also be from a like Cause, that Men are so often delirious in violent Fevers. Besides these Two Arteries, viz. the Carotids, the Brain has Two more, call'd Cervicales, which arise from the Subclavian Arteries, and ascend to the Head thro' the Foramina, in the Transverse Processles of the Cervical Vertebrae, and into the Scull thro' the Tenth or great Foramen; these Two Arteries uniting soon after their entrance, they give off Branches to the Cerebellum, and then passing forward, divide and communicate with the Carotids; and the Carotid Arteries communicating with each other, there is an entire communication between them all; and these communicant Branches are so large, that every one of these Four great Vessels, with all their Branches, may be fill'd with Wax injected thro' any One of them, as I have often Experienced.

The Subclavian Arteries, are each continu'd to the Cubit in one Trunk, which is call'd Axillaris as it passes the Arm-pits, and Humeralis as it passes by the inside of the Os Humeri, between the Muscles that bend and extend the Cubit. From the Subclavians within the Breast arise the Arteria Mammaria, which run on the inside of the Sternum, and lower than the Cartilago Ensisformis. As soon as the Arteria Humeralis has pass'd the Joynt of the Cubit, it divides into Two
Of the Arteries and Veins.

Two Branches, call'd Cubitalis Superior and Cubitalis inferior, which latter soon sends off a Branch, call'd Cubitalis media, which is bestowed upon the Muscles seated about the Cubit. The Cubitalis Superior passes near the Radius, and round the Root of the Thumb, and gives One Branch to the Back of the Hand, and Two to the Thumb, One to the first Finger, and a Branch to communicate with the Cubitalis inferior. The Cubitalis Inferior passes near the Ulna to the Palm of the Hand, where it takes a turn, and sends One Branch to the out-side of the Little Finger, another between that and the next Finger, dividing to both, another in the same manner to the Two Middle-Fingers, and another to the Two Fore-Fingers. These Branches, which are bestowed on the Fingers, run One on each side of each Finger internally to the Top, where they have small Communications, and very often there is a Branch of Communication between the Humeral and inferior Cubital Arteries; this Communicant Branch is sometimes very large, and liable to be Prick'd by careless or injudicious Blood-letters, in Bleeding in the Basilic Vein, immediately under which, as far I have been able to observe, this Branch always lies: When the Operation for an Aneurism is made upon this Communicant Branch, it is necessary to Tie it on both sides of the Orifice, because the Blood is liable to flow freely into it either way.
From the descending Aorta on each side is sent a Branch under every Rib, call'd Intercostalis, and about the fourth Vertebra of the Back, it sends off Two Branches to the Lungs, call'd Bronchiales, which are sometimes both given off from the Aorta, sometimes one of them from the Intercostal of the fourth Rib on the right side; and as the Aorta passes under the Diaphragm, it sends Two Branches into the Diaphragm, call'd Arteria Phrenica, which sometimes rise in one Trunk from the Aorta, and sometimes from the Celliaca; but oftner the right from the Aorta, and the left from the Celliac. Immediately below the Diaphragm arises the Celliac Artery from the Aorta, it soon divides into several Branches, which are bestowed upon the Liver, Pancreas, Splene, Stomach, Omentum and Duodenum. These Branches are nam'd from the Parts they are bestowed on, except Two that are bestowed upon the Stomach, which are call'd Coronaria superior and inferior, and the Branch bestowed upon the Duodenum, which is nam'd Intestinalis. At a very small distance below the Arteria Celliaca from the Aorta, arises the Mesenterica superior, whose Branches are bestowed upon all the Intestinum Jejunum and Ileum, part of the Colon, and sometimes one Branch upon the Liver. A little lower than the superior Mesenteric Artery, arise the Emulgents, which are the Arteries of the Kidneys. And a little lower than the Emulgents, forward from the Aorta, arise the Arter-
Of the Arteries and Veins.

For which, Vid. Chap. Of the Parts of Generation in Men.

Lower laterally, the Aorta sends Branches to the Loyns, call'd Lumbales, and one forward, to the lower part of the Colon and the Rectum, call'd Mesenterica inferior. Between the Arteria Cæliaca Mesenterica superior, and inferior and the Branches of each, near the Guts, there are large communicant Branches to convey the Blood from one to another when they are either compress'd in any posture, or frighten'd by being stretch'd out in Ruptures, or from any other Cause.

As soon as the Aorta divides upon the Loins, it sends off an Artery into the Pelvis upon the Os Sacrum, call'd Arteria Sacra, and the Branches the Aorta divides into, are call'd Iliaca, which in about Two Inches space divide into External and Internal. The Iliaca Interna, first send off the Umbilical Arteries which are dry'd up in adult Bodies, except at their Beginnings, which are kept open for the collateral Branches on each side, One to the Bladder, and One to the Penis in Men, and in Women the Uterus; the rest of these Trunks are bestowed upon the Buttocks, and upper parts of the Thighs. The Iliaca Externa, run over the Osja Pubis into the Thighs; and as they pass out if the Abdomen, they send off Branches, call'd Epigastrica, to the fore-part of the Integuments if the Abdomen under the Recti Muscles. And the Epigastrick Arteries send each a Branch into the Pelvis and thro' the Foramina of the Osja Innominata.
nominate to the Muscles thereabouts. As soon as the Iliac Artery is pass'd out of the Abdomen into the Groin, it is call'd Inguinalis, and in the Thigh Cruralis, where it sends a large Branch to the back-part of the Thigh; but the great Trunk is continu'd internally between the Flexors and Extensors of the Thigh, and passing thro' the Insertion of the Triceps Muscle into the Ham, it is there call'd Poplitea; then below the Joint it divides into Two Branches, One of which is call'd Tibialis antica, it passes between the Tibia and Tibula to the fore-part of the Leg, and is bestow'd upon the Great Toe, and One Branch to the next Toe to the Great One, and another between these Toes to Communicate with the Tibialis postica; which Artery soon after it is divided from the Antica, sends off the Tibialis media, which is bestow'd upon the Muscles of the Leg, while the Tibialis postica goes to the bottom of the Foot and all the lesser Toes. The Tibialis antica, is dispos'd like the Cubitalis superior; the Postica, like the Cubitalis inferior; and the Media in each, have also like uses. These Arteries which I have describ'd, are uniform in most Bodies, but the lesser Branches are distributed like the Branches of Trees in so different a manner one Body from another, that it is highly probable there are not any Two Bodys alike, nor the Two sides in any one Body; wherefore I think it is not needful to describe any of them.

I have once seen a Rupture of Matter, and once
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Blood and Matter, which flowed out of the Abdomen into the Fore-part of the Thigh, through the same Passage at which the Iliac Artery goes out of the Abdomen.

The Veins arise from the Extremities of the Arteries, and make up Trunks which accompany the Arteries in almost every part of the Body, and have the same Names in the several Places which the Arteries have, which they accompany. The Veins of the Brain unload themselves into the Sinuses, (Vid. Chap. Of the Dura and Pia Mater) and the Sinuses into the internal Jugulars and Cervicals, and the internal Jugulars and Cervicals into the Subclavians, which joining, make the _a va descendens._ The Internal Jugulars are seated by the Carotid Arteries, and receive the Blood from all the Parts which the Carotids serve, except the Hairy-scalp and part of the Neck, whose Veins enter into the External Jugulars, which run immediately under the _Musculus Quadratus Geneæ_, often Two on each side. The Cervical Veins, descend Two thro' the Foramina in the Transverse Processes of the Cervical Vertæ, and Two thro' the great Foramen of the spine, and One on each side the Spinal Marrow; these join at the lowest _Vertebra_ of the Neck, and then empty into the Subclavians, and at the interstices of all the _Vertebra_ communicate with one another.

The Veins of the Arm are more than double the Number of the Arteries, there being one
of the Arteries and Veins.

On each side each Artery, even to the smallest Branches that we can trace, besides the Veins which run immediately under the Skin. Those which accompany the Arteries have the same Names with the Arteries; those which run immediately under the Skin on the back of the Hand have no proper Names, they run from thence to the inside of the Elbow; where the uppermost is call’d Cephalica, the next Mediana, the next Basilica, and the lowest Salvatella. These all communicate near the Joint of the Elbow, and then send One Branch which is more directly from the Cephalica, and bears that Name, until it enters the Subclavian Vein; it passes immediately under the Skin, in most Bodies, between the Flexors and Extensors of the Cubit, on the upper side of the Arm. The other Branches joyning, and receiving those which accompany the Arteries of the Cubit, they pass with them by the Artery of the Arm into the Subclavian Vein. The External Veins have frequent communications with the Internal, and are always fullest when we use the most Exercise, because the Blood being expanded by the Heat which Exercise produces, it requires the Vessels to be distended, and the inner Vessels, being compressed by the Actions of the Muscles, they cannot dilate enough, but these Vessels being seated on the out-sides of the Muscles, are capable of being much dilated; and this seems to me to be the chief use of these External Vessels. The Cephalic Vein as it runs up the Arm, is very Visible in most Men, but
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In Children is rarely to be seen, therefore great care should be taken not to wound it in the cutting of issues in Children's arms; and I know no way to be sure of avoiding it, but by cutting the issue more externally than is usual in Men, which may be done without any inconvenience.

In the Thorax, besides the Two Cava's, there is a vein call'd Azygos or Vena sive Pari, it is made up of the intercostal, Phrenic, and Bronchial veins, and enters the descending Cava near the Auricle, as if its use was to divert the descending Blood from falling too directly upon the Blood in the ascending Cava, and direct the Blood of the descending Cava into the Auricle; besides this vein in the Thorax, are the Mammary veins, one to each artery; and the veins of the Heart which are call'd Coronaries; they are twice the number of the arteries, but they enter the right Auricle at only one orifice.

In the Abdomen, (besides the Cava ascendens, and the veins which are nam'd like the arteries, viz. The Enaulents from the Kidneys, the Lumbar and Spermatick veins, the Sacra, Iliac and Hypogastrick veins) there is one large one call'd Vena Porta, which arises from all the branches of the Celiac and two Mesenterick arteries, and uniting in one trunk enters the Liver, and is there again distributed like an artery, and has the branches of the Cava in the Liver; this vein being made use of instead of an artery, to carry
carry Blood to the Liver, for the separation of Bile. Nature has procured a Circulation of Blood about Eight times slower than it is in the Arteries hereabouts; and this slow Circulation being suppos’d necessary, I think, there could be no other so fit way of procuring it; for if an Artery had been employ’d for this Use, and been thus much dilated in so short a passage, the Blood would not have mov’d uniformly in it, but much after thro’ its Axis than near its sides; and besides, it is very probable that the Blood in this Vein, having been first employ’d in Nourishing several parts, and having thro’ a long space moved slowly, may be made much fitter for the separation of Bile than Blood carried by an Artery, dilated to procure a Circulation of the same Velocity with that in this Vein.

In the Leg the Veins accompany the Arteries in the same manner as in the Arm, the External Veins of the Foot being on the upper side, and from them is deriv’d One call’d Saphena, which is continu’d on the inside of the Limb it’s whole length, and has several Names given it from the several Places thro’ which it passes.

The Arteries are said to have Three Coats, a middle Muscular, and an external and internal Membranous. The Veins are said to have the same; the internal Coat of an Artery may be pretty easily seperated, but not the External; and tho’ the Veins have certainly Muscular Fibres, yet I could never separate any one distinctly into three
the arteries and Veins.

Three Coats; and in the inside of the Veins there are many Valves, especially in the lower Limbs, to hinder any reflux of the Venal Blood, which otherwise would have happened from the frequent Actions of the Muscles on the outsides of the Veins; and both the Arteries and Veins as they run in the inside of a Limb, or as they are dispersed in Parts that suffer great Extensions as the Stomach, Guts, and Uterus, they are bent in and out so much as that when these Parts come to be distended, they may comply with those distentions, by only being strecthened, and so preserved from being strecthened, which would lessen their Diameters. The small Arteries near the Heart go off from the large Trunks at obtuse Angles, farther at less obtuse Angles, then at Right Angles, farther still at acute Angles, and near the extremities at very acute Angles, because the Blood in the Vessels near the Heart moving with less Velocity than the Blood in the Vessels near the Heart, the Blood in the Collateral Branches more remote from the Heart wants the advantage of a directer course; and because a very large Branch arising out of another, might weaken too much the sides of the Vessel it would arise from. Nature has taken care to prevent any such Mischief by encreasing the Number, and so lessening the Size of the Collateral Branches, where otherwise one large Branch would have serv'd better; as in the going off of the Subclavian and Carotid Arteries, which might have gone off for some space in one Trunk;
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Trunk; but this Mechanism is more evident in the going off of the Arteria Cæliaca and Mesenterica superior. And the small Arteries always divide so as that the least Branches may lie least in the direction of the Blood flowing into them, which makes the Blood flow most freely into those Branches, that have farthest to carry it; and the smaller Branches arise more or less obliquely, from the sides of other Arteries, according to the proportion they bear to the Arteries they arise from, because an Artery comparatively large arising obliquely from the side of another, would make an Orifice, in that it arises from too large and weaken it. And both these ends are at once brought about, by making the Arteries that give off the Branches, bend more or less towards the Branches they give off, according to the comparative magnitude of the Branches given off.

Borelli has computed the force which the Heart exerts at every Syphon, to be equal to Three Thousand Pounds Weight, and the force which all the Arteries exert at every Syphon, to be equal to Sixteen Thousand Pounds Weight, and that they together overcome a force equal to a Hundred and Thirty Six Thousand Pounds Weight; and Dr. Keill has computed that the Heart in every Syphon, exerts a force not exceeding Eight Ounces, (but in both these accounts a Weight in Motion is compared to a Weight at Rest) the first of them was made by comparing the Heart with other Muscles, whose Power to sustain a Weight could be best determin'd, and
and the later computation was made from the velocity of the Blood moving in an Artery, therefore if we consider that Borelli's way of computing led him to find out the absolute force of the Heart, and Dr. Keill's the force which the Heart usually exerts; perhaps these very different Computations may in some measure be accounted for, for if the force of the Heart, which is constantly exerted, should compared with any other Muscle, be but in a reciprocal proportion of the frequency of their Actions, and the importance of their uses; may not the Heart very fitly have a force vastly greater than usually it exerts, because it is always in Action, and must be able to exert a certain force in the lowest state of Health. What force the Heart ever exerts in a grown Man, I cannot say, but it must be less in each Ventricle than is sufficient to burst the Valves, which hinder the Blood from returning into the Auricles out of the Ventricles, or than is sufficient to break those tender Threads by which these Valves are tied to the Papillae. In a Dog I found the force which the Heart would exert, would not raise to One Foot Perpendicular Height, a Column of Blood through the Aorta ascendens. And when I inject the Arteries of a Child, I find a force exceeding little, will throw Water through all the Vessels, with a Velocity equal to that with which the Blood moves in those Vessels when living. And if the Heart like other Muscles can perform the first part of its contraction with most ease, is not
the quick Actions of the Heart in Fevers owing to its not being able to empty the Ventricle every Syftole, which I think will oblige it to act Ceteris Paribus so much the oftner. Here I will observe, not having consider'd it in the proper Place, that though the Auricles of the Heart are equal to each other, and the Two Ventricle also equal, yet the Auricles are not so large as the Ventricles; for the Ventricles contain not only all the Blood which Flow'd from the Veins into the Auricles, during the Contraction of the Heart, but also that which Flows (which will be directly into the Heart) while the Auricles contract, and the Ventricle dilate; which leads us to the exact knowledge of the use of the Auricles. If the Syftole and Diaftole of the Heart are performed in equal times, then the Auricles must be half the size of the Ventricle; or whatever proportion the space of time of the Syftole of the Heart, bears to the space of time in which the Syftole and Diaftole are both perform'd, that proportion will the Cavities of the Auricles bear to the Cavities of the Ventricle.

If the Arteries contract about a Fourth part of the Squares of their Diameters at every Syftole, and if the Heart does not throw out a quantity at every Syftole, equal to the Fourth part of the Solid Contents of all the Arteries when dilated, it is evident the Heart does not throw the Blood through the whole Arterial System, but into so much of the Arteries naerest the Heart, as will con-
Of the Arteries and Veins.

Four times as much as is thrown out of the left Ventricle at once, and then this Portion of Arteries throws the Blood forwards and dilates the Arteries that lie next, and so on; but the Sections of all the remoter Vessels, being greater than a Section of the Aorta, the Blood will move so much lower in the lesser Vessels than in the greater, as the Sections of the lesser Vessels are greater than the Section of the greater Vessel or Vessels. The Strength of the Coats of the Arteries if the Blood press'd equally against the sides of them all, ought to be one to another as their Circumferences, because so much as the Circumference of one Artery is greater than another, so much greater pressure its Sides must sustain; but the Arteries nearest the Heart, sustaining the reaction of all the Arterial Blood, they must have a Strength somewhat greater than in that proportion: And the Vessels, both Arteries and Veins, the more distant they are from the Head, the greater proportional Strength their Coats must have, because the Arterial and Venal Blood communicating, they will press upon the Lower Vessels, with a force proportional to the perpendicular Altitude of Blood above, which will be that of the perpendicular Altitude of the whole Body; for the Ascending Blood of the Arteries, may be said not to press upon the descending because it moves another way, nevertheless it being thrown from the Heart into one common Vessel, which afterwards divides

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the Blood moving both ways Communicates, and that force which is necessary to overcome the natural inclination of the ascending Blood to descend, will be impress'd also upon the descending Blood, which is just the same with the Weight of the ascending Blood, and the Veins both from above and below communicating at the right Auricle, the pressure in them will also be as the Perpendicular Altitude of the Body; so that the Blood in all the Veins and Arteries resembles a Fluid in a curv'd Tube, in which that Part in one Leg, exactly Balances that in the other, both pressing most upon those parts which are nearest the Center of the Earth: Accordingly we find by experience, that Humours are most apt to flow to the lowest parts, and that by laying those parts upon a level with the whole Body, this inconvenience is remedied, but laying a Leg only in a Chair does it but in part, just so much as the perpendicular Altitude of the Body from that part, is shortened. There is also to be consider'd concerning the thickness of the Coats of the Vessels, that the Blood moving slower in the small Vessels than in the great, the Moment of the Blood against the Sides of a small Vessel, will be as much less than the Moment of the Blood against equal Parts of a great one, as the velocity of the Blood in a small Vessel is less than that in a great one, and therefore their Coats may also differ from the former proportion, as the Velocity of the Blood differs. Nevertheless
whenever any of the minutest Arteries are obstructed so as to occasion the bursting of any Vessel, they are deriv’d from, it will be that Vessel that is nearest to those Obstructions, because the Coats of that Vessel are weaker than any other nearer the Heart. And if Hæmorrhages of Blood do frequently arise from Obstructions in the minutest Veinss, it plainly appears, how Opium and the Bark, which most powerfully thin the Blood come to be so often effectual Remedies in that Case. And the Coats of the lesser Veins being proportionally weaker than the great ones, according to the decrease
Of the Arteries and Veins.

decrease of the Velocity of the Blood, which lessens the moment with which it moves in them, whenever the Blood begins to move in them with an equal Velocity, or greater as it happens after an amputation when the great Vessels are tied, the Force of Blood often overcomes the strength of the Coats of the smaller Vessels, and dilates them so, that sometimes those Vessels, which scarce bled during the Operation, will in a few Hours bleed vehemently; and this constant effort of the Blood to dilate Vessels upon the Obstructions of others, I take to be one Reason of those throbbing Pains which are felt in Wounds when the bleeding is stop'd, and in all violent Inflammations until the Collateral Branches are dilated.

The Extrem Branches both of the Arteries and Veins have very numerous Communications, like those in the Stamina of the Leaves of Plants, by which Communications the Blood that is obstructed in any Vessels by any Pressure, may pass off by other Vessels that are not obstructed; and since the Moment of the Blood in the Vessels lessens, and the Friction from the Vessels increases as it approaches the Extremities; and since many of the lesser Vessels are more expos'd to pressure than any of the large ones, these Communications in the lesser Vessels are made so much the more numerous. By means of these Communications, the Blood circulates in a Limb that has had part Amputated, and into any Vessels that have been separated from the Trunks that supplied
supplied them, which otherwise must have morti-
tified for want of Nourishment, and with them
for the same Reason, all the Branches that arise
from such separated Vessels; and I can discern
no other way than by these Communications, that
the Fluids contain'd in a large Inflammation, can
suppurate into one Cavity.

If we inject by the Arteries a large quantity
of a coloured Fluid, we find all the Veins full
of that Liquor, before any of the solid parts are
much colour'd with it, and upon frequent repeti-
tions all of them much less coloured; then I think
might be expected, if it had gone into any thing
near all the Vessels of the Body; and I have often
thrown Wax or Tallow coloured with Vermilion
or Verdigrease, through all the Arteries, and
back again through the Veins, even to the Heart,
every where filling Vessels that cannot be discern'd
without a Microscope; and all this without filling
or much discolouring any one entire part. In
viewing with a Microscope the Circulation of the
Blood in the Tail of a Fish, the Eye easily traces
Arteries to their Extremities, and their return in
Veins, yet all the Vessels we can see make but a
small part of the whole of what we see: And tho'
we are taught that the whole Animal Body, is a
Compages of Vessels such as we see, if it were so,
I think we could not well distinguish any, and if
the Sum of the Diameters of all the Vessels we
can see, are to that of the Breadths and Thicken-
tes of all the rest of the parts, which we see at
the fame time, taken together, but as one to five, These Vessels then are but the Hundred and Twenty-Fifth part, of what we see with them. What then shall we suppose the rest of the Tail, and those parts which were so little ting’d, and those which were not filled with Wax, in the foregoing experiments, composed of? Are they not composed of Vessels which arise from the Arteries, as Excretory Ducts do in a Gland, but terminate in the Veins? And these Vessels being only to convey the Nutritious Juices, and what else may be a proper Vehicle for them, is it not fit the Circulation in them should be exceeding slow, that the Nutritious Particles may adhere the closer to the Fibres of the Vessels, which they are to augment or repair? And are not these Vessels the seat of Óedematous swellings, and is not the slow return of the Fluid into an Óedematous part after pressure, an argument of the slowness of motion of the Fluids in these Vessels, and is not the readiness with which it recedes from any Part pressed, to all the parts about that pressure, a proof of a vast Number of Communications in these Vessels? And if there are such Vessels as these, the Velocity of the motion of their Fluid will not depend upon any proportion they bare to the Vessels they arise from, but upon the Velocity with which their Fluids are Separated from the Arteries into them, and the Proportion of the Sections of all their Orifices to the Sum of their own Sections, at any distance where we would compare the Velocity of their
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their Fluid. But to know these things in this manner seems impossible. And the strength of the Coats of these Vessels, may not only be as much less than the strength of the Coats of an Artery, as their Diameters are less, but also less I think in that proportion in which the Velocity of their Fluids is less and the Motions more uniform, than the Velocity and motion of the Blood in an Artery.

The Coats of the Veins are much thinner than those of the Arteries, comparing Vessels whose Sections are equal, because the Blood moving slower in the Veins than the Arteries, it presses with less moment against their Sides: And besides the Blood in the Veins has nearly an equal uniform motion; but in the Arteries a very unequal one, and that will require a farther difference in the strength of their Coats; for those of the Arteries must be equal to the greatest natural pressure; and if the Arterial Blood propels the Venal, that is another reason for the different strength of their Coats.

All these things being considered, it appears to me to be an exceeding difficult thing to determine nearly, what proportion the Fluids of an Animal Body bear to the Solids, or to determine what proportion the sum of all the Areas of the Minuteest Arteries bear to the Aorta, without which I think we can neither determine the comparative Velocity of the Blood moving in the Minuteest Vessels, nor the quantity of Blood in any Animal Body, nor the time in which the whole Mass of Blood, or a quantity equal to the whole Mass is flowing
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flowing through the Heart. But if each Ventri-
cle of the Heart holds Five Ounces of Blood, and
they are filled and emptied every Syftole and Di-
aftole, which I think I can demonstrate, and if
Eighty Pulses in a Minute be allow’d to be a
common Number, there then flows Twenty Five
Pounds of Blood through each Ventricle of the
Heart, and through the Lungs in a Minute.

Dr. Keill has shown that the sum of all the Fluids
in a Man, exceed the sum of all the Solids, and
yet the quantity of Blood which all the Visible
Arteries of a Man will contain, is less than two
pounds, and if we may suppose all the Visible
Veins including the Vena Portæ, hold Four times
as much: The whole then that the Visible Vef-
dels can contain, is about Ten pounds, but the
whole that they do contain, is but very little
more than the Veins can contain, seeing the Ar-
teries are always found almost empty in Dead
Bodies, but how much the invisible Arteries and
Veins contain, I mean those which contain such a
Compound Fluid, as is found in the larger Vessels;
I know no way to judge, unless we knew what
proportion these Vessels bear to those that carry
the Nutritious Juices and Serum, (if there are any
such) without the Globuli of the Blood; if these
things were known, we might then perhaps de-
termin e the comparative Velocity of the Blood
in the minutest Vessels.

Cæteris paribus, is not the Ve-
locity
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ocity of Blood in all Animals, proportionable to their quantity of Action, and is not their necessity of Food also in proportion to their quantity of Action? If so, we may see how it comes to pass, that Animals that use no Exercise, and whose Blood moves extremely slow in the Winter, can subsist without any fresh supply of Food, while others that use a little more Exercise, require a little more Food, and those who use equal exercise Winter and Summer, require equal quantities of Food at all times, the end of Eating and Drinking, being to repair what Exercise and the Motion of the Blood has destroy'd or made useless; and is not the less Velocity of the Blood in some Animals than in others, the reason why Wounds and Bruises in those Animals do not so soon destroy Life, as they do in Animals, whose Blood moves swifter.

CHAP. X.

Of the Lymphaticks.

Lymphaducts are small pellucid cylindrical Tubes which arise invisible from the Extremities of the Arteries throughout the whole Body, but more plentifully in Glands than other Parts, and in greatest Number from such Glands as separate the viscidest Fluids, as may be observ'd in the Liver and Testes; they cannot be discern'd
discern'd in a natural State to have more than one Coat, and that exceeding thin, having Valves at small and uncertain Distances, to prevent the regres of their Fluid. They have frequent Communications like the Veins, but do not unite so often; the larger Trunks are, in many places attended with small Glands, thro' which they run, and at the same time send communicant Branches over them, that they might be secure'd against Obstructions from Diseases in those Glands. They all terminate in the \textit{Via Lactea}, or in the left subclavian Vein. All that arise below the Diaphragm, empty into the \textit{Vena Lactea secundi generis} and \textit{Receptaculum Chyli}; those in the Cavity of the Thorax into the \textit{Ductus Thoracicus}; and those of the superior Parts into the left subclavian Vein. Their Uses are to carry Lymph to dilute the Chyle, to make it incorporate more readily with the Blood (but not to make it flow the better in the \textit{Lacteals}, as appears sufficiently from their not entering into the minutest \textit{Lacteals}) and to carry off so much Lymph as is necessary to leave the Blood in fit Temper to flow thro' the Veins; for it is always observed that in such Persons as have their Blood too thin, the \textit{Globuli} cohere and form \textit{Molecula} or \textit{Polypus's}, which I imagine must arise from the \textit{Globuli} of the Blood not rubbing often enough, and with sufficient Force one against another to disunite them as fast as they cohere. These Polypuses are frequently found in all the large Veins, and in the right Auricle and Ventri-
Of the Lymphaticks.

Of the Lymphatics of the Heart, especially in such Bodies as Die of Cronic Diseases.

Authors have hitherto describ'd and painted these Vessels like Strings of Poppies: As they appear when injected with Mercury, because the Coat of these Vessels being exceeding thin, it is not able any where between the Values to refist the Mercury's attracting it felt into Globules, and the same Appearance also happens when they are præter-naturalie distended, because_values_hinder aDistention where they are seated, the Spaces between them approach to a spherical Figure from the equal pressure of the Fluid, according to the Degree of their Distention; but in a natural State when they are fill'd with Lymph, or when they are moderately injected with Air or Water, they always appear as cylindrical as the Veins. Any of these Vessels being burst, they cause a Dropie in the Cavity into which they open, which is oftener in the Abdomen than the Thorax; this kind of Dropie is sometimes, tho' very rarely cur'd by Tapping, and I believe the chief Reason why so few are Cur'd by that Operation is, because this Diseafe generally has its Rife from a schirous Liver. Out of a vast Number that I have open'd, I remember but one whose Liver appear'd found, which was of a Captain of a Man of War, whose Case being very extraordinary, I will relate it from a Journal which he kept himself. His way of Life expos'd him to drink more than he thought could be
be consistent with his Health, he resolv'd on a sudden to forbear drinking any strong Liquors; and this being in Winter-time, and he catching some Colds in stormy Weather, he first became Rheumatick and then Dropisical; and then he came to London for a Cure, October the 4th 1716; he was tapp'd by Mr. Ferne, who took away all the Water which was about five Gallons; but the Abdomen filling again very fast, he tapp'd him again, October the 28th, November the 18th, December the 1st, December the 30th, January the 16th, and on February the 17th Mr. Ferne being indispos'd, he was tapp'd by Mr. Will. Smith; and on February the 24th by Mr. Ferne: On March the 17th Mr. Ferne and my self, there being a Rupture at the Navel, open'd that with a Launcet, and let out all the Water that Way, and endeavoured to make a Fistula there to prevent future Tapping, but in vain, for when the Belly was emptied of Water, the Orifice would close up; he not being able to bear a Sponge-Tent to keep it open; and on March the 24th 1711, we open'd it again at the Navel, with a Launcet, and on April the 7th, Mr. Ferne open'd the Navel, and again on April the 22d, at which Time there being accidentally present one Mr. Spirling a Barber, who pretending to Surgery, and having observ'd how Mr. Ferne did it, undertook to make the Apperture in the same Manner, which was by pinching up the Skin, and cutting of it as is usually done in making of Fistulas; this was on the 30th of April; he perform'd it again
Of the Lymphatics.

again in May, about the 20th Day: And again on
the 11th of June; but he not doing it to the
Captain's Satisfaction was after this Time
discharged, and Mr. Ferne was desir'd to do the
Operation again, but the Gentleman being far-
ther in the Country than Mr. Ferne could conve-
ni ently go, I was desir'd to attend him, which
I did afterwards, and tapp'd him on June the
25th. July about the 4th or 5th. July the 16th.
July the 26th. August the 2d. August the 11th.
August the 18th. August the 25th. September the
1st. September the 8th. September the 15th, and on
September the 17th. the Water burst out of itself.
If open'd it again on September the 27th a few Days
after which he died; after 29 times tapping and
once opening it self. At all which Times he lost
above seventy Gallons of Water. When he was
first tapp'd he was so weak he could scarce fit in
a Chair; but he soon gather'd Strength, went
into the Country, and drove himself in a Chaise:
About the 17th Time he drove himself out of the
Country, and was tapp'd at my House, and drove
himself home immediately after; and at other
Times would go out immediately after Tapping.
But for about three Weeks before he died, he was
almost constantly troubled with Rheum atick Pains,
and Bled frequently at the Nose, which seem'd to
be the most immediate Cause of his Death.

Since the Writing of this I opened a Woman
who died of a Dropstie in the Liver, the Gibous
part was entirely wasted, and the Coat of the Li-
ver
ver was about a Quarter of an Inch thick and contained about Five Gallons of a gross yellowish Fluid, in which were many Hydatids about the Size of Gooseberries, and some pieces of Matter of as bright a Red as Vermillion. At about Fourteen Years of Age she first began to feel Pain in this part, which returned Monthly, but in time grew continual. Her Belly constantly encreasing till she died, which was in the Twenty Eight Year of her Age, without ever having had her Menstrues. All the other viscera both in the Thorax and Abdomen were perfectly sound, nor was there the least sign of a Dropsic in any of the Limbs, or yellowness in the Skin, which is common in diseases of the Liver.

C H A P. XI.

Of the Lymphatick Glands.

The Glands accompanying the Lymphatics, are situated in the three Cavities in the Interstices of the Muscles, where the Lymphatics lie with the large Blood-Vessels, and in the four Emuncutories, viz. the Arm-Pits and Groin. In the Brain is seated the Glandula Pinealis, which I judge to be of this Sort, having often seen large Lymphaeus running into it from the Plexus Choroides, and at the Basis of the Brain in the Sella Turcica is the Glandula Puitaria, into which enters a large Lymphatick, nam'd.
Of the Lymphatick Glands. 

In the Neck are situated a great many of these by the sides of the Carotid Arteries and internal Jugular Veins, and two, or a sort of double, one upon the Larynx immediately below the Thyroid Cartilage, from which Situation they derive the Name of Thyroidea, and just within the Thorax seated another call'd Thymus; in very young children the Thymus is as large or larger than the Thyroid Glands; But in Men these Glands are very large, and the Thymus very small, the former having encreased in about a double Proportion of any other Gland of this kind, and the latter having rather diminished than encrease. But in Brutes, such as have fallen under my Observation, it is just contrary; from which Observations I am inclin'd to conclude, that they both belong to the very same Lymphaticks, and that either of them encreasing as much as both ought to do, if both encrease'd, answers the same as if both did; and that the Reason why the Thymus encreases rather than the Thyroid Glands in Brutes is because the Shape of their Thorax renders convenient Room for it to lodge in; and in Men the Thyroid Glands encreased so much, because there is no Room in that Part of the Thorax where the Thymus is seated, for a large Gland to be lodg'd. In Dogs, a Porpuss, and some other Animals, I have seen the Lymphaticks in the Thymus and between the Thymus Ductus Thoracicus full of Chyle, and so in many
many other Lymphaticks near the *Via Lactea*
Under the Basis of the Heart, and at the Sides of
the Lungs where the great Vessels enter, are many of
these Glands from the Size of a Pea to that of a
Hazel-Nut. In the *Abdomen* upon the Loins near
the Kidneys, and by the Sides of the Iliac Vessels
are many of these Glands, they are call'd
*Lumbales*, and there are some at the hollow Side
of the Liver, nam'd *Hepatica*, and the Mesentery
is full of Glands of a like Appearance, but they
seem to belong only to the Lacteal Veins, unless
some of them belong to the Lymphaticks that
come from the Liver, which are seated at the
*Basis* of the Mesentery among the *Vena Lactea*
secundi generis, where the Hepatick Lymphaticks
pass in their way to the *Receptaculum Chyli*. The
Glands which accompany the Blood-Vessels in
the Limbs are few, and distributed in no certain
Order; except those in the four Emunctories, i.e.,
in the Arm-Pits and Groins, nam'd *Axilares* and
*Inguinales*.

Brutes have some large ones in the Thigh, com-
monly call'd the *Pope's-Eye*; these are seated about
the great Vessels in the Thigh, where they pass
thro' the *Triceps* Muscle. From this Situation, and
not from any thing extraordinary in these Glands it
is that Wounds are there so dangerous. These
Glands are said by *Nuck* and others after him, to
be compos'd of Vesicles, and not of Vessels, like
other Glands; and that these Vesicles are Repos-
tories of Lymph, but from their Appearance in a
natural
natural State which is very compact and uniform; there seems to me to be but little Reason for such a Conjecture. Some have thought their Use to be by contracting to accelerate the motion of the Fluid in the Lymphatics; But that does not seem very probable, because a stronger Coat would have been the readiest Means to produce that Effect; besides these Vessels never enter any of 'em without detaching a Branch over at the same time perhaps to prevent Obstructions. And if these Glands were endued with a Contracting Power, which is only presum'd without any Proof, it would still be difficult to conceive how such a Power apply'd at uncertain Spaces, should not rather obstruct than accelerate the Motion of Lymph in the Lymphatics, unless there were Values to prevent a Reflux; and even then, if this were a convenient Piece of Mechanism, it would be very strange that it should no where else in the Body be made use of.

C H A P. XII.

If the Course of the Aliment and Fluids, Abstracted from the foregoing Chapters.

The Aliment being receiv'd into the Mouth, is there masticated by the Teeth, and impregnated with Saliva, which is press'd out of the Salivary Glands by the Motions of
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of the Jaw and the Muscles that move it and the Tongue. (See from Page One Hundred and Twenty One, to Page One Hundred and Twenty Five.)

Then it descends thro' the Pharynx into the Stomach, where it is digested by the Juices of the Stomach, (which are what is thrown out of the Glands of its inmost Coat, and Saliva out of the Mouth) and a moderate Warmth and Attrition. (See from Page One Hundred and Twenty Eight, to Page One Hundred and Thirty Three.)

Then it is thrown thro' the Pylorus or right Orifice of the Stomach into the Duodenum, where it is mix'd with Bile from the Gall-Bladder and Liver, and the Pancreatic Juice, from the Pancreatic Gland. These Fluids serve further to attenuate and dilute the digested Aliment, and probably, to make the Fluid Part separate better from the Faces. After this it is continually mov'd by the Peristaltic or Vermicular Motion of the Cuts, and the Compress of the Diaphragm and Abdominal Muscles, by which forces the fluid parts are press'd into the Lacteals, and the gross parts thro' the Guts to the Anus. (See from Page One Hundred and Thirty Three, to Page One Hundred and Thirty Six, and from One Hundred and Forty Two, to Page One Hundred and Forty Nine.)

The Chyle, or thin and Milky part of the Aliment, being receiv'd into the Lacteals from all
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all the small Guts, they carry it into the *Receptoraculum Chyli*, and from thence the *Ductus Thoracicus* carries it into the *left Subclavian Vein*, where it mixes with the Blood, and passes with it to the Heart. *(See from Page One Hundred and Forty Nine, to Page one Hundred and Fifty.)*

All the Veins being empty'd into two Branches, viz. the ascending and descending *Cava*, they empty into the right Auricle of the Heart; the right Auricle unloads into the right Ventricle, which throws the Blood thro' the Pulmonary Artery into the Lungs; from the Lungs, the Blood is brought by the Pulmonary Veins into the left Auricle; and from that into the left Ventricle, by which it is thrown into the *Aorta*, and distributed thro' the Body. From the Extremities of the Arteries, arise the Veins and Lymphatics, the Veins to collect the Blood and bring it back to the Heart, and the Lymphatics to return the Lymph, or thinner part of the Blood; from the Arteries, to the *Via Lactea*, where it mixes with the Chyle, and then passes with it into the *left Subclavian Vein* and to the Heart. *(See from Page One Hundred and Fifty Seven to Page One Hundred and Ninety.)*

All the Fluids that pass into the Stomach and Guts being carried into the Blood-Vessels, the greatest part of 'em are separated and carry'd off by proper Vessels, viz. Urine from the Kidneys, Bile from the Liver, &c. And these...
ces carry along with them whatever might be injurious to the Animal Economy. (See from Page One Hundred and Fifty to Page One Hundred and Fifty One.

CHAP. XIII.

Of the Dura Mater and Pia Mater.

Dura Mater, is a very compact strong Membrane lining the inside of the Scull, firmly adhering at its Basis, and but lightly at the upper part. It has Three Processes: The first nam'd Falx, begins at the Crista Galli, and runs backwards under the Sutura Sagittalis to the Cerebellum, dividing the Cerebrum into Two Hemispheres. Its Use is said to be, to support one side of the Cerebrum from pressing on the other when the Head is inclin'd to one side. But I think it is evident that this is not the Use, because there would be more need of such a Process from one side of the Scull to the other, than this way; and it would be also very necessary that it should run through the Brain, to Answer that end. The Principal use appears to me to be to divide the Brain into such Portions as are least liable to be mov'd in the Scull, by any violent motions of the Head, which is better done this way than it would the other; and the under-side of the Brain is kept steady by the inequalities of the Basis of the
the Scull, which the Brain is exactly fitted to. In Brutes, the *Falx* is always very small, therefore in those whose Brains are of the larger size, as Oxen, Sheep, Horses, &c. The upper part of the Scull is made uneven, exactly to fit the folds of the Brain, which secures the upper parts of their Brains from concussions, in the same manner that the lower parts are secure'd. The Second Process runs from the lower and back-part of the former to the upper edge of each *Os Petosium*, and sustains the Posterior Lobes of the *Cerebrum*, that they might not compress the *Cerebellum*. In such rapacious Animals as I have dissected, this Process is Bone. The third is very small, sometimes not to be distinguish'd; it runs from the last describ'd Process down towards the great *Foramen* of the Scull, and possesses the small space in the *Cerebellum* between the *Processus Vermiformes*. These Processes of the *Dura Mater*, serve also to keep the Brain steady.

The *Dura Mater* has also to be observed in it several Sinuses, which are large Veins to receive the Blood from the lesser Veins of the Brain: Their number is uncertain, and those that are constant, are not describ'd in the same Order by Writers. The first that presents itself is, the *Longitudinalis superior*, running from a blind Hole a little above the *Crista Galli* all along the upper Edge of the *Falx*. A transverse section of this Vessel is not Circular, like other Vessels, but a Triangle whose sides are arches of a Circle; the upper
upper side convex outwards, and the two lower convex inwards; the figure of this Vessel, is preserved by small Ligaments running across in the inside that it might not become conical, or cylindrical, like other Vessels, from the equal pressure of the contain’d Blood, and thereby incommode the upper Edges of each Hemisphere of the Cerebrum. On the lower Edge of this Process, is generally another very small one, call’d Longitudinalis inferior; this runs into the Rectus, and when wanting is supply’d by a Vein; Rectus runs between the Two first Processes of the Dura Mater, and unloads with the Sinus Longitudinalis superior into the Two lateral Sinuses. There is sometimes a small one in the third Process, which empties in the same place with the former. From the endings of the Longitudinal and straight Sinuses, begin the Two Lateral Sinuses, which when they come to the Os Petrosum, dip down and pass thro’ the Eighth Foramina into the internal Jugular Veins. There is another nam’d Circularis, it runs round the fore-part only of the Sella Turcica; the two Ends of this empty into Four Sinuses, one on the Top of each Os Petrosum, which pass into the Sinus Laterales, and one at the under sides of the same Bones, which pass indifferently into both the Lateral and Cervical Sinuses; these Two last Sinuses have always communicant Branches. The Cervical Sinuses run from the Basis of the Scull thro’ the great Foramen on both sides the Medulla Spinalis Colli, and
and Pia Mater.

and thro' the Transverse Processes of the Cervical Vertebrae; the last of these, have many times, proper Foramina, running from the Eighth Foramina to the back-part of the Apophyses of the Occipital Bone. There are also Two more of these Vessels, which run from the Circular Sinus between the Os Sphenoides and fore-part of the Os Petrosum directly into the Internal Jugular Veins.

Pia Mater, is an exceeding fine Membrane immediately investing the Brain, even between its Lobes, Hemispheres and Folds. It serves to contain the Brain, and support its Blood-vessels, which run here in great numbers; for the Arteries to divide into small Branches upon, that the Blood contain'd may not enter the Brain too impetuously; and for the Veins to unite on, that they may enter the Sinuses without difficulty. Some pretend, That there is another Membrane under the Pia Mater, which I cou'd never discover, and therefore will not describe.

I have once seen a large part of the Dura Mater, and once part of the Pia Mater ossify'd.
CHAP. XIV.

Of the Cerebrum, Cerebellum, Medulla Oblongata and Medulla Spinalis.

Cerebrum, is that part of the Brain which contains all the upper and fore-part of the Cranium, being separated from the Cerebellum by the second Process of the Dura Mater. Its upper side is divided into Two Hemispheres, and its lower side into Four Lobes, Two called anterior, and Two posterior, which latter are much the largest; at the meeting of the Four Lobes, appears the Infundibulum, which is a large Lymphatic running from the Ventricles of the Brain into the Glandula Pituitaria. This Gland is seated in the Sella Turcica. Immediately behind the Infundibulum appear Two small Bodies, nam'd Protuberantiae duo albae pone Infundibulum. Between the Two Hemispheres of the Cerebrum, lower than the Circumvolutions, appears a White Body nam'd Corpus Callosum. Under the Corpus Callosum, appear the Two Lateral or Superior Ventricles, which are divided into right and left by a very thin Membrane, nam'd Septum Lucidum, which is extended between the Corpus Callosum and Fornix. The Fornix is a Medullary Body, beginning from the fore-part of
Of the Cerebrum and Cerebellum, &c.

Of these Ventricles, with Two small Roots which soon unite; and running towards the back-part, where they divide into Two parts, call’d Crura Fornicis. In the Basis of these Two Ventricles, are four Prominences, the Two anterior are call’d (because of their inner Texture) Corpora Striata. The other Two are nam’d Thalami Nervorum Opticorum.

Beyond these, are Two more Processes, call’d Nates: And under them nearer the Cerebellum, Two call’d Testes. On the upper part of the Nates, is situated the Glandula Pinealis, famous for being supposed by Des Cartes the Seat of the Soul. And upon the Thalami Nervorum Opticorum, are a number of Blood-Vessels, Glands, and Lympheducts, call’d Plexus Choroides. Under the beginning of the Fornix, is a small Foramen call’d Foramen ad Radices Fornicis: And under the middle of the Fornix, one call’d Foramen posterius which is cover’d with a Valve nam’d Membrana Valvula major; and the Space under the Two anterior Ventricles between the Foramina and the Cerebellum, is the third Ventricle.

Cerebellum, is situated under the second Process of the Dura Mater. By dividing this part of the Brain lengthways, we discover the fourth Ventricle, whose Extremity, is call’d Calamus Scriptorius; to these are observed Two Medullary Bodies call’d Pedunculi, which are the Basis of the Cerebellum.
Of the Cerebrum and Cerebellum, &c.

The Substance of the Brain is distinguished in two outer and inner; the former is call'd Cortex, Cerebra or Glandulosa, the latter Medullaris, Alba, or Nervea.

Medulla Oblongata, is a medullary Production on the under part of the Cerebrum and Cerebellum: It first appears in two Bodies, from the anterior part of the posterior Lobes of the Cerebrum, call'd Crura Medulla Oblongata. The union of these Crura between the Cerebrum and Cerebellum, is call'd Infamus; and immediately beyond this, is an Eminence, nam'd Processus Annularis.

Medulla Spinalis, is a Production of the Medulla Oblongata thro' the great Foramen of the Scull, and thro' the Channel of the Spine. The Coats of this Part are the same with those of the Brain; it is divided its whole length by a thin Membrane, and so we suppose, the Medulla Oblongata. The lower part of the Medulla Spinalis, is call'd Cauda Equina.

Wounds in the Cerebrum are not Mortal; but in the Cerebellum and Medulla Oblongata, they cause present Death; and in the Medulla Spinalis, loss of Sense in all the Parts which receive Nerves from below the Wound. In Persons that have died Lethargic, I have always found the Brain full of Water; and in Children the Brain is always very soft and moist. In a Man that died of an Apoplexy I found all the Vessels of the Brain immediately
Of the Nerves.

Of the Nervet.

Of the Nerves.

Of the Nerves.

The Nerves, are in Number Forty Pair, Ten Pair of which arise from the Medulla Oblongata within the Scull, and are call'd Nerves of the Brain; the rest arise from the Medulla Spinalis. The Seven Pair of the Neck, are call'd Cervicales. The Twelve of the Back, Dor-sales. The Five of the Loyns, Lumbales. And there are

CHAP. XV.

Of the Nerves.

I have twice seen in the Cerebrum a Schirrous Tumor as large as a Pullet's Egg. And in another Body, Impostumations which posses'd near two Thirds of the Whole Cerebrum. And in a Person that dy'd with a Gutta Serena, I found all the Ventricles of the Brain full of Lymph; and the Thalami Nervorum Opticorum and the Optick Nerves, e'er they went out of the Scull, made flat with the pressure. And in an old Man I found the right Optick Nerve wasted, and black.
are six which pass out of the Os Sacrum. They seem, when examin’d with a Microscope, to be Bundles of straight Fibres not communicating with one another; And I am inclin’d to think that every, the Minutest Nerve, terminating in any part, is a distinct Cord from its origin in the Brain, or Spinal Marrow; or else I do not see how they could produce distinct Sensations in every part; and the distinct points of Sensation throughout the Body, are so very numerous, that the whole Body of Nerves (which taken together would not make a Cord of an Inch Diameter) must be divided into such a Number, to afford one for every part that has a distinct Sensation, that surely each Nerve would be too small to be seen by the best Microscope; they all pass in as direct Courses to the Places they serve as is possible, never separating nor joining with one another but at very acute Angles, unless where they unite in those Knots which are call’d Ganglia, the use of which I do not pretend to know; they make what appears to be a Communication of most of the Nerves on the same side, but never join Nerves of opposite sides.

The Nerves of the Brain, I shall describe in Order: But from what Parts they arise within the Brain, I do not pretend to show, tho’ Anatomists describe ’em, as if they had trac’d ’em from their Beginnings; nor have they been less definitive in the Descriptions of their Terminations, where they frequently describe Nerv-
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vous Plexuses, which in their prints are made transverse interweavings, which is a structure that I have never been able to observe among the nerves, and which is not agreeable to the general disposition of them, since they every where in the same parts, as far as I can discern, run as nearly parallel one to another as is possible.

The first Pair of Nerves, as they are called by Dr. Willis, or the Processus Mammillaris of the brain, in Men are small, but in some Brutes and such as have no nice sense of smelling, they are very large and hollow; they pass directly towards the Os Ethmoides, thro' whose Foramina they are laid to pass to the Membranes of the Nose, to be expanded on them for the sense of smelling. But the least care in dissection will clearly show, that they do not pass out of the skull; and the great cavities which there are in these processes in Sheep and Oxen, evidently show them appendages to the third Ventricle of the brain, with which their cavities communicate, but in Men I can no more conceive what may be their use, than I can of any other part of the brain.

The second Pair of Nerves, are the Optic, which are round and medullary; they arise single, and then uniting at the fore-part of the Cella Turcica, they divide again, and pass out at the first Foramina of the skull to the bottom of the eyes, where they enter, and expanding themselves form the Tunica Retina, upon which objects are painted. (Vid. Chap. Of the Eyes.)
The Third Pair of Nerves are small, they pass out of the second Foramina, or Foramina Lacera, and are bestowed upon the Eyes, the Membranes, and Glands in the Orbits, and some of the Muscles.

The Fourth Pair of Nerves are the smallest and are call'd Pathetic ; they go out of the second Foramina, or Foramina Lacera, to the Musculi Trochleares, or Obliqui superiores, Oculorum, and the Neighbouring parts.

The Fifth Pair of Nerves are the largest of all; after they have pierc'd the Dura Mater, they each Unite more closely, and then send One Branch thro' the Foramien Lacerum vel secundum into the Orbits of the Eyes, thro' which Branches are given to the Coats and Muscles of the Eyes; and One thro' a Notch at the upper Edge of the Orbits to the Forehead. The next Branch, which is larger, passes thro' the third Foramen of the Scull, and a Foramen in the Maxilla superior just under the Orbit of the Eye; this is bestowed upon the Face. The third, and largest Branch of this Nerve, is bestowed upon the Tongue, Jaws, Mouth, Nose, Chin, Teeth, and all the Parts near the Jaws, and One small Branch goes to the Cervicals. This Nerve I take to be both the Gustatory and Olfactory.

The Sixth Pair of Nerves send One Branch into the Orbits of the Eyes, and One thro' the sixth Foramina of the Scull, which after joyns a Branch
Branch of the fifth, and is distributed to the Tongue and down the Neck.

The Seventh Pair of Nerves are composed of a Portio Dura; and a Portio Mollis. The latter is spread within the Ear for the Sense of Hearing; and the former passes out behind the Processus Styloïdalis, and is bestowed upon the Ears, Face, Tongue, and adjacent Parts.

The Eighth Pair of Nerves, or Par Vagum, go out of the eighth Foramina of the Scull; but before they go out, they each receive a Nerve from the superior part of the Medulla Spinalis, nam'd Accessorius. They descend on both sides the Larynx to the Thorax, where they each form a Ganglion, and return a Nerve, nam'd Recurrents, to the Larynx; the right turns round the right Subclavian Artery, and the left round the Ductus Arteriosus, and passes under the beginning of the descending Aorta. It is generally said that these Nerves being divided in a Dog prevents his barking, which Experiment I have made, but found it otherwise. The larger Trunks of these Nerves, passing down by the sides of the Pharynx, communicate and bestow Branches upon the Heart, Lungs and Pharynx, and the remaining Parts are bestowed upon the Stomach.

The Ninth Pair of Nerves, go out of the Ninth Foramina of the Scull, and are bestowed upon the Muscles therabouts.
The Tenth Pair, go out between the Scull and the first Vertebra, and are distributed among the adjacent Parts. This Pair of Nerves is reckon'd among those of the Scull, and not those of the Spine, because it does not arise double on each side and join with a Ganglion, as all the other Spinal Nerves do.

From these last describ'd Nerves, and some others thereof, arise some small Branches of Nerves on each side, which soon unite about the fore-part of the second Vertebra, in larger Ganglions than are found in any other Part of the Body; after which they part with some very Minute Twigs, and then descend through the Neck, near to the Par Vagum, and passing through the Thorax near the Spine, they receive Branches, which join them with a Ganglion, from every one of the intercostal Nerves, and some of the uppermost of the Loins, and towards the Lower Part of the Thorax, and upper part of the Loins, they detach several Branches, which soon join into Two on each side, which are chiefly bestowed upon the Liver, Spleen, Pancreas, Guts and Mesentery.

The Three first Pair of Cervical Nerves, are bestowed upon the Neck and Shoulders, and from the Fourth and Fifth go off the Phrenic Branches to the Diaphragm; which Branches as they Pass, send off Branches to the Sternum and Pericardium. And the Fourth, Fifth, Sixth, and Seventh, with the first of the Back, make the Sr-
Subclavian Nerves. The last describ'd Pair send off Branches under the Two first Ribs; which Branches, with the other Eleven Pair of the Back, are all call'd Intercostals. The Two first of the Loyns, are bestowed upon the Loyns; and the Three last upon the Fore-parts of the Thighs, to which they run together with the Blood-Vessels. The Three first of the Sacrum, are very large, they joyn and form the Posterior Crural Nerves; and the remaining Nerves of the Sacrum are bestowed about the Buttocks.

Every one of the Intercostal and Lumbal Nerves, send off small Branches to the Back and Loins; and those of the Sacrum send off Branches likewise, but they separate within the Spine, and go out backwards at distinct Holes. These last Nerves of the Sacrum, have no Ganglions after they leave the Spine.

The Subclavian Nerves when they are got into the Axilla's with the great Blood Vessels, divide into Three principal Branches; One of which passes along with the Blood-Vessels towards the Thumb, and is call'd Nervus Cubitalis superior. Another passes down behind the inner Apophysis of the Os Humeri to the Hand, and is call'd Cubitalis inferior. And the third Branch, which is less than either of these, passes behind the Os Humeri, and is bestowed upon the Cubit and Back of the Hand. There is also another large Branch detach'd from the Axillary Nerve.
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Of the Coracobraehialis Muscle, and is call'd Perforans; besides these Branches, they every One as they pass give off Branches to the Circumjacent Parts. I have seen a Palsy and Atrophy of both Arms, from a Pressure made by Crutches upon the Axillary Nerves and Arteries.

The Cubitalis superior sends Two Branches to the Thumb, Two to each of the first Fingers, and One to the third Finger; and the Cubitalis inferior sends also One to the third Finger, and Two to the little Finger; besides these Branches, they detach many others in their Progress.

The Posterior Crural Nerve descends between the Flexors of the Tibia, and under the Extensors of the Tarsus to the Foot, where it passes under the Os Calcis, and then soon divides into Two Branches which detach two to each Toe, in the very same manner as the Cubitalis superior and inferior do to the Fingers: A little below the Knee, the Crural Nerve sends a Branch over the Fibula to the fore-part of the Leg, and as it passes along, it sends off Branches to all the other Parts of the Lower Limb.

I think I have here describ'd the Nerves, as far as may be of any use to Surgeons in Operations, and as far as may be of any use to the understanding of the consent of the Parts; and if this is not enough, I do not see where to stop, though they may be more properly describ'd to their very small Branches, than other Vessels, because
because I never have met, that I remember, in any Author or in any Dissection, with one *Latius Nature* among the Nerves.

That the Nerves are instruments of Sensation, is clearly proved from Experiments, but how they convey those Sensations to the Brain, is matter of great dispute. The most general Opinion is, that the Nerves are Tubes to contain Animal Spirits, by whose motions these Sensations are conveyed: And Diligent Enquiry has been made with Microscopes to discover their Cavities, but hitherto in vain; and if each Nerve is distinct from its Origin, (as I have endeavour'd to show in the beginning of this Chapter) I doubt whether a single Nerve, is not too small to be the Object of the best Microscope. Some to prove the existence of Animal Spirits in the Nerves, have affirmed, that upon tying any parcel of them, they swell on that side of the Ligature next their rise, and sink on the other side, like an Artery: but this I could never see, and the Appearance of seems to be owing to the Preposition of an Hypothesis. However, I think the Nerves may be tubes, and that a Fluid, whose Cohesion is very little, and whose parts are perhaps no finer than light, may move very freely in them. Those who deny Animal Spirits in the Nerves, suppose at the Sensation is conveyed by a Vibration them. To which it is objected, That they are slack, moist, and surrounded with soft parts,
and are therefore unfit for Vibrations, as indeed they are for such as are made on the strings of a Musical Instrument; but the Minutest Vibrations, such as they cannot be without, may be as sufficient for this end, as the impulse of light upon the Retina, is for the Sense of Seeing. So that for ought that I can discern, Sensations may be convey'd either, or both ways, tho' the Advocates for each Opinion, have chiefly insisted upon the improbability or impossibility of the other Opinion.
BOOK IV.

CHAP. I.

Of the Urinary and Genital Parts of Men, together with the Glandulae Renales.

The Urinary Parts are the Kidneys with their Vessels and Bladder of Urine.

The Kidneys of Men, are very like those of a Hog, the Two weigh about Twelve Ounces; they are seated towards the upper part of the Loyns upon the Two last Ribs, the right under the Liver, and a little lower than the other, and the left under the Splene. Their Use is to separate the Urine from the Blood, which is brought thither for that Purpose by the Emulgent Arteries; and what remains from the Secretion, is return'd by the Emulgent Veins, while the Urine secreted is carry'd off through the Ureters to the Bladder.

The Ureters, are Tubes about the bigness of a Goose-quill; and about a Foot Long, they arise from the Hollow side of the Kidneys, and end in the Bladder near its Neck, running obliquely
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obliquely for the space of an Inch between its Coats; which manner of entering, is to them as Valves. The beginning of the Ureters in the Kidneys, are the Tubuli Urinarii, which joyning form the Pelvis in each Kidney. Between the Tubuli Urinarii, Authors have remark'd small Papi\lila; and the Parts which distinguish themselves by a clearer Colour, they call Glandula.

The Bladder of Urine, is seated in the Pelvis of the Abdomen; its shape is Orbicular, and its Coats are the same with those of the Guts, and other hollow Muscles already describ'd; viz. an External Membranous, a Middle Muscular, which is the Musculus detrufor Urina, and an inner Membranous Coat, exceeding sensible, as is fully shown in the Cases of the Stone and Gravel. The use of this nice Sense is, to make it capable of that uneasiness which excites Animals to exclude their Water, when the Bladder is much extend-ed. Some Anatomists not thinking how soon Fluids taken into the Stomach, and not retain'd there, by being mix'd with Solids, may pass into the Blood, as the Effects from drinking strong Liquors, or Laudanum, or drinking without eating, when we are hot, sufficiently show. And also not considering the shortness of the Course, from the Stomach to the Kidneys this way, together with the Size of the Emulgent Arteries, and the Velocity of the Blood in them, have imagined and almost affirmed, that there must be some immediate Course from the Stomach or Guts to
to the Bladder, not considering either how such a Course would have interrupted one great end in the Animal Economy, or that Vessels fit to fill the Bladder faster than the Ureters, must have been too large to be conceal'd.

**Glandulæ Renales**, are Two Glands seated immediately above the Kidneys, of no certain figure, nor do we know their Use; but always paint and describe them with the Urinary Parts because of their Situation. They receive a great many small Arteries, and return each of 'em One or Two Veins. In their inside is a small Sinus tingitur'd with a footy colour'd Liquor.

The Genital Parts of Men are the Testes and Penis, with their Vessels, &c.

The Office of the Testes, is to separate the Seed from the Blood; they are seated in the Scrotum, and are said to have Four Coats, Two common, and Two proper; the common are the outer Skin and a loose Membrane immediately underneath, call'd Dartos. The first of the proper, is the Processus Vaginalis, it is continued from the Peritoneum to the Testicle, which it incloses with all its Vessels. Into this Membrane, the Intestinum Ileum or Colon, descend in the Hernia Intestina-lis, the Omentum in the Hernia Omentalnis, and the Water in the Hernia Aquosa. (Vid. Musculi Abdominis) The other proper Coat, is the Albuginea, which is very strong, immediately inclosing the Testicles. The Testicles of a Rat may be unravel'd into distinct Vessels and the Texture of
of the Testicles of all other Animals appear to be the same, but they are too tender or cohere too much laterally to bear to be separated.

The Testicles, receive each, One Artery from the Aorta, a little below the Emulgents, which unlike all other Arteries, arise small, and dilate in their progress, that the velocity of the Blood may be sufficiently abated for the Secretion of so viscid a Fluid as the Seed. The right Testicle returns its Vein into the Cava, and the left into the Emulgent Vein on the same side; both because it is the readiest Course, and because as Authors say, this Spermatic Vein would have been obstructed by the Pulse of the Aorta, if it had crossed that Vessel to go to the Cava. A Gentleman whom I Castrated, who trusted too much to his own Resolution, and refused to have any one present to hold him, except Mr. Geeke, who was my Assistant during the Operation, moved so much, that the Ligature, which tied all the Vessels with the Process together, slip, and only tied the Process over the ends of the Vessels, which I perceiving, soon after the Operation, I cut the Ligature, and took out the Extravasated Blood, and tied the Artery alone, which gave but little Pain, and digested off in a Weeks time, and the Wound being afterwards stitch'd, though the Testicle weigh'd a Pound, it was perfectly well in Five Weeks; which is in less time than the Ligature often requires to be digested off, when the Process and all
all the Vessels are tied together. However if this Case is not sufficient, to recommend doing this Operation by tying the Artery only, it may be sufficient to recommend extraordinary care in doing of it the usual way, for if the Blood had found an easy passage into the Abdomen, the Patient had bled to Death without our knowledge.

On the upper part of the Testicles, are hard Bodies, call'd Epididymis, which are evidently the beginnings of the vasa deferentia, I have unraveled them backward, in single Vessels, and then into more and smaller, like the Excretory Vessels of other Glands.

Vasa deferentia, are Excretory Ducts to carry the elaborated Seed to the Vesicula Seminales. They pass from the Epididymis of the Testicles, together with the Blood Vessels, till they have enter'd the Muscles of the Abdomen, and then they pass under the Peritoneum, directly through the Pelvis, to the Vesicula Seminales.

Vesiculae Seminales, are Two Bodies that appear like Vesicles, they are seated under the Bladder of Urine, near its Neck; they may be each of them easily unravell'd into one single Duct, which discharge into the Urethra, by the sides of the Rostrum Gallinaginis, which is an Eminence in the underside of the Urethra, near the Neck of the Bladder. In these Vesicles or Ducts the Seed is reposited against the time of Coition; but in Dogs there are no such Vesicles, therefore Nature has contriv'd a large bulb in their Penis, which
Of the Urinary and

which keeps them Coupl’d, seemingly against their inclinations, ’till the Seed can arrive from the Testicles: The Seed passes from these Vessels in Men, and even from the Vasa deferentia, in time of Coition, through the Prostate Glands into the Urethra; as in those Animals that have no Vescula Seminales, for when the Ducts into the Urethra are distended, that is the directest Course from the Vasa deferentia; as well as from the Vescula Seminales.

Prostate, are Two Glands, or rather One, about the size of a Nutmeg; they are seated between the Vescula Seminales and Penis, under the Ossa Pubis, almost within the Pelvis of the Abdomen. They separate a lympid glutinous Humour which is carried into the Urethra by several Ducts, which enter near those of the Prostate; this Liquor seems to be design’d to be mix’d with the Seed in the Urethra, in the time of Coition, to make it flow more easily.

Penis, Its Shape, Situation, and Use, need no Description. It begins with Two Bodies, nam’d Crura, from the Ossa Ischia, which unite under the Ossa Pubis, and are there strongly connected. In its under part is a Channel from the Bladder, call’d Urethra, through which both the Urine and Seed pass; its fore-part is call’d Glans, the loose Skin which covers it, Preputium, and the strait part of that Skin on the under side, Frænum.
The Urethra, is lined with a Membrane fill'd with small Glands, that separate a Mucus, that defends it from the Acrimony of the Urine. These Glands are largest nearest the Bladder. Mr. Cowper describes Three large Glands of the Urethra, which he discover'd; Two of which are settled on the sides of the Urethra, near the ends of the Crura Penis, to which he adds, a Third less than the other seated almost in the Urethra, a little nearer the Glans than the former; all these Glands have Excretory Ducts into the Urethra.

The inner Texture of the Penis is spongy, like the inner Texture of the Splene, or the Ends of the great Bones; it is usually distinguish'd into Corpus Cavernosum Penis, Glandis and Urethra; these Three Parts are all distinct, and the Two former divided lengthway with a thin Septum; but the Cells of the Corpora Cavernosa Penis, are much larger than those of the Urethra, or Glans. In the upper side of the Penis, are Two Arteries, and One Vein call'd Vena ipsius Penis; the Arteries are deriv'd from the beginnings of the Umbilical Arteries, which parts never dry up, and the Vein runs back to the Iliac Veins. The Vena Ipsius Penis, being obstructed, the Blood that times by the Arteries, distends the Cells of the whole Penis, and makes it Erect, but to prevent any mischief from this Mechanism, there are small Collateral Veins on the surface of the Penis, that carry back some Blood all the time the
Penis is Erect. By what Power the Vena iipsa
Penis is obstructed to Erect the Penis, I cannot
conceive, unless small Muscular Fibers constrict
it. Most Authors think the Musculi Erectores
Penis do it, by thrusting the Penis against the Ol.
Pubis; but they are not seated, as Mr. Cowper
observes, conveniently for such an Office; besides
if a pressure from the Lower side of the Penis
is sufficient, an Artificial pressure, which may be
much greater, shou'd, I think, produce the same
effect. When the Matter of a Gonorrhea is so vi
rulent as to make Ulcers in the Urethra, when
those Ulcers Cicatrize they constrict the Urethra
and make that difficulty in the Waters passing
which is vulgarly tho't to proceed from Caruncles.

In the Seed of Men, and of many other Mammals,
Animals, Lewenhoek, by the help of Micro
copes, discover'd an Infinite Number of Animals
like Tadpoles, which he and his followers suppose
to be Men in Miniature, and that one of these
being enter'd into an Egg in one of the Ovaria
(See the next Chapter.) Conception is perform'd.
But though scarce any one, that has made due
enquiry, has ever doubted of the Existance of
these Animals, yet there are many who object
against this Hypothesis; and though I am in
clin'd to think it true, yet I will endeavour im-
partially, to lay down the principal Objections
and Answers, that the Reader may Judge for him-
selv. The first and strongest Objection, is rais'd
from the several instances that have happened of
mixed.
mixed Generation, where the Animal produc'd always appears to partake of both kinds, as in the common Case of a Mule, which is begot by an Ass upon a Mare; when according to that Hypothesis, they expect the Animal produc'd from mixed Generation, should be entirely of the same Species with the Male Animal, as the Seeds of Plants, whatever Earth they grow in, always produce Plants of the same kind; nevertheless if we consider what influence Womens fears or longings, frequently have upon their Children in Utero, and how great a change Castration makes in the shape of any Animal, we cannot wonder if the Mothers Blood, to which the Animal owes its Nourishment and increase, from the time of Impregnation to the time of its Birth, should be thought a sufficient cause of Resemblance between these Animals and their Mothers. Another Objection is, that Nature should provide such a Multiplicity of these Animals, when so few can ever be of use, an Animal being to be Generated of one only. To which it has been Answered, that in all Plants a vast Number of Seeds are found, though a very few of the whole that are produc'd, fall into the Earth, and produce Plants; and as in Plants the greatest part of their Seeds are the Food of Animals, so the Greatest part of the Animalcule, may as well live a time to enjoy their own existance, as any other Animal of as low an order. The last Objection is, their shape, which I think, will appear to have no weight, when
when we consider how the Eggs of Flies produce Maggots, which grow up into Flies, and the Tadpole produc'd from the Egg of a Frog, grows into a form as different from a Tadpole as the form of a Man, and if these Animals had produc'd so few at a time, as that their young might have undergone this Change in utero, it is highly probable, that we should not so much as have suspected these analogous Changes: But how the Animaleleule themselves are produc'd, is a difficult Question, unless by Equivocal Generation, seeing none of them appear to be in a state of encrease, but all of a Size.

In a Boy that dy'd of the Stone, I found a double Ureter, each part being dilated to an Inch Diameter; the Pelvis in each Kidney to twice its natural bigness, and the Tubuli Urinarii, each as large as the Pelvis.

In a Man that had never been cut for the Stone, I found the Ureters dilated in some places to Four Inches Circumference, while in some few short places they were but little dilated, and a Stone in the Bladder less than a Nutmeg, which must have fallen in several pieces, or both Ureters could not have been dilated. From this, and other like Observations, I think it appears that the Prodigious Size to which the Ureters are usually extended, in People who are troubled with the Stone, is owing to small Stones which stick at the entrance into the Bladder, until the obstruct-
ed Urine, which dilates the Ureters, can force them into the Bladder.

I have once met with a Kidney almost con-
sum'd. And once Lymphatics in a diseas'd Testi-
cule, as large as a Crow-quill.

C H A P. II.

Of the Genital Parts of Women.

THE External Parts, are the Mons Veneris; which is that rising of Fat cover'd with Hair above the Rima Magna upon the Os Pubis, the great doubling of the Skin on each side the Rima call'd Labia, and within these a lesser dou-
bling nam'd Nymphæ. These help to close up the Orifice of the Vagina: The Nymphæ are usually did to serve to defend the Labia from the Urine; but I do not see how the Labia stand more in need of such a defence, than the Nymphæ them-
lives.

Clitoris, is a small Spongy Body
earing some Analogy to the Penis in Men, but as no Urethra. It begins with Two Crura from the Os Ischiae, which uniting under the Osse Pu-
trum, it proceeds to the upper part of the Nym-
æ, where it ends under a small doubling of skin, call'd Preputium; the End is call'd Glans.
This is said to be the chief Seat of Pleasure in Women, as the Glans is in Men. (*Vid. Musc. Erectores Clitoridis.*)

A little lower than this, just within the Vagina, is the exit of the Meatus Urinarius.

**Vagina**, is seated between the Bladder and the Intestinum Rectum. The Textum of it is Membranous, and its Orifice is contracted with a Sphincter; (*Vid. Musc. Sphincter Vagina*) but the further part is capacious enough to contain the Penis without dilating. Near the beginning of the Vagina, immediately behind the Orifice of the Meatus Urinarius, is constantly found in Children, a Valve call’d Hymen, which looking towards the Orifice of the Vagina, closes it in the same manner that the Valves of the Ventricles of the Heart, close the entrance of the Ventricles; but as Children grow up, and the Sphincter Vagina grows more useful, this Valve is proportionally smaller, and in Women very rarely to be found, only some small parts appearing in the place of this Valve call’d Caruncule Myrtiformes. There have been a few instances in which the Edges of this growing together, it continued unperforate, until it has been necessary to make an incision to let out the Menstrum. The inner part of the Vagina is form’d into Rugs, which are largest in those who have not us’d Coitus; and least in those who have had many Children. Under these Rugs are small Glands,
whose Excretry Ducts are call'd Lacuna: These Glands separate a Mucilaginous Matter to lubricate the Vagina, especially in Coition; and are the Seat of a Gonorrhea in this Sex, as the Glands in the Urethra are in the Male.

**Uterus, is seated at the end of the Vagina;** it is about One Inch thick, Two broad, and Three long, with a very small Cavity scarce large enough to contain the Kernel of a Hazelnut; but in Women that have had Children a little larger. It's Orifice into the Vagina, is call'd Os Tinea, from the resemblance it bears to a Tench's Mouth. It has two round Ligaments which go from the sides of it to the Groins thro' the Oblique and Transverse Muscles of the Abdomen, in the same manner as do the Seminal Vessels in Men. This way the Gut passes in a Hernia Intestinalis in Women, (Vid. Musculi Abdominis.) Some Authors mention Ligamenta Lata, which are nothing but a part of the Peritoneum. Near the sides of the Uterus lie two Bodies call'd Ovaria, they are of a depressed Oval Figure, about half the Size of Men's Testicles, and have spermatic Vessels; they contain small pel- lucid Eggs, from which they have their Name. There are Two Arteries and Two Veins, which pass to and from the Ovaries or Testes, in the same manner that they do in Men; but make more windings, and the Arteries dilate more suddenly, in Proportion as they are shorter. These Arteries and Veins detach Branches to the Uterus and Fallopian
Of the Genital Parts of Women.

lopian Tubes, and not only make a Communication betwixt the Artery and Vein on one side and those of the other, but also with the proper Vessels of the Uterus detach'd from the Internal Iliac Arteries and Veins. From these Vessels both Arteries and Veins in the inside of the Uterus, the Menstrual Purgations are made in Women, and something of the same kind in Brutes, as often as they desire Coition; one use of these Purgations is, to open the Vessels of the Uterus, for the Vessels of the Placenta to joyn to them. Many Authors have imagin'd that there must be some Evacuations Analogous to this, in Men, which I cannot see the Necessity of; but on the contrary, I believe that Men's not having such Evacuations, is the true Reason why their Bodies grow Larger and Stronger than Women's. And their continuing to grow longer before they are fit for Marriage, I also take, to be the true Reason why the Supream Being creates more Males than Females in about the proportion of Thirteen to Twelve, for Women being sooner fit for Marriage than Men, fewer will die before that Time, than of Men.

Near the sides of the Ovaria, are seated the Tuba Fallopianæ, one End of each is connected to the Uterus, and the side to the Ovarium by a Membrane, the other end being Jagg'd is call'd Morsus Diaboli, among these Jaggs is a small Orifice which leads into the Tube, which near this End is about a quarter of an Inch in Diameter, and thence growing gradually Smaller passes to the
Of the Genital Parts of Women.

The Uterus and enters there with an Orifice about the Size of a Hogs Bristle; the Use of these Tubes is to convey the Male Seed from the Uterus to the Ovaria, to impregnate the Eggs for Conceptions; yet they are seemingly so ill adapted to this End, that many Writers have supposed there must be some other Passage from the Uterus to the Ovaria; but if we consider the Case of Conceptions found in these Tubes; and the exact Analogy between these and the Tube of a Hen, where we have the most Undeniable Proof of the Seed going thro' the Tube, and of the Eggs being impregnated that way, and of the Eggs coming from the Ovarium through the Tube, and seemingly with much greater Difficulty than in Women; and besides how frequently a matter like the Male Seed, (which I suppose is Seed,) is found in the Fallopian Tubes of Women, as I have found in Executed Bodies, and in a common Whore that Died suddenly; it appears almost certain, that the Seed goes through the Fallopian Tubes to the Ovaria, to impregnate Eggs which come back through the same Tubes to the Uterus. I have seen in a Woman both the Fallopian Tubes unperforated, which upon the Foregoing Hypothesis, must have caused Barrenness, and Seed Lodg'd in these Tubes may have the same Effect, which I take to be often the Case of common Whores, and Women that use Coition too frequently; and I believe the Fat in the Membrane...
brane that connects the Ovaria to the Tubes, may in very Fat Women, so keep these Tubes from the Ovaria as to interrupt impregnations, and besides these Cases too much or too little of the Menses, may destroy or interrupt Conceptions, but the latter Case, especially in Young Women is very rare.

CHAP. III.

Of the FOETUS in UTERO.

The Foetus in Utero is involv’d in Two Coats, viz. Chorion, which is external, and Amnion which immediately incloses the Foetus. They contain a quantity of Liquor, which is a proper Medium for so tender a Being as the Foetus to rest in; and when the Membranes burst at the time of Production, this Humour lubricates the Vagina Uteri, and renders the Birth less Difficult. And seeing the Stomach of a Foetus in Utero, is always full of a Fluid like what is contain’d in the Amnion, and the Guts always fill’d with excrements; is it not Reasonable to suppose that this Fluid is frequently, during the Time of gestation, swallowed by the Foetus, if not for Nourishment, at least to keep these Parts in Use, and to flow through the Lacteals (as a Quantity of Blood from the Right Ventricle of the Heart, flows through the Lungs before the Birth) to keep open those Passages ’till the Birth,
Of the Foetus in Utero.

Birth, there being after that Time no other Way of receiving Nourishment; and are not the Fæces found in the Guts of a Foetus, chiefly those Parts of this Fluid that were taken in at the Mouth and were too gross to enter the Lacteals?

Besides these Coats, in a Cow and many other Animals, we find another Membrane call’d Allantois, it is inclosed by the Chorion together with the Amnion, and contains a large Quantity of Water, which it receives from the Bladder of Urine by the Urachus, its Use seems to be to contain the Urine that it might not by the common Passage be emptied into the Liquor of the Amnion, of which the Foetus, I am inclin’d to think is frequently Drinking. Yet I own it takes off very much from the probability of the Opinion, of the Foetus’s imbibing this Liquor, that, if I am rightly inform’d, some who have been Born with Mouths and Nostrils unperforate, have had such Fluids and Excrements in the Intestines that other Foetus’s have, which may indeed be derived from the Salivary Glands and from the Liver, &c. Whether this last mention’d Membrane is to be found with a Human Foetus or no, Anatomists are not agreed, and I cannot give my Opinion having never had a sufficient Opportunity to enquire. But Children having an Urachus would make one expect an Allantois, and yet I think that would be of no Use, unless it were large enough to be undeniably discover’d. I have been informed by a Gentleman, whose probity I can
can sufficiently Rely on, that he had seen a Child that had no External Genital Parts, and made Water through the Navel. At Henly upon Thames, there is now Living a Bargeman’s Child about Ten Years Old, of which Child I had the like Account, but upon Examination I found an unperforated Glans with its Frænum immediately below the place of the Navel, and the Urine Issued out by Drips between this and the Belly, in the place which I suppose was the Navel, but it was so much Excoriated, that I could make no certain Judgment about it. In the Uterus of a Cow with Two Calves, I found they had but one Chorion, but each an Amnion, and Allantois distinct, but the Cotyledons which are Analogous to the Placenta of the Humane Fœtus, were pretty much in common to the Umbilical Blood Vessels of both.

The Placenta, or Womb-Liver, is a Mass of Blood-Vessels seated on the outside of the Chorion; being compos’d of the extremity Branches, of the Umbilical-VEin and Arteries, which are for the composition of this Part divided into exceeding small Branches to joyn a like Number of the Menstrual Vessels of the Uterus, which Vessels of the Uterus are made numerous rather than large, that the separation of the Placenta from them may not be attended with a Flux of Blood fatal to the Mother; for the Sides of little Vessels soon Collapse and Close, and they are more easily Stopt, being Compress’d by the Uterus itself as it shrinks which
Of the Foetus in Utero.

which it begins to do from the time of the Birth, but when the Placenta is separated before the Delivery whether untimely or not, these Vessels Bleed until the Uterus is discharged of the Foetus, the Figure of the Placenta is circular, and its size as that of the Foetus; being at its greatest growth about Two Inches Thick, and Six or Seven Diameter.

The Arteries and Veins of the Uterus of the Mother, by which the Menstrual Purgations are made, are joy nied to the Umbilical Arteries and Veins in the Placenta of the Foetus, the Arteries of the Uterus to the Veins in the Placenta, and the Veins in the Uterus to the Arteries of the Placenta, by these Vessels a large Quantity of Blood is continually flowing from the Mother to the Foetus and back again; but for what end such a Quantity flows continually and back again, I cannot conceive, unless it is that the Foetus not Breathing for itself, it is necessary that as much Blood of the Mother should flow continually to the Foetus, as can leave enough Air, or whatever our Blood receives in the Lungs for the Foetus; and perhaps what Nutritious Juices the Foetus receives, require a great deal of Blood to convey them, they being but a small Part of the Blood.

The Navel String or Umbilical Blood Vessels, between the Placenta and the Navel are about Two Foot long, that the Foetus may have room to Move without tearing the Placenta from the Uterus, which being done too soon, from whatever
ever Cause occasions a Miscarriage; these Vessels, viz. Two Arteries and One Vein twist about each other, particularly the Arteries about the Vein, and are contain'd in one common Coat together with a Vessel call'd Urachus, which arises from the top of the Bladder of Urine, and ends in the Membrane Allantois; the Umbilical-Vein goes from the Navel directly into the Liver, and there, enters the great Trunk of the Vena Porta. Near which entrance, there goes out the Ductus Venosus to the great Trunk of the Cava, which carries part of the Blood that is brought by the Umbilical Vein, that way into the Cava, while the rest circulates with the Blood in the Porta, the whole of it not passing thro' the Ductus Venosus as is generally believ'd, but a great part of it into the Branches of the Porta in the Liver, otherwise there need be no Communication between the Umbilical-Vein and the Porta, and when the Umbilical-Vein is stop'd, the Ductus Venosus soon shrinks and Disappears, having no longer any Blood flowing through it; and even the Porta itself (from whence only Blood cou'd pass after the Birth into the Ductus Venosus) has less Blood flowing thro' it for some time than it had before the Birth, it receiving much Blood before the Birth from the Umbilical-Vein. After the Birth, the Umbilical-Vein becomes a Ligament, and the Ductus Venosus becomes useless, contracts, and almost disappears. The Blood which flows from the Mother to the Fetus by the Umbilical
Umbilical-Vein, is return'd (all but a small Quantity, which is reserv'd for Nutrition) by the Two Umbilical Arteries, which arise from the Internal Iliac Arteries, and passing by the outsides of the Bladder go directly to the Navel and Placenta, and together with these, there runs a small Duct, call'd Urachus, from the Top of the Bladder thro' the Navel into the Allantois, in Brutes at least. The Umbilical Arteries and Urachus ceasing to be of use after the Birth, lose the greatest part of their appearance, being seldom to be trac'd farther than Two Inches above the Bladder, and often not so far.

Part of the Blood before the Birth and not the whole Quantity as is generally thought, which is brought by the Ascending Cava to the right Auricle, passes at once through the Foramen Ovale into the left Auricle, and the rest flows into the right Ventricle with the Blood of the descending Cava, and thence into the Pulmonary Artery, where about one half flows into the Lungs, and the other half directly into the Aorta by the Ductus Arteriosus, which lies between the Pulmonary Artery, and the Aorta, and which after the Birth is call'd Ductus Arteriosus in Ligamentum versus.

The better to explain this Contrivance, I will call the Quantity of Blood Flowing through the Ascending Cava in a given Time Four, and that which flows through the Descending Cava Two, then let Two of the Quantity in the Ascending Cava flow into the Right Auricle, it will then
then with the Two received from the Descending Cava have the Quantity Four, which being thrown from the right Ventricle into the Pulmonary Artery, the Quantity Two is thrown into the Aorta by the Ductus Arteriosus, and the same Quantity into the Lungs by the Pulmonary Branches, then the Quantity returning from the Lungs to the left Auricle, will be Two in the same given Time, which being added to the Two which flow'd through the Foramen Ovale, in the same Time there will be constantly the same proportions receiv'd into each Ventricle at every Diastole of the Ventricles as after the Birth.

Now if the Blood flowing through the Ascending Cava join'd by that from the Umbilical Vein, was but equal to that flowing through the Descending, let each of them be call'd Two, and let all the Blood of the Ascending Cava go through the Foramen Ovale, then the Blood which the Left Ventricle would receive, wou'd exceed that which flows into the Right, by the whole Quantity which flows from the Lungs in the same time, but the Ascending Cava conveying more Blood than the Descending Cava, the Excess in the Left Ventricle would be greater. If the Proportions which I have taken for the easier computing were perfectly right, as I am sure they are nearly, then the Quantity flowing into the Left Ventricle, wou'd be to that flowing into the Right at the same Time as Five to Two, if all the
Of the Foetus in Utero.

And tho' after the Birth the Left Ventricle of the Heart is only employ'd in throwing Blood into the Aorta, and the Right wholly employ'd in Circulating the Blood through the Lungs, yet before the Birth all the Blood thrown out by the Left Ventricle, and about Half the Blood thrown out of the Right Ventricle, being thrown into the Aorta, and the other part only thro' the Lungs, it follows, that the whole force exerted by the Left Ventricle with about half that of the Right is employ'd in throwing Blood into the Aorta, while that distributes Blood through the whole Foetus and to the Mother, but after the Birth when the Blood is to be no longer carried from the Foetus to the Mother, the Left Ventricle becomes sufficient for the Circulation thro' the Foetus, and a New Occasion immediately arises for that Additional Power, which before was necessarily employ'd in throwing Blood into the Aorta, for the whole Mass of Blood now being to be circulated thro' the Lungs, the Ductus Arteriosus closes, and the Right Ventricle must throw all the Blood it receives into the Lungs, there being no longer any passage into the Aorta. It is supposed that the Inflation of the Lungs at the Birth, presently alters the position of the Ductus Arteriosus, so as to obstruct it, which Account is indeed Mechanical, but I think not true because I can neither discern that
that the position of this Vessel is Alter'd, nor its Surface compress'd: But I rather think that immediately upon the Birth, there being no Blood carried off from the Foetus to the Mother, and the Left Ventricle being sufficient to fill the Aorta and its Branches with Blood, as I have shown before, there is no longer Room for any Blood from the Right Ventricle, wherefore the Blood from the Right Ventricle will be forc'd into the Lungs, where the Passage is now made easy as I imagine by their being Inflated; and the Ductus Arteriosus, having the Blood no longer forced into it, shrinks, and in Time almost Disappears: This Duct being stop'd, the Valve of the Foramen Ovale immediately stops that Passage, it being on the side of the Left Auricle (or that Muscular Bag, which is the largest part of that Auricle) which is much the Strongest, must at all Times be press'd more on that Side than the other, by the Blood in the Time of the Sytole of the Auricle, and it is as Evident that in the Diastole of the Auricle, there must be more pressure to open that than the Right, it being a Stronger Muscle, or else there could have been no Reason for having the Left Auricle Stronger than the Right in proportion to their Ventricles. Sometimes this Valve does not quite cover the Foramen, in which Case a small Quantity of Blood may possibly flow from the Left Auricle to the Right, and so Circulate Twice through the Lungs to
to Once through the Body, but none could flow
from the Right to the Left and escape the Lungs,
which might be of bad Consequence. Some
have imagin'd, that Men who have this Passage
open, cannot be Drown'd: But tho' this Passage
has sometimes been found open, no Man has been
yet seen, that we have ever heard of, that cou'd
not be Drown'd. I have seen the Foramen
open in a Man that was Hang'd, to whom
one might justly expect it shou'd have been
as useful as in the Case of Submersion. Man-
ny Writers have suppos'd that this Foramen
is open in Amphibious Animals, and in such
Fishe as have Two Auricles, Two Venticles, and
Lungs like Land Animals; without Gills (which
in other Fish are Analogous to Lungs.) I have
dissected a Porpus which is of this kind, and found
this Foramen clos'd; but the great Veins were
vastly large in proportion to the Bulk of the
Animal; whence I conjectured their Blood was
accumulated in their Veins, while they kept under
Water, and by that means that the Lungs escaped
being oppres's'd with Blood; which conjecture
seem'd to me the more probable, since all Ani-
mals of this kind are able to abide the least Time
under Water, when their Blood is most expande-
d with Heat. But upon the Dissection of an
Otter, whose Foramen Ovale was also clos'd, I
found the Veins nothing differing from those of
Other Animals. In a Water Tortoise which I had
an opportunity of Examining, with that most
dextrous
Of the Fetus in Utero.

dextrous and indefatigable Anatomist, Dr. Douglaia, I found the Two Ventricles of the Heart but half divided by a Septum, and in the beginning of the Pulmonary Artery several strong Muscular Rings, a little distance from each other, each of which by contracting, would be capable of resifting a part of that Blood, which otherwise would have been thrown into the Lungs, when they were under Water; and this Blood so obstructed must necessarily be thrown into the Aorta, the Two Ventricles being in a manner One common Cavity; and when they are out of the Water, this Communication of Ventricles, will suffer but little confusion of the Blood which flows into the Ventricles, because each Ventricle receiving and discharging the same quantity of Blood, at the same Times, they will Ballance each other, and thereby such a mixture will be very much prevented. As a reason of Women's bringing forth at the Usual Time; it has been said, that at that Time, the Head of the Child begins to be specifically Heavier than the rest of the Body; and therefore must fall lowest in the Fluid it lies in: Which being an uneasy posture, makes the Child struggle, and bring on the Labour; but it is not true, that the Head then alters its Specific Gravity; or if it did, there is seldom Fluid enough in the Ammon for this purpose; and besides, this could only happen right in one posture, and would always happen wrong in Brutes.

C H A P.
CHAP. IV.

Of the Eye.

Of the Eye.

The Figure, Situation, and use of the Eyes, together with the Eyebrows, Eyelashes, and Eyelids, being well known, I think need only describe what is usually shown by reflecting. The Orbit of the Eye, or Cavity in which it is contain'd, is in all the vacant places filled with a loose Fat, which is a proper Medium for the Eye to rest in, and serves as a socket for it to be moved in. In the upper and outer part of this Orbit, is contain'd a large Gland, which take to be the Lacrymal Gland, notwithstanding it has been thought otherwise, because Muses do not cry, at least, not much, and yet have this Gland as large, in proportion, as Men; but we must consider, that to yield a sudden effusion of Tears, at any particular Time, is not the principal use of this Gland, but to furnish all Times enough to wash off Dust and keep the outer Surface of the Eye soft, without which the Tunica Cornea would be less pellucid, and the Rays of Light would be disturbed in their passage; and that this Liquor may be rightly dispos'd of, we frequently close the Eyelids to spread it equally, even when we are not conscious of doing it. At the inner
inner corner of the Eye, between the Eye-lids, stands a Caruncle, which seems to be plac’d to keep that corner of the Eye-lids from being totally clos’d, that any Tears or Gummy Matter, may flow from under the Eye-lids, when we Sleep, or into the Puncta Lacrymalia, which are little holes, one in each Eye-lid, near this corner, to carry off into the Ductus ad Nasum, any superfluous Tears.

The First Membrane of the Eye is call’d Conjunctiva, it covers so much of the Eye as is call’d the White, and being reflected all round it lines the Two Eye-lids, it being thus return’d from the Eye to the inside of the Eye-lids: It effectually hinders any Extraneous Bodies, from getting behind the Eye, into the Orbit, and smooths the parts it covers, which makes the Friction less between the Eye and the Eye-lids. This Coat is very full of Blood Vessels, as appears upon any inflammation.

Tunica Sclerotis, and Cornea, make together one firm Case of a proper Form, for the use of other Coats and Humours. The fore-part of this strong Coat being Transparent, and like Horn, is call’d Cornea, and the rest Sclerotis. Under the Cornea lies the Iris which is an Opake Membrane, like the Tunica Choroides, but of different Colours in different Eyes, such as the Eye appears, as Grey, Black, or Hazel, for it being seated under the Tunica Cornea, it gives such an appearance to that as it has its self. The middle:
middle of it is perforated for the Admission of the Rays of Light, and is call’d the Pupil. Immediately under the Iris lie the Procesius Ciliares, like Radial Lines from a lesser Circle to a greater; when these Processes contract they dilate the Pupil to suffer more Rays of Light to enter into the Eye; and the contrary is done by the circular Fibres of the Iris, which act as a Sphincter Muscle, but these Changes are not made with great Quickness, as appears from the Eyes being oppress’d with a strong Light, for some time after we come out of a dark place, and from the contrary Effect in going suddenly from a Light place, to a dark one. And as the Pupil always dilates in darker places, to receive more Rays of Light, so when any Disease makes some of those Ray’s ineffectual, which pass through the Pupil, it dilates as in dark places to admit more Light; Therefore a dilated Pupil is a certain sign of a bad Eye, and this may be discern’d usually sooner, than the Patient discerns any defect in Vision. In Man the Pupil is round which fits him to see every way alike, it’s also round in Animals that are the Prey both of Birds and Beasts. But Graminivorous Brutes that are too large to be the Prey of Birds, have it oblong Horizontally, which fits them to view a large space upon the earth; while Animals of the Cat-Kind who limb Trees, and Prey indifferently on Birds or Animals that hide in the Earth; have their pupils oblong the contrary way, which fits them
beft to look upward and downward at once. Besides these there are other Animals whose Pupils are in these Forms, but in less proportions so as best to fit their ways of Life. Immediately under the Sclerotis, is a Membrane of little firmness call’d Choroides; in Men it is of a rusty dark Colour, such as will bury almost all the Rays of Light, that pass through the Tunica Retina, which if it were of a brighter Colour, would reflect many of the Rays upon the Retina, and make a Second Image upon the first somewhat less, and less distinct, but both together stronger; which is the Case of Brutes of Prey, where a great part of this Coat is perfectly White, which makes them see Bodies of all Colours in the Night better than Men, for White reflects all Colours: But Brutes that feed only on Grass, have the same parts of this Membrane of a bright Green, which enables them to see with less Light and makes Grass, an Object that they can discern with greatest Strength: But these Advantages in Brutes, necessarily destroy great accuracy in Vision, which is of little or no Use to them, but to Men of great Consequence. This Green part of the Tunica Choroides, in Animals that Graze, may properly be called Membrana Uvea, from its resemblance in Colour, to an Unripe Grape. But in Men’s Eyes, only a White Circle round the back side of the Choroides, near the Cornea, is call’d Uvea.

Immediately under the Tunica Choroides, lies the Tunica Retina, which is the Optic Nerve expanded...
expanded and co-extended with the *Choroides*. Rays of Light striking upon this Membrane, the sensation is convey'd by the Optic Nerves, to the common *Sensforium* the Brain; these Nerves do not enter at the middle of the Bottom of the Eyes, but nearer the Nose, for those Rays of Light being ineffectual for vision that fall upon the entrance of the Optic Nerves, it is fit they shou'd so enter, as that the same Object, or part of any Object, shou'd not be unperceiv'd in both Eyes, as would have been the Case, had they been otherwise inserted; which appears from a common Experiment of part of an Object being lost to one Eye, when we are looking towards it with the other shut. I know a Gentleman who having lost one Eye by the Small-Pox, and going through a Hedge a Thorn unseen (probably from this Cause) struck the other and put it out. The Two Optic Nerves soon after they arise out of the Brain Joyn and seem perfectly united, yet from the following Case, I am not without suspicion of their Fibres being preserv'd distinct, and that the Nerve of each Eye, arises wholly from the opposite side of the Brain. A Soldier who was my Patient in the Hospital about three Years since, had, by a push with a broad Sword, his Left Eye rais'd out of the *Orbit*, which I replac'd with my Fingers, it was presently follow'd with excessive Pain in the Right side of the Head only, and a loss of the Sense of Feeling and motion in both the Right Limbs, the Sense of Feeling he recovered by
degrees in about a Month, and soon after began to recover their Motion, but was about Twelve Months before he could walk, and lift up his Hand to his Head; and in about Two Years recovered all but the Sight of the Wounded Eye, which indeed did not appear perfect. In Fish these Nerves arise distinct from the opposite sides of the Brain, and Cross without uniting; but as these Animals have their Eyes so plac’d, as not to see the same Object with both Eyes at once, whereas Animals whose Optic Nerves seem to unite, do see the same Object with both Eyes at once, one would suspect that in one they were Joyn’d to make the Object not appear double, and in the other distinct, to make their Two Eyes (as they are to view different Objects at the same time) independent on each other; and yet from the following Cases, the seeing Objects single seems not to depend upon any such Union, nor from the Light striking upon Corresponding Fibres of the Nerves; as others have believ’d, but upon a Judgment from Experience, all Objects appearing single to both Eyes in the manner we are most us’d to observe them, but in other Cases double; for tho’ we have a distinct Image from each Eye sent to the Brain, yet while both these Images, are of an Object seen in one and the same place, we conceive of them as one, so when one Image appears to the Eyes (when they are distorted or wrong directed) in two different places it gives the Idea of two; and when two Bodies are seen
in one place, as two Candles rightly plac'd, through one Hole in a Board, they appear One: But Cases of this kind, being too numerous, I will conclude with one very remarkable, and I think much in favour of this Opinion. A Gentleman who from a Blow on the Head, had one Eye distorted, found every Object appear double, but by degrees the most familiar ones became single, and in time all Objects became so, without any amendment of the distortion.

The inside of the Eye is fill'd with Three Humours, call'd Aqueous, Crystalline and Vitrious, the Aqueous lies foremost, and seems to be of use to prevent the Crystalline from being easily bruis'd by rubbing or a Blow, and perhaps it serves for the Crystalline Humour, to move forward in, while we view near Objects, and backward for remoter Objects, without which Mechanism or in the place of it a greater Convexity in the Crystalline Humour in the former Case, and a less Convexity in the latter, I do not imagine according to the Laws of Optics, how we could so distinctly see Objects at different distances. However it is in Land Animals, I think we may plainly see, that Fishe move their Crystalline Humour, nearer the Bottom of the Eye when they are out of Water; and the Contrary way in Water, because Light is less refracted from Water through the Crystalline Humour then from Air. Some have said, that Amphibious Animals have a Membrane like the

Membrana
Membrana Nictitans of Birds, which serves them as a LENS in the Water, I have examined the Eye of a Crocodile which Sir Hans Sloane keeps in Spirits, and I found this Membrane equally thick and dense, and consequently unfit for this purpose, or I believe any other except that Obvious one, of defending the Eye from the Water.

Next behind the Aqueous Humour lies the Crystalline, its shape is a depress’d Spheroid, and it is distinctly contain’d in a very fine Membrane call’d Aranea; the Use of this Humour is to refract the Rays of Light which pass through it, so that each pencil of Rays from the same point of any Object, may be united upon the Retina (as in the Camera Obscura) to make the stronger impression, and though by this Union of the Rays a Picture inverted is made upon the Retina, yet surely it is the Impulse only of the Rays upon the Retina, that is the Cause of Vision, for had the Colour of the Retina been black and consequently unfit to receive such a Picture, would not the Impulse of Light upon it have been sufficient for Vision? Or would such a Picture, if it could have been made without any Impulse, have ever convey’d any Sensation to the Brain? Then if the Impulse of Light upon the Retina and not the Image upon the Retina, is the Cause of Vision; When we enquire why an Image inverted in the Eye appears otherwise to the Mind, might we not expect to find, the true Cause from considering the Directions in which the
Of the Eye.

Of the Eye.

Of the Eye.

the Rays strike the Retina, as we judge of above and below, when any Thing strikes upon any part of our Bodies; nevertheless in viewing an Object through a Lens, we conceive of it as inverted, when as in receiving the Impulses of Light in the same manner, and having the Picture on the Retina in the same Attitude, when we stand on our Heads without the Lens, we have not the same, but the Contrary Idea of the Position of the Object. Tho’ I have considered this Humour only as a refractor of Light, yet the first and greatest refraction is undoubtedly made in the Cornea, but it being Concavo-convex, like Glasses of that kind, while one side makes the Rays of Light converge, the other diverges them again, the same Thing also may be observed of the Aqueous Humour, which is indeed more concave than convex; But when the Crystalline Humour is remov’d in the couching a Cataraet the Aqueous possesses its place, and becomes a Lens. In some Eyes either this Humour being too convex or too distant from the Retina, the Rays unite too soon unless the Object is held very near to the Eye, which fault is remediable by a concave Glass, as the contrary fault (common to Old Persons) is by a convex Glass. Here it may not be improper to observe, how wisely Providence has fix’d the Distance, at which we ordinarily see Objects best, for if the Eye had been form’d for a nearer View, the Object would often obstruct the Light.
Light, and if it had been much farther, Light en-
ough would not commonly have been produc'd
from the Object to the Eye. In Fish the Cry-
stilline Humour seems a perfect Sphere, which is
necessary for them, because Light being less re-
fracted from Water thro' the Crystalline Hu-
mour than thro' Air; that defect is compensat'd by
a more' convex Lens. The Vitrious Humour lies be-
hind the Crystalline, and fills up the greatest part
of the Eye, its foreside is Concave for the Crystal-
line Humour to lodge in, and its backside being
convex the Tunica Retina is spread over it, it
serves as a Medium to keep the Crystalline Hu-
mour and the Retina at a due distance.

The larger Animals having larger Eyes, their
Organs of Vision (like a Microscope with a
large Lens) are fit to take in a greater View, but
in that View Things are not so much Magnified;
so in the Minutest Animals a small space is dis-
cern'd, such as is their Sphere of Action, but
that greatly Magnified, not really so, but compa-
ratively; for Vision shews not the real Mag-
nitude of Objects, but their proportion one to
another. Fish have their Eyes and particularly
their Pupils' larger than Land Animals, because
there is less Light, (and that not so far distribu-
ted) in Water as in the Air.
The figure and situation of the outer ear, needs no description, its inner substance is cartilage, which preserves its form without being liable to break: it's use is to collect sounds, and direct them into the meatus auditorius, which is the passage that leads to the drum; this passage is lined with a glandular membrane, in which also is some hair; the cerumen, which is separated by these glands, being spread all over this membrane, and its hairs, serve to defend the membrane from the outer air, and to entangle any insect that might otherwise get into the ear. Sometimes this wax being separated in too great quantity, it fills up the passage and causes deafness; and those great discharges of matter from the meatus auditorius, which are commonly call'd impostumes in the ear, I think can be nothing else then ulcerations, or great secretions from these glands. At the further end of the meatus auditorius lies the drum, which is extended upon a bony ridge almost circular, its situation in men and brutes is nearly horizontal
Horizontal, inclin'd towards the *Meatus Auditory*, which is the best position to receive Sounds; the greatest part of which being ordinarily reverberated from the Earth. In its common Situation in Men and Brutes, it is concave outward, but in Birds it's convex outward, so as to make the upper side of it nearly perpendicular to the Horizon, which serves them better to hear each other's Sounds when they are high in the Air, where they can receive but little reverberated Sound. This Membrane does not wholly close up the Passage, I found it once half open in a Man that I Dissected, who had not been Deaf, and I have seen a Man Smoke a whole Pipe of Tobacco out thro' his Ears, which must go from the Mouth, thro' the *Eustachian* Tube, and thro' the *Tympanum*, yet this Man heard perfectly well. These Cases occasioned me to break the *Tympanum* in both Ears of a Dog, and it did not destroy his Hearing, but for some time he receiv'd strong Sounds with great Horror. And that most Excellent Anatomist Mr. *St. Andre*, to whom I am greatly oblig'd in this Chapter, and whom I wish I had had the Happiness to have made earlier mention of in this Treatise, has assured me, that a Patient of his had the *Tympanum* destroy'd by an Ulcer, and the Auditory Bones cast out, without destroying his Hearing. In very young Children I have always found this Membrane cover'd with Mucous, which seems necessary to prevent Sounds from affecting them too much, there being no provision to shut the Ears.
Of the Ear.

Ears, as there is for the Eyes. A Family well known in this City, having had Four Children Born Deaf, were advised to lay a Blister upon the Heads of the next Children they might have, which they did to Three which they had afterward, and every one of them heard well; it seems not unreasonable to suppose that too great a quantity of this Mucous upon the Drum, might be the cause of Deafness in the Four Children, and that the discharge made by the Blisters in the latter Cases, was the cause of their escaping the same misfortune.

Into the middle of the Tympanum is extended a small Bone call’d Malleus, whose other end is articulated to a Bone call’d Incus, which is also articulated by the Intervention of an exceeding small Bone call’d Os Orbiculare, to a Fourth Bone call’d Stapes: These Bones are contain’d in that Cavity behind the Tympanum, which is call’d the Barrel of the Ear; but some Anatomists call the Barrel only Tympanum, and the Membrane Membrana Tympani: The Malleus being mov’d inward, by the Musculus Obliquus Internus, or Trochlearis, it extends the Tympanum that it may be the more affected by the Impulse of Sounds when they are too weak; This Muscle arises from the Cartilaginous part of the Eustachian Tube, and passing from thence in a proper Groove, it is reflected under a small Process, and thence passes on perpendicular to the Tympanum, to be incerted into the Handle of the Malleus, sometimes with a
a double Tendon. Parallel to this Muscle lies another Extensor of the Tympanum, call’d Obliquus Externus, it arises from the outer and upper part of the Eustachian Tube, and passing through the same Hole, with the Corda Tympani, which is a Branch of the Fifth pair of Nerves, it is inserted into a long Process of the Malleus; this is not so obvious an Extensor as to be known to be so, without an Experiment. The Muscle which relaxes this Membrane is call’d Externus Tympani, it arises from the upper part of the Auditory Passage under the Membrane which lines that Passage, and is inserted into the upper Process of the Malleus: The Relaxation of the Tympanum is made by this Muscle, without our knowledge, when Sounds are too strong; and as the Pupil of the Eye is contracted, when we have too much Light, and dilated where there is too little; from what cause soever, so when Sounds are too low, or the Sense of Hearing imperfect, from whatever cause, the Extensors of the Tympanum stretch it, to make the Impulse of Sounds more Effectual upon it, just as in the Case of the common Drum, and the Cords of any Musical Instrument. From the Cavity behind the Tympanum, which is call’d the Barrel of the Ear, goes the Eustachian Tube, or Iter ad Palatum, it ends Cartilaginous behind the Palate, this Passage seems to be exactly of the same Use with the Hole, in the side of the common Drum,
Of the Ear.

Drum, that is to let the Air pass in and out from the Barrel of the Ear, to make the Membrane vibrate the better, and perhaps in the Ear (which is closer than a common Drum) to let Air in or out as it alters in Density, and if any fluid should be separated in the Barrel of the Ear to give it a Passage out. This Passage being obstructed as it is sometimes by a large Polypus behind the Uvula, it causes great difficulty of Hearing, and sometimes when the Meatus Auditorius is obstructed, a Man opening his Mouth wide, will hear pretty well thro' this Passage, which is often so open as that Syringing Water thro' the Nose, it shall pass thro' into the Barrel of the Ear and cause Deafness for some time. If any one would try how well he can hear this way, let him stop his Ears, and take between his Teeth the End of a small strait Wire, or a Cord that will vibrate well, and holding the other End, set it a vibrating, and the Sound that he hears will be thro' this Passage. Dr. Haley in his Account of the Diving Bell says, that as the Air grew dense in Diving, they felt a great Pain in their Ears, which increased till on a sudden they heard a great Pop in their Ears, and were then as suddenly relievd from their Pain, which they never felt again at that Diving, tho' they Div'd till they doub'd the Density of the Air after that time: But to make this agree well with the foregoing Cases (unless the Passages were stop'd with my Mucous) I know no more how, than to doubt of
of the Doctors Veracity, which no Man that knows him can possibly do. To the Stapes there is one Muscle call'd Musculus Stapedis, it lies in a long Channel, and ending in the Stapes, it serves to pull the Stapes off of the Fenestra Ovalis, which otherwise it covers. Besides the Fenestra Ovalis, there is another near it somewhat less, call'd Rotunda, these Two Holes lead to a Cavity call'd Vestibulum, which leads into other Cavities aptly call'd Cochlea, and Three Semicircular Canals or altogether the Labyrinth, in which are spread the Auditory Nerves to receive and convey the Impulse of Sounds, to the common Sensorium the Brain. The Two Holes call'd Fenestra Ovalis & Rotunda, are clos'd with a fine Membrane like the Membrane call'd the Drum, and the larger being occasionally cover'd and uncover'd by the Stapes, Sounds are thereby made to influence more or less, as best serves for hearing, and this Advantage, being added to that of a Lax or Tense Tympanum, the Effect of Sounds may be greatly encreas'd or lessen'd upon the Auditory Nerves, expanded in the Labyrinth. In the strongest Sounds, the Tympanum may be lax, and the Fenestra Ovalis cover'd, and for the lowest the Tympanum Tense and the Fenestra uncover'd. If Sounds propagated in the Air were heard less, we might often be in Danger before we were appriz'd of it, and if the Organs of Hearing were much more perfect, unless our Understandings were so too, we should commonly hear more things at once than we could attend to.
CHAP. VI.

Of the Senses of Smelling, Tasting and Feeling.

The Sense of Smelling is made by the Effluvia from any Body, which are conveyed by the Air to the Nerves, ending in the Membranes which line the Nose and its Lamella. In Men these Lamella are few, and the Passage thro' the Nose not difficult, hence fewer Effluvia will strike the Nerves, than in Animals of more exquisite Smell, whose Noses being full of Lamella, and the Passage for the Air Narrow and Crooked, few of the Effluvia escape one place or another, besides their Olfactory Nerves may be more sensible. Fish tho' they have no Noses, yet in their Mouths they may Taste Effluvia in the Water, as surely those Fish do, who seek their Prey in the darkest Nights, and in great Depths of Water, there being more Nerves disposed in their Mouths, than thro' their whole Bodies beside, the Optic excepted; and it looks as if it was done for this purpose; for the mere Sense of Tasting, is ordinarily less curious in them, than in Land Animals; In baiting Eel Baskets, if the bait has lain long in Water, it is seldom taken
taken but upon Scarifying it afresh, which will make it emit new *Effluvia*, it serves as a fresh bait.

The Sense of Tasting is made in the like manner upon the Nerves, which line the Mouth, and so is that of Feeling upon the Nerves, distributed throughout the Body; of which, I shou'd speak largely in this place, if I had not done it already in the Chapter of the Nerves.

**FINIS**
SYLLABUS,
SIVE
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N Textura sunt observanda, Fibrae, compactae.

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Coronalis.

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Cetera ab Ossibus, quae circumagunt nominantur.

Os,

Bregmatis.

Frontis, { Spina.

Foramina.

Sinus.

Ethmoides, { Crista Galli.

Foramina.

Pterygoides { externus.

Processus { internus.

Inominatus.

Salpingoides.

Clinoides.

Sphenoides, { Sella Turcica.

primum.

secundum, vel lacerum.

tertium.

quartum.

quintum.

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Procesus e quo fit Os Jugale dictum.

Petreolum, { Foramen sextum.
{ Processus Septimum.

Meatus auditorius, &c. Vide, de organis auditus.

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Foramen octavum.

Occipitis, { Foramen nonum.
{ decimum, vel magnum.

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Pælectio Quarta.

De Offibus Faciei, & Maxillarum, &c.

Os,

\[ \text{A S I.} \]

Unguis, — ductus ad Natum.

Janum.

Ialæ, vel Zygoma.

ulati, — Foramina.

omer.

Conioforum & septum Nasi quid.

\[
\begin{align*}
\text{Superior,} & \text{ Alveolii.} \\
\text{Antrum.} & \text{Foramina.}
\end{align*}
\]

Axilla

\[
\begin{align*}
\text{Processus} & \text{Condyloides.} \\
\text{Coronalis.} & \text{Inominatus.}
\end{align*}
\]

Inferior, Foramina.

Alveoli.
Praelection Quinta.

De Offibus Trunci Corporis.

Colli 7. parts anteriores spongiosae.
Atlas prima. Obliqui superiores.
Dentata secunda. Obliqui inferiores.
Proces. dentatus. Spinales bifurcati.

Dorsi 12. partes anteriores spongiosae.
Lumborum 5. Spinae.
Proces. Spinales.

Sacri 5, vel 6. Foramina.
Coxygis 4, vel 5. Processus obliqui superiores.

Veræ 7. Offa Pectoris, plerumq; tria.

Sternum. Cartilago ensiformis.
Cartilagines ad Costas.

Os Hyoides.

Praelection
Praelectione Sexta.

De Ossibus artus superioris.

Oss.

Clavicula.

Acetabulum.
Processus { Coracoide.

Scapula.
Costa { Superior.
Spina. { Inferior.
Basif.

Caput.
Apophysis superior.
Sulcus.

Humeri.
Apophysis { externus, { internus, { inferior.
Sinus.

Ulna, Olecranon.
Processus Styloides.

Radius, ——— Tuberculum.

Carpi, { primi, { secund, } ordinis 4.

Metacarpi 4.
Pollicis 3.
Digitorum 12.
Praelectio Septima.

De Ossibus artus inferioris.

Os, Ilium, Spina.

Innominatum, Ischium —— Procennis, obtusus.

Pubis, Acetabulum, Foramen.

Caput.

Trochanter, major.

Linea aspera.

Femoris, Apophyses inferiores.

Patella.

Tibia, Apophyses.

Fibula, —— Appendix, superior, inferior.

Aastragalus.
Calcaneum.

Cuboides.

Navicular.

Tarso 7.

Cuneiforme, majus.

medium.

minimum.

Metatarso 4.
Pollicis pedis 3.

Digitorum pedis 12.

Selamoidea.

Praelectio
Praelection Octava.

De Ligamentis, & Cartilaginibus Capita ossium investientibus, & Glan-
dulis Ossium, juncturis inservientibus: Etiam de his quibus Sceleton Viri,
& Fœminæ Factus, & Adulti different.

De Ligamentis in genere.  
Ligamento Terete.  
Cartilaginibus in genere.  
Glandulis juncturas lubricantibus.
Praelectionio Nona.

De quibusdam Partium externarum integumentis et Partibus constituen-
tibus.

MAMMÆ, {Papillae.
Areolæ.
Scrobiculus Cordis.
Regio Umbilicalis.
Hypochondria.
Hypogastrium.

Cetera partes externe propriis Praelectionibus sunt demonstranda.

Cuticula.
Reticulum mucosum.

Cutis. {Papillae Pyramidales. — Ungues.
{Bulbi, unde procedunt — Pili.

Glandulae miliares, vel sudoriferae.
Membrana adiposa.

Fibra.
Membrana.
Arteria.
Vena.
Lymphæ ductus.

Nervus.
Glandula.
Vas lacteum.
Musculus.

Tendo.
Os.
Cartilago.
Ligamentum.

Prælectionio
Praelectio Decima.

De Membranis totius Corporis.

Ura Mater. 
Pia Mater. 
Mediastimum. 

Pleura. 
Peritoneum, &c.

Praelectio Undecima.

De Glandulis salivaibus, earumque ductibus.

Arotides, vel Maxillares superiores. 
Maxillares inferiores. 
Sublinguales. 
Tonsillae. 

earum ductus.

Membrana Glandularis oris, cujus Glandulae nominantur.

Buccales. 
Labiales. 
Linguales. 
Fauciales. 
Palatinae. 
Uvulares.

Praelectio Duodecima.

De Ductu Alimentali, & Membranis in Abdomine.


Omentum,
Omentum, \{ \begin{align*} \text{Ala,} & \text{superior.} \\
\text{inferior.} & \end{align*} \}

\text{Oesophagus.}

\text{Ventriculus,} \quad \text{orificum} \{ \begin{align*} \text{sinistrum,} & \text{Cardia.} \\
\text{dextrum,} & \text{ubi circulus fibrosus.} \end{align*} \}

\text{Intestina tenuia,} \{ \begin{align*} \text{Duodenum.} & \\
\text{Jejunum.} & \end{align*} \}

\text{Intestina cæsa,} \{ \begin{align*} \text{Colon,} & \text{ubi valvulae ad ingremum.} \\
\text{Cæcum.} & \end{align*} \}

\text{Rectum.}

\text{In omni parte ductus Alimentalis est notanda.}

\text{Tunica} \{ \begin{align*} \text{externa,} & \text{Communis.} \\
\text{media,} & \text{Muscularis.} \\
\text{interna,} & \text{Glandulosæ, Villo obduæta.} \end{align*} \}

\text{Ventriculo flaccido, Rugæ.}

\text{In} \{ \begin{align*} \text{intestinis} & \text{tenuibus, Valvulae Conniventes.} \\
\text{cæsis, Cæco excepto,} & \text{Glandulae.} \\
\text{crassis,} & \text{Ligamenta.} \end{align*} \}

\text{Mesenterium,} \quad \text{Glandulae} \{ \begin{align*} \text{Majores, in Canibus} \\
\text{Pancreas Asellii.} & \end{align*} \}

\text{Minores.}

\text{In omnibus his membranis, sunt observandæ Lamelles.}

Prælecitio
Praelection Decima Tertia.

De Hepate, Pancreate, Splene & Via lactea.

\[
\begin{align*}
&\text{Ligamentum}\{\text{Suspensorium,} \\
&\text{Latum,} \\
&\text{Umbilicale.}
\end{align*}
\]

\[
\begin{align*}
&\text{Epar,} \\
&\text{Vena} \{\text{Porta,} \\
&\text{Cava.} \\
&\text{Ductus Venosus,} \\
&\text{Vesica Fellea.}
\end{align*}
\]

\[
\begin{align*}
&\text{Vasa excretoria,} - \text{Ductus}\{\text{Cysticus,} \\
&\text{Hepaticus,} \\
&\text{Communis,} \\
&\text{Choledochus.}
\end{align*}
\]

Pancreas — Ductus excretorius.

\[
\begin{align*}
&\text{Rete.} \\
&\text{Splen,} \{\text{Cellulæ,} \\
&\text{Glandulæ.}
\end{align*}
\]

Praelection Decima Quarta.

De quibusdam Glandulis, & de Vasis lacteis & Lymphaticis.

\[
\begin{align*}
&\text{Veniae lacteæ,} \{\text{primi} \text{ generis.} \\
&\text{secundi} \\
&\text{Receptaculum chyli.} \\
&\text{Ductus Thoracicis.} \\
&\text{Lymphœductus in genere.} \\
&\text{Vasa ubique concomitantes.} \\
&\text{Glandulae} \{\text{Inguinales.} \\
&\text{Axillares.}
\end{align*}
\]

Praelection
Prælectio Decima Quinta.

De Corde, V partibus respirationi interventibus.

Larynx, — Cartilago

Thyroides.
Cricoides.
Arytaenoides.
Epiglottis.

Bronchos, — Cartilagines, Pene-anulares.
Glandulae Thyroideae.
Thymus.
Pleura.
Mediastinum.
Pulmones, { Lobi.
{ Lobuli.
Pericardium.

Cava \{ descendens.
\{ ascendens.

Tuberculum Loweri.

\{ Columnæ.

Auriculadextra \{ Foraminis ovalis locus.
\{ Ostium Venarum coronariarum.
\{ Valvulæ tricuspidæ.
Ventriculus dexter, \{ Papillae.
\{ Columnæ.

Cor \{ Valvulæ sigmoïdales.

Arteria Pulmonalis, \{ Canalis arteriosus in Ligamentum versus.
Vena Pulmonalis.
Auricula sinistra, — Columnæ.
\{ Valvulæ mitrales.
Ventriculus sinister, \{ Papillæ.
\{ Columnæ.

Septum Cordis.

Aorta, \{ Valvulæ semilunares.
\{ Ostia Arteriarum coronariarum.

Prælectio
### Praelection Decima Sexta.

**De Arteriis & Venis superioribus.**

**Arteriae.**
- Orta ascendens.
- Coronariae Cordis.
- Subclaviae.
- Thymae.
- Mammariae.
- Cervicales.
- Carotides.
- Thyroideae.
- Laryngeae.
- Temporales.
- Occipitales.
- Parotides.
- Ranulae.
- Occiei.

**Vene.**
- Jugulares, internae.
- Rami communicantes.
- Ranulares.
- Faciei.
- Parotides.
- Laryngeae.
- Thyroideae.
- Mammariae.
- Thymae.
- Occipitales.
- Cervicales.
- Subclaviae.
- Cava descendens.

**Vasa Cerebri. Vide Prae. xviii.**
- Digitales.
- Cephalica.
- Mediana.
- Basilica.
- Salvatella.
- Humeralis.
- Axillaris.

### Praelection Decima Septima.

**De Arteriis, & Venis inferioribus.**

**Arteriae.**
- Orta descendens.
- Intercoftales.
- Tracheales.

**Vene.**
- Digitales Pedis.
- Saphana.
- Tibiales.
- Phrenicae.
| Phrenicae. | Popliteae. |
| Caeliaca. | Crurales. |
| Pancreatica. | Epigastricae. |
| Hepatica. | Iliaca externa. |
| Cystica. | Iliaca interna. |
| Coronaria Ventriculi super. | Lumbares. |
| Epiploicae. | Spermaticae. |
| Splenica. | Emulgentes. |
| Coronaria Ventriculi infer. | Mesentericae. |
| Mesenterica superior. | Coronaria Ventriculi infer. |
| Emulgentes. | Splenica. |
| Spermaticae. | Epiploicae. |
| Lumbares. | Coronaria Ventriculi super. |
| Mesenterica inferior. | Cystica. |
| Rami communicantes. | Hepatica. |
| Sacra. | Pancreatica. |
| Iliaca externa. | Porta. |
| Iliaca interna. | Phrenicae. |
| Epigastricae. | Intercoftales. |
| Crurales. | Bronchiæ. |
| Tibialis anterior. | Azygos in Cavam descendente. |
| Tibialis media. | Cava ascendentis. |
| Tibialis posterior. | Earum Valvæ. |
| Ramus communicans. | Tunicae, & Vasa Vasorum. |
| Digitales Pedis. | |

Praelectio Decima Octava.

De Cerebro, ejusque Membranis, & Vasis.

Dura Mater

\[ \text{primus, (i.e.,) Falx.} \]
\[ \text{Proeeflus (i.e.,) Secundus.} \]
\[ \text{tertius.} \]
\[ \text{Longitudinalis sup. ubiLigamenta.} \]
\[ \text{Laterales.} \]
\[ \text{Rectus.} \]
\[ \text{Circularis.} \]
\[ \text{Innominata.} \]

Ceteri non sunt semper observandi:

Pia Mater

\[ \text{Veneæ.} \]
\[ \text{Volvuli.} \]
\[ \text{Hemispheria 2.} \]
\[ \text{Lobi 4.} \]
\[ \text{Arteriae Cervicales.} \]
\[ \text{Infundibulum.} \]
\[ \text{Glandula pituitaria.} \]
\[ \text{Protuberantia 2 albae pone infundibulum.} \]

Cerebrum

\[ \text{Medulla oblongata.} \]
\[ \text{Protuberantia annularis.} \]
\[ \text{Crura.} \]
\[ \text{Caudex.} \]
\[ \text{Olfactorium.} \]
\[ \text{Opticum.} \]
\[ \text{Oculorum motorium.} \]
\[ \text{Patheticum.} \]
\[ \text{Gustatorium.} \]
\[ \text{Auditorium.} \]
\[ \text{Accelforius.} \]
\[ \text{Recur-} \]
\[ \text{vagum, Nervus rens.} \]
\[ \text{T Cerebellum.} \]
Cerebellum, — Processus vermisformes.

Substantia: Corticalis cinerea.

Medullaris alba.

Septum lucidum.

Fornix, \{ Radices.

Crura. \} Plexus Choroides.

Glandula Pinealis.

Corpora striata.

Thalami Nervorum opticorum.

Nates.

Teftes.

ad Radices Fornicis.

Foramen \{ anterius.

posterius. \}

Ventriculus tertius.

Ventriculus quartus. \} Valvula.

Pedunculi.

Quod de Cerebro superest notatu indignum judio.

---

Praelection Decima Nona.

De Medulla Spinali \& Nervis passim in Corpus dispersis.

Medulla Spinalis \} Meninges.

\{ Cauda Equina. Cervicis 7.

\{ Nervorum pares Dorfi 12.

\} Lumborum 5.

\} Sacri 6.

Brachiales.

Cubitales.

Digitales.
Syllabus.

Digitales.
Intercoflales.

Cruralis \anticus, \posticus.

Tibiales.
Digitorum pedis.

Sunt plurimi ex his oriundi, \per Corpus undique dispersi. Et a partibus quibus Subserviunt nominantur.

Praelection Vigesima.

De Partibus Urinariis, \et Organis generationis in Viris.

Arteriae \emulgentes.

Enes, Venae.

Glandulae.

Papillae.

Tubuli Urinarii.

Pelvis.

Glandulae Renales. — Sinus.

Ureteres.

Vesica urinaria, — Externa communis.

Tunica, Media, Musculus detrusor urinae.

Musculus Sphincter Vesicae.
### Sillabus

<table>
<thead>
<tr>
<th>Communes</th>
<th>externa, Cutis.</th>
<th>interna, Dartos.</th>
<th>externa, Processus Ely-throides.</th>
<th>interna, Albuginea.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tunicæ Propriæ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Testes**

- Arteriae Spermaticæ
- Venæ
- Corpora varicosa
- Epididymes

**Vasa deferentia**

**Vesiculæ seminales**

**Prostatae**

- Præputium
- Glans, Frænum
  - Corpora cavernosa
  - Glandulae odoriferae
- Crura
- Corpora cavernosa

**Penis**

- Septum
  - Connexio ad Ossa pubis, vulgo Ligamentum suspensorium
  - Corpus cavernosum
  - Urethra
    - Rostra Gallinaginis
    - Membrana Glandulosa

*Musculi: Vide Præl. xxvi.*
Prælectio Vigesima Prima.

De Partibus Generationis Mulierum.

Mons Veneris.
Rima Magna.
Labia.
Nymphæ.

Externæ, Glans.
      Hermæ.
      Preputium.
      Crura.
      Corpora cavernosa.

Meatus Urinarii exitus.

Hymen.
Carunculae myrtiformes.

Vagina, Rugæ.
      Glandulae.
      Lacunæ.

Uterus, Ligamenta.
      Os Tincæ.

Tubæ Fallopianæ, Fimbriae.

Arteriae, Spermaticæ.

Testiculi, Corpora varicosa.
      Ova.

Prælectio Vigesima Secunda.

De Factu in Utero, cum Membranis, &c.

Membrana, Chorion.
      Allantois.
      Amnion.
Humores.
Placenta Uterina. Vena.
Vasa Umbilicalia, Arteriae. Urachus.
Foramen ovale.
Ductus arteriosus.

Prælectio Vigesima Tertia.
De Organis Taetius, Gustus, & Odoratus.

Taetius.

P Apillæ pyramidales in Cote. Vide Præl. ix.

Gustus.

Papillæ pyramidales in Lingua,

Odoratus.

Membrana Glandulosa, & Nervec, passim indueta in Laminas Nasi, commune Os spongiosum dictum.

Prælectio Vigesima Quarta.
De Organis Vistus.

P Alpebræ cum Ciliis, & Superæiliis.
Caruncula lachrymalis.

Tunica
Conjunctiva.
Sclerotis.
Cornea.

Tunica
Choroides.
Uvea.
Retina.
Aranea.

Proceffus Ciliares.
Iris.
Pupilla.

Aquaeus.
Humores, Vitreus.
Crystallinus.

Prælectio Vigesima Quinta.

De Organis Auditus.

AURICULA,
Méatus Auditorius. — Membrana Glandulosa.
æter ad Palatum.
Tympanum.
Membrana Tympani.
Fenestra ovalis.
Vestibulum.

Labyrinthus.

Cochlea.

Canales tres semicirculares.

Incus.
Stapes.
Malleolus.
Ossiculum quartum.

Tympani, laxatores.

Musculus internus, — Tympani, tenfor.

Tympani, laxatores.

M. MYO-
Praelectione Vigesima Sexta.

De Musculis Abdominis, &c.

FASCI A tendinosa, vulgo Membrana communis Musculorum.
Membrana propria.

Abdominis.

Obliqui descendentes.
Pyramidales, — sæpe desunt Compressores.
Recti, — flexores.
Transversales.
Cremafteres Teftium.
Erectores Penis.
Acceleratores urinæ.
Erectores Clitoridis.
Sphincter Vaginæ.
Sphincter ani.
Levatores ani.
Prælectio Vigesima Septima.

De Musculis Faciei, Oculi, &c.

Frontis.

OCCIPITO-FRONTALIS.
Retractor Auriculæ.

Palpebrarum.

Orbicularis.

Ciliaris, est portio prioris.
Aperiens Palpebram superiorem rectus.

Oculi.

Elevator.
Depressor.
Adductor.
Abductor.

Obliquus superior, seu Trochlearis.

inferior.

Faciei.

Sphincter Oris.

Elevator Labii superioris Dilatator labarum Nasi.
Depressor proprius est Constrictor labarum Nasi.

Elevator Labi inferioris, proprius.

Depressor Labiorum communis.

Lygomaticus.

Buccinator.

Platyisma Myoides.
Prælectio Vigesima Octava.

De Museulis Ossis Hyoidis, Lingue, & Laryngis.

**Ossis Hyoides.**

*Mylohyoidei,* fursum antrosumque.

*Geniohyoidei,*

*Stylohyoidei,* — fursum, retrorsumque.

*Coracohyoidei,* — deorsum, retrorsumque.

*Sternohyoidei,* — deorsum.

**Lingue.**

*Genioglossi,* — fursum, antrosumque.

*Styloglossi,* — fursum, retrorsumque.

*Ceratoglossi,* — deorsum.

**Laryngis.**

*Hyothyroidei,* — Elevatores *

*Sternothyroidei,* {depressoressis} *

*Cricothyroidei,*

*Cricoarytœnoidei,* {postici, apertores} *

*Thyroarytœnoidei,* {clauros.

*Arytœnoidei,*
Prælectio Vigesima Nona.

De Musculis Maxillæ inferioris, Pharyngis, & Uvulae.

Maxilla inferioris.

Gastricus, — depressor.

Masseteres, temporales, erygoidei interni, externi, elevatores.

Pharyngis.

Glyopharyngei, — dilatores.

Pharyngis, — constrictores.

Originalis Gulae.

Uvula.

Erygostaphylini interni, — sursum.

Prælectio Trigesima.

De Musculis Claviculae, Scapulae, Humeri, & Cubiti.

Claviculae.

UBCLAVIUS.

Scapulae.

Trapezius —— retrotorium.

Leverator.

Homboides, sursum, retrotoriumque.

Serratus
Serratus \{ \text{major}, \text{minor} \} \text{antrorsum, fusfumque.}

Pectoralis, — antrorsum.

Deltoides, \{ \text{fusfum} \}

Supraspinalis, \{ \text{fusfum} \}

Infraeispinalis.

Teres \{ \text{major}, \text{minor est por.Mus. infraeisp} \text{intraorsum.}

Latissimus Dorsi.

Coracobrachialis, — fusfum, extrorsumque.

Subscapularis, — introrsum.

\text{Cubiti.}

Biceps, \{ \text{Flexores} \}

Brachialis, \{ \text{Flexores} \}

Triceps, \{ \text{Extensores} \}

Anconaeus, \{ \text{Extensores} \}

---

\text{Praelection Trigesima Prima.}

\text{De Musculis Volæ Manus, Carpi, Pollicis, Digitorum, \& Radii.}

\text{Volæ Manus.}

\text{Palmaris} \{ \text{longus, sēpe dēes} \text{t. brevis, sēu caro quadrata.}

\text{Carpi.}

\text{Flexor} \{ \text{Radialis.} \text{Ulnaris.}

\text{Extensor} \{ \text{Radialis, sēu Bicornis.} \text{Ulnaris.}

\text{Pollicis.
Pollicis.

\[
\begin{align*}
\text{extensor} & \quad \{ \text{primi} \} \quad \text{secundi} \quad \{ \text{ternii} \} \quad \text{internodii} \\
\text{flexor} & \quad \{ \text{primi, & secundi} \} \quad \text{Offis.} \\
\text{adductor} & \\
\text{aducer} & \\
\text{Dietorum.} \\
\text{foratus, — secundi} & \\
\text{forans, — tertii} & \quad \{ \text{ternii internodii flexor.} \\
\text{ambricales, — primi} & \\
\text{Communis.} & \\
\text{extensor} & \quad \{ \text{Indicis.} \\
\text{Auricularis.} & \\
\text{adductor} & \quad \{ \text{primi} \} \quad \text{minimi} \quad \text{digiti.} \\
\text{terosseis, — extensores, & divaricatores.} & \\
\text{Radii.} \\
\text{spinator} & \quad \{ \text{longus.} \\
\text{brevis.} & \\
\text{monator} & \quad \{ \text{teres.} \\
\text{quadratus.} & \\
\end{align*}
\]
Praelection Trigesima Secunda.

De Musculis Capitis, & Colli.

Mastoidei, Capitis.

Recti

<table>
<thead>
<tr>
<th>interni</th>
<th>majeores</th>
<th>flexores.</th>
</tr>
</thead>
<tbody>
<tr>
<td>minores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>laterales</td>
<td></td>
<td>utrinque.</td>
</tr>
</tbody>
</table>

Longi, — flexores.

Scaleni.

Intertransversales.

Spleni.

Complexi.

Recti

<table>
<thead>
<tr>
<th>majeores.</th>
<th>extenfores.</th>
</tr>
</thead>
<tbody>
<tr>
<td>minores.</td>
<td></td>
</tr>
</tbody>
</table>

Obliqui

<table>
<thead>
<tr>
<th>superiores.</th>
<th>rotatores.</th>
</tr>
</thead>
<tbody>
<tr>
<td>inferiores.</td>
<td></td>
</tr>
</tbody>
</table>

Colli.

Spinales.

Transversales.

Intertransversales.

Praelection Trigesima Tertia.

De Musculis Dorfi, Lumborum, & Costarum.

Dorfi.

Sacrolumbales.

<table>
<thead>
<tr>
<th>Longissimi.</th>
<th>extenfores.</th>
</tr>
</thead>
</table>

Semispinales.
Lumborum.
Psoae parvae, — flexores, sede desunt.
Quadrati, — utrinque.
Coccygei.

Costarum.
Serrati (superiores, postici levatores,
inferiores, depressores.
Intercostales (externi, levatores.
Triangulares; constrictores.

Diaphragma.

Praelectio Trigesima Quarta.
De Musculis Femoris, & Tibia.

Femoris.
PSOA magna,
Iliacus internus, flexores.
Pectineus,
Triceps,
Gluteus (maximus,
medius, extensores.
minimus,
Pyriformis, feu Iliacus externus.
Marsupialis, obturator internus.
Quadratus.
Obturator internus.

Tibia.
Membranosus, extensor externum.
Sartorius, flexor introrsumque.
Gracilis,
Semitendinosus,
Semimembranosus, flexores.
Biceps,
Popliteus,

Rectus.
Prælectio Trigésima Quinta.

De Musculis Tarsi, Pollicis, & Digitorum Pedis.

Tarsi Musculi.

GASTROCNEMIUS externus,
Plantaris, sēpe deest extensores.
Gastrocnemius internus,
Tibialis { anticus, — flexor introrsum.
{ politius, — extensor
Peroneus { longus, extensores extrorsum.
{ brevis,

Pollicis Pedis:

Extensor { longus.
{ brevis.

Flexor { longus.
{ brevis.

Abductor { sunt Flexores.
Adductor { Digitorum Pedis.

Extensor { longus.
{ brevis.

Interossei, — extensores.
Perforatus, — secundi internodii Flexores.
Perforans, — tertii
Lumbricales, — primi
Transversalis Pedis — constrictor.

FINIS
### TABLE I.

The Fore View of a Sceleton.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Os Frontis</td>
</tr>
<tr>
<td>2</td>
<td>Offa Pectoris</td>
</tr>
<tr>
<td>3</td>
<td>Clavicula</td>
</tr>
<tr>
<td>4</td>
<td>Scapula</td>
</tr>
<tr>
<td>5</td>
<td>Os Humeri</td>
</tr>
<tr>
<td>6</td>
<td>Radius</td>
</tr>
<tr>
<td>7</td>
<td>Ulna</td>
</tr>
<tr>
<td>8</td>
<td>Carpus</td>
</tr>
<tr>
<td>9</td>
<td>Metacarpus</td>
</tr>
<tr>
<td>10</td>
<td>Spina Dorsif</td>
</tr>
<tr>
<td>11</td>
<td>Os Inominatum</td>
</tr>
<tr>
<td>12</td>
<td>Os Femorisi</td>
</tr>
<tr>
<td>13</td>
<td>Trochanter Major</td>
</tr>
<tr>
<td>14</td>
<td>Patella</td>
</tr>
<tr>
<td>15</td>
<td>Tibia</td>
</tr>
<tr>
<td>16</td>
<td>Fibula</td>
</tr>
<tr>
<td>17</td>
<td>Tarsus</td>
</tr>
<tr>
<td>18</td>
<td>Metatarsus</td>
</tr>
</tbody>
</table>

---

*Note: The table lists the fore view of a skeleton with the corresponding bone names and numbers.*
<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Os Bregmatis</td>
</tr>
<tr>
<td>2</td>
<td>Os Occipitis</td>
</tr>
<tr>
<td>3</td>
<td>Clavicula</td>
</tr>
<tr>
<td>4</td>
<td>Scapula</td>
</tr>
<tr>
<td>5</td>
<td>Processus Acromion</td>
</tr>
<tr>
<td>6</td>
<td>Os Humeri</td>
</tr>
<tr>
<td>7</td>
<td>Radius</td>
</tr>
<tr>
<td>8</td>
<td>Ulna</td>
</tr>
<tr>
<td>9</td>
<td>Olecranon</td>
</tr>
<tr>
<td>10</td>
<td>Costae</td>
</tr>
<tr>
<td>11</td>
<td>Spina</td>
</tr>
<tr>
<td>12</td>
<td>Os Innominatum</td>
</tr>
<tr>
<td>13</td>
<td>Os Sacrum</td>
</tr>
<tr>
<td>14</td>
<td>Os Coccygis</td>
</tr>
<tr>
<td>15</td>
<td>Os Femoris</td>
</tr>
<tr>
<td>16</td>
<td>Trochanter major</td>
</tr>
<tr>
<td>17</td>
<td>Trochanter minor</td>
</tr>
<tr>
<td>18</td>
<td>Tibia</td>
</tr>
<tr>
<td>19</td>
<td>Fibula</td>
</tr>
</tbody>
</table>
### TABLE III.

The **Bones of the Head**.

<table>
<thead>
<tr>
<th>No.</th>
<th>Bone</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sutura Coronalis</td>
</tr>
<tr>
<td>2</td>
<td>Sutura Sagittalis</td>
</tr>
<tr>
<td>3</td>
<td>Sutura Lambdoïdalis</td>
</tr>
<tr>
<td>4</td>
<td>Sutura Squamosa</td>
</tr>
<tr>
<td>5</td>
<td>Sutura Transversalis</td>
</tr>
<tr>
<td>6</td>
<td>Os Frontis</td>
</tr>
<tr>
<td>7</td>
<td>Os Bregmatis</td>
</tr>
<tr>
<td>8</td>
<td>Os Occipitis</td>
</tr>
<tr>
<td>9</td>
<td>Os Temporis</td>
</tr>
<tr>
<td>10</td>
<td>Processus Mammillaris</td>
</tr>
<tr>
<td>11</td>
<td>Meatus Auditorius</td>
</tr>
<tr>
<td>12</td>
<td>Processus Styliformis</td>
</tr>
<tr>
<td>13</td>
<td>Processus Jugalis</td>
</tr>
<tr>
<td>14</td>
<td>Os Sphenoides</td>
</tr>
<tr>
<td>15</td>
<td>Os Max.</td>
</tr>
<tr>
<td>16</td>
<td>Os Nasi.</td>
</tr>
<tr>
<td>17</td>
<td>Os Unguis.</td>
</tr>
<tr>
<td>18</td>
<td>Os Planum.</td>
</tr>
<tr>
<td>19</td>
<td>Ductus ad Nasum</td>
</tr>
<tr>
<td>20</td>
<td>Maxilla superior.</td>
</tr>
<tr>
<td>21</td>
<td>Foramen Maxillae superioris</td>
</tr>
<tr>
<td>22</td>
<td>Maxilla inferior.</td>
</tr>
<tr>
<td>23</td>
<td>Processus Coronalis</td>
</tr>
<tr>
<td>24</td>
<td>Processus Condyloides</td>
</tr>
<tr>
<td>25</td>
<td>Foramen.</td>
</tr>
<tr>
<td>26</td>
<td>Dentes Incisorii.</td>
</tr>
<tr>
<td>27</td>
<td>Dentes Canini.</td>
</tr>
<tr>
<td>28</td>
<td>Dentes Molares.</td>
</tr>
</tbody>
</table>
TABLE IV.

A. The Fore View of the Scull.

1. Sutura Coronalis.
2. Sutura Sagittalis.
3. Sutura Squamosa.
4. Sutura Sphenoidalis.
5. Os Frontis.
6. Os Bregmatis.
7. Os Male.
8. Os Nasi.

B. A View of the Basis of the Scull.

1. Sutura Lambdoidalis.
2. Os Occipitis.
3. Os Temporis.
4. Processus Mammillaris.
5. Processus Styloides.
7. Os Male.
8. Os Palati.

C. The Os Hyoides.

1. Basis.
2. Cornua.

D. The
D, The *Osca Sesamoidea* of the Great Toe.
E, The *Osca Sesamoidea* of the Thumb.
F, A Sesamoid Bone that I found near the beginning of the Plantaris Muscle.
G, The first Vertebra.

1. *Processus Transversus*.
2. *Processus Obliquus*.

H, The second Vertebra.

1. *Processus Dentatus*.
2. *Processus Transversus*.
3. *Processus Obliquus*.
4. *Processus Spinalis*.

I, One of the Vertebrae of the Thorax.

1. *Corpus Spongiosum*.
2. *Processus Transversus*.
3. *Processus Obliquus*.
4. *Processus Spinalis*.

J, One of the Vertebrae of the Loins.

1. *Corpus Spongiosum*.
2. *Processus Transversus*.
3. *Processus Obliquus*.
4. *Processus Spinalis*.

L, The Bones of the Foot.

1. *Astragalus*.
2. *Os Calcis*.
3. *Os Naviculare*.
4. *Os Cuboides*.
5. *Os Cuneiforme majus*.
6. *Os Cuneiforme medium*.
7 Os Cuneiforme minimum.
8 Metatarsus.
9 Os Pollicis Pedis.
10 Os Digitorum Pedis.


1, 2, 3, 4, } The Eight Bones of the
carpus.
9 Metacarpus.
10 The Bones of the Thumb.
11 The Bones of the Fingers.
A, S H E W S the S c e l e t o n of a full grown F a t u s, in which may be observ'd, the E p i-
physis, the C a r p u s and T a r s u s, which are C a r t i l a-
ginous, (shrunken in drying) and the shape in gene-
ral differing from the S c e l e t o n of an A d u l t.

B, The S c a p u l a of a B o d y T w e l v e Y e a r s old.

1 An E p i p h y s i s at the B a s i s.

2 The E p i p h y s i s of its P r o c e s s e s.

3 The E p i p h y s i s at the upper E n d of the Os
H u m e r i from the same B o d y.

C, The B r e g m a of a F a t u s Five M o n ths old p r e-
par'd, to shew the Fibres O s s i f y i n g from a
middle P o i n t, and shooting out on e v e r y
side.

D, The T i b i a s a w ' d length w a y s.

E, The T i b i a of a F a t u s Five M o n ths o l d. with
with the E p i p h y s i s o f f.
TABLE VI.

A. A Distorted Spine.

B. The Os Femoris of a Man Eight Foot high.

1. Shows Three Trochanters.
2. A Fourth Trochanter.
3. The Linea Aspera.
4. The Two inferior Apophyses.

C. Part of an Os Femoris Carious.

D. Half the Lower-Jaw exfoliated. By Mr. Maurice Berkeley.

E. Part of a Carious Leg and Foot, with all the Bones grown into One.

1. The Tibia.
2. The Fibula.

F. Part of a Thigh-bone.

1. A Bony Excrecence.

G. The Head of the Os Femoris broke off, which had been mistaken for a Luxation.

H. Another piece of an Os Femoris with the Head broke off; which had also been mistaken for a Luxation.
A Bone taken out of the Omentum of a Sheep, and Delineated by Dr. Steukly. The Prickt Line shews where one Part was broke off from the other.
TABLE VIII.

SHERS a Number of Bladders differently disposed, to explain an Hypothésis about Muscular Motion. Let the Diameter of the large Bladder, when fill'd, be call'd Two; also let the space through which it moves a weight, be call'd Two; and the utmost weight it will so raise in a given time, be Four, by an inflation or influx of any Fluid, with a given moment: In like manner, one of the smaller Bladders, being in Diameter but One, it will, from the same inflation, or influx, raise no more than the weight One, through the space One; and Eight times as soon as the great One; it being Eight times less than the great One: So that as the large Bladder, Number One, will raise the weight Four through the space Two, the Bladders Two will raise the weight One through the space Two, but Four times as soon as the former; the Bladders Three, will raise the Weights 1, 1, thro' the space Four, in the same time, with the great One; and the Bladders Four, will in like manner raise the weight One, through the space Eight; and the Bladders Five, will raise the Eight weights mark'd, 1, 1. &c. through the space One, in the same time.
<table>
<thead>
<tr>
<th>No.</th>
<th>Muscles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Frontalis</td>
</tr>
<tr>
<td>2</td>
<td>Mastoideus</td>
</tr>
<tr>
<td>3</td>
<td>Coracobrachialis</td>
</tr>
<tr>
<td>4</td>
<td>Sternohyoides</td>
</tr>
<tr>
<td>5</td>
<td>Part of the Trapezius</td>
</tr>
<tr>
<td>6</td>
<td>Deltoides</td>
</tr>
<tr>
<td>7</td>
<td>Pectoralis</td>
</tr>
<tr>
<td>8</td>
<td>Part of the Serratus Major anticus</td>
</tr>
<tr>
<td>9</td>
<td>Obliquus descendens</td>
</tr>
<tr>
<td>10</td>
<td>The Portions of the Recti, the Left being</td>
</tr>
<tr>
<td></td>
<td>being divested of its Fascia</td>
</tr>
<tr>
<td>11</td>
<td>Pyramidalis</td>
</tr>
<tr>
<td>12</td>
<td>Biceps Cubiti Flexor</td>
</tr>
<tr>
<td>13</td>
<td>Brachius Flexor</td>
</tr>
<tr>
<td>14</td>
<td>Triceps Extensor</td>
</tr>
<tr>
<td>15</td>
<td>Supinator Radii Longus</td>
</tr>
<tr>
<td>16</td>
<td>Flexor Carpi Radialis</td>
</tr>
<tr>
<td>17</td>
<td>Flexor Carpi Ulnaris</td>
</tr>
<tr>
<td>18</td>
<td>The first Head of the Extensor Carpi Radialis</td>
</tr>
<tr>
<td>19</td>
<td>The second Head of the same Muscle</td>
</tr>
<tr>
<td>20</td>
<td>Extensor Digitorum Communis</td>
</tr>
<tr>
<td>21</td>
<td>Fascialis or Membranofus</td>
</tr>
<tr>
<td>22</td>
<td>Sartorius</td>
</tr>
</tbody>
</table>

TABLE IX.
<table>
<thead>
<tr>
<th>No.</th>
<th>Muscle</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>One Head of the Triceps</td>
</tr>
<tr>
<td>25</td>
<td>Pectineus</td>
</tr>
<tr>
<td>26</td>
<td>The great Head of the Triceps</td>
</tr>
<tr>
<td>27</td>
<td>Gracilis</td>
</tr>
<tr>
<td>28</td>
<td>Rectus</td>
</tr>
<tr>
<td>29</td>
<td>Vastus Externus</td>
</tr>
<tr>
<td>30</td>
<td>Vastus Internus</td>
</tr>
<tr>
<td>31</td>
<td>Semitendinosus</td>
</tr>
<tr>
<td>32</td>
<td>Gastrocnemius</td>
</tr>
<tr>
<td>33</td>
<td>Soleus</td>
</tr>
<tr>
<td>34</td>
<td>Tibialis Anticus</td>
</tr>
<tr>
<td>35</td>
<td>Tensor Pollicis Pedis Longus</td>
</tr>
</tbody>
</table>

The document appears to be a medical or anatomical text, listing several muscle names and their corresponding numbers. The text is written in Latin, with some formatting and decorative elements typical of historical manuscripts.
**TABLE X.**

**MUSCLES OF THE FACE.**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
<th>P</th>
<th>Q</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fronalis</td>
<td>Temporalis</td>
<td>Masseter</td>
<td>Orbicularis</td>
<td>Sphincter Oris</td>
<td>Elevator Labii superioris proprius</td>
<td>Elevator Labiorum communis</td>
<td>Depressor Labiorum communis</td>
<td>Depressor Labii inferioris proprius</td>
<td>Zygomaticus</td>
<td>Buccinator</td>
<td>The Right Eye, with its Muscles</td>
<td>Obliquus superior</td>
<td>The Trochlea</td>
<td>Obliquus inferior</td>
<td>Elevator Oculi</td>
<td>Depressor Oculi</td>
</tr>
</tbody>
</table>
A View of the Posterior External Muscles.

1 Medistoeus.

2 Trapezius.

3 A small Part of the Elevator Scapulae.

4 Part of the Rhomboides.

5 Deltoides.

6 Latissimus Dorsi.

7 Teres Major.

8 Infraspinalis Scapulae.

9 Triceps extensor Cubiti.

10 Anconeus.

11 Extensor Carpi Ulnaris.

12 Extensor Carpi Radialis.

13 Extensor Digitorum Communis.

14 Extensor Primi Internodi Opplicis.

15 A small Part of the Supinator Radii longus.
16, 16 Gluteus Maximus.
17, 17 Guteus Medius.
18, 18 Membranous or Fascialis.
19 Gracilis.
20 The great Head of the Triceps.
21 Semimembranous.
22 Semitendinosus.
23 Biceps Tibia.
23 Vastus Externus.
24, 24, &c. Gastrocnemius.
25, 25 The Tendinous part of the Gastrocnemius over the Soleus.
TABLE XI.


B, A Bone taken out of the first Process of the *Dura Mater,* not far from the *Crista Galli.*

C, D, The Two Bones mention'd, *pag. 49, 50.*

C, Shews the under-side of that part of the *Os Bregmatis* that was depress'd.

D, The piece of Bone that separated last and which was not depress'd.

E, The Two places first Trephin'd.

F, The place last Trephin'd to give more vent to the Matter.
TABLE XII.

1. The Pericardium covering the Heart.
2. The Lungs.
4. The Diaphragm.
5. The Liver.
6. The Stomach.
7. The small Guts.
TABLE XIII.

A, The Liver.
B, The Gall Bladder.
C, The Pancreas.
D, The Splene.
E, One of the Renal Glands.
F, F The Kidneys.
G, G The Ureters.
H, The Bladder of Urine distended.
K, The Aorta.
L, The Vena Cava.

M, The Four Spermatick Arteries, with the Arteria Mesenterica Inferior, rais’d over a Probe; the middle one the Arteria Mesenterica inferior; the Two next the Spermatick Arteries arising from the Aorta; the outmost the Spermatick Veins, the Right ending in the Cava, the Left in the Left Emulgent Vein.
TABLE XIV.

The Vessels of the Brain
fill'd with Wax.

1. 1 The Carotid Artery.
2. 2 The Cervical Artery.
3. &c. The Branches of the Carotid Artery which pass between the Lobes of the Brain on the Left Side.
4. 4 The Branches from the Carotid Artery which pass between the Hemispheres of the Brain.
5. 5 The Branches from the Cervical Artery, which are bestowed upon the Cerebellum.
6. The Superior Longitudinal Sinus.
7. The Inferior Longitudinal Sinus.
8. The Straight Sinus.
9. The Lateral Sinus.
10. The Circular Sinus.
11. A Vein from the Circular Sinus.
12. A Sinus at the upper Edge of the Os Petrosum.
13. A Sinus at the lower Edge of the Os Petrosum.
**Table XV.**

**Arteries fill'd with Wax.**

1. *Part* of the descending *Aorta*.
2. *Arteria Celiaca*.
4. *Mesenterica Inferior*.
5. Part of the Communicant Artery.
6. Shews one of the *Extremes Mesenteric Arteries*, as it is distributed round the Intestine.
TABLE XVI.

The Vena Portæ fill'd with Wax.

1. The Extreme Branches of the Vena Portæ in the Mesentery.

2. The single Trunk of the Vena Portæ entering the Liver.

3. The Extreme Branches of the Vena Portæ in the Liver.
TABLE XVII.
The Veins of the Liver.

1. Part of the Vena Cava Ascendens.

2, 2. The Branches of the Cava taken out of the Liver.
TABLE XVIII.

The Excretory Ducts and Arteries of the Liver.

1 Ductus Hepaticus, with its Branches, taken out of the Liver.

3 The Gall-Bladder.

4 Ductus Cysticus.

5 Ductus Communis Cholodochus.

6 Ductus Pancreaticus.

7 The Hepatic Artery, which is given off from the Superior Mesenteric.

8 The Hepatic Artery, which is given off from the Celiac.

9 Arteria Cystica.
A Polipus cough'd up out of the Lungs, which admirably shews the manner of the Aspera Arteria dividing in the Lungs. Communicated to me by the late Dr. Oliver Horseman.
**TABLE XXI**

**Figure 1.**

*S* Hews the Circulation of the Blood, in the Tail of a *Greg*, from Mr. *Cooper*.


B, B, B Several other Communications.

**Figure 2.**

Hews the Circulation of the Blood, in the Tail of a *Gudgeon*.

A, A, A The large Vessels.

B, B, B The Extremities of Arteries communicating with Veins.

C, C Some small Vessels whose Extremities could not be seen for the thickness of the Tail.
TABLE XXI.

THE Case of Mrs. Stonestreet of Lewis. Vid. Pag. 137.
TABLE XXII.

The Urinary and Genital Parts of a Man.

1. Arteria Aorta Descendens.
2. Vena Cava Ascendens.
3. The Emulgent-Veins.
5. The Left Kidney.
6. The Emulgent-Vein taken out of the Right Kidney.
7. Glandula Renales.
8. The Ureters.
9. Part of the Bladder of Urine.
10. The Pelvis of the Right Ureter taken out of the Kidney.
11. The Tubuli Urinarii taken out of the Right Kidney.
12. The Spermatic Arteries.
13. The Spermatic Veins, the Right entering the Cava, and the Left the Emulgent.
Collateral Branches of the Spermatic-vein, which on this side are not laid bare, and separated from the Artery which runs in the same Membrane with it.

The Left Testicle included in the Processus Vaginalis or Elgybroides.

The Right Testicle denuded.

The Right Epididymis.

The Vasa Deraentia.

The Vesicula Seminales.

The Prostate.

The Rostrum Gallinaginis in the Urethra.

Two Probes put into the Ureters, to shew their oblique Passage into the Bladder of Urine.

A, A A transverse Section of the Penis prepar’d with Mercury.

The Two Arteries of the Penis.

The Vena Ipsius Penis.

The Urethra.

The Corpora Cavernosa Penis.

The Corpora Cavernosa Urethra.
TABLE XXIII.

A The Testicle of a Rat.

B, B The Epididymis.

C The same Testicle divested of the Tunica Albuginea, and magnified to shew the Convolutions of the Vessels.

D An inward Portion of same Testicle more magnified.

E A Group of Animalcule, as they appear in the Male Seed in a Microscope, and Five other besides more magnified, but not represented enough like Tadpoles.
### TABLE XXIV.

The Parts of Generation in Women, the lower side of the *Vagina* being laid upward, and cut open.

1. The *Labia*.
2. The *Nymphæ*.
3. The *Glans* of the *Clitoris* extremely large.
4. The *Preputium Clitoridis*.
5. The Orifice of the *Meatus Urinarius*.
6. The inside of the *Vagina* where the *Rugæ* are to be seen.
7. *Os Tineæ*.
8. *Uterus*.
9, 9. *Tube Fallopiane*.
10, 10. *Fimbria*.
11, 11. *Ovaria*.
12, 12. *Ligamenta Rotunda*.  

---

**TA-**
TABLE XXV.

REPRESENTS the Parts of an Hermaphrodite, in which appear'd as much of the mixture of the Sexes as cou'd be; (but Dr. Douglas, to whom I am Oblig'd for this Cut and the References, esteems it a Female). I once examin'd another, in which I found a divided Scrotum just like the Labia Pudendi, with Testicles in it, and a Urinary Passage between them, with a perfect Clitoris; large as a Penis, with an exceeding small Urethra, thro' which came a little Urine.

Figure 1.

1. The Clitoris cover'd with its Preputium.
2. The two Labia Pudendi.

Figure 2.

3. The Clitoris cover'd with its Preputium.
4. The Glans Clitoridis.
5. The Nympha.
6. The Labia turn'd back, to show the Entrance into the Vagina mark'd 7.
8. The Furca Virginalis, or the Skin that joins the two Labia at their lower part.
TABLE XXVI.

THE lower Parts of a Negro, whose Scrotum was swell'd to this size from a Kick (the Spermatick Vessels being not at all thickened): The greatest length was Twenty Seven Inches, and the greatest Horizontal Circumference, Forty Two Inches. He was the late Mr. Dickinson's Patient in St. Thomas's Hospital; the Tumour was Solid, without Inflammation or Pain; but what Parts were affected we could not learn, he not staying for the Operation. At the Dark-place he could pull out his Penis, when the Scrotum was lifted up.
**TABLE XXVII.**

*The Vessels of the Liver, &c. of a Foetus, fill'd with Wax.*

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>THE Umbilical Vein</td>
</tr>
<tr>
<td>2</td>
<td>Branches of the Vena Porta</td>
</tr>
<tr>
<td>3</td>
<td>3, &amp;c. The extreme Branches in the Liver</td>
</tr>
<tr>
<td>4</td>
<td>4 The Ductus Venosus</td>
</tr>
<tr>
<td>5</td>
<td>5, &amp;c. The extreme Branches of the Cava in the Liver</td>
</tr>
<tr>
<td>6</td>
<td>6, 6, 6 The Ascending Vena Cava</td>
</tr>
<tr>
<td>7</td>
<td>The Foramen Ovale</td>
</tr>
<tr>
<td>8</td>
<td>The Mouth of the Coronary Veins</td>
</tr>
<tr>
<td>9</td>
<td>Part of the Right Auricle of the Heart</td>
</tr>
<tr>
<td>10</td>
<td>Part of the Descending Cava</td>
</tr>
<tr>
<td>11</td>
<td>Tuberculum Loweri</td>
</tr>
</tbody>
</table>
TABLE XXVIII.

SHOWS how all the Rays that flow from any Point of any Object, through the Pupils of the Eyes, are refracted by the Crystaline Humour, to meet in a Focus upon the Retina; the two Dark Cones shew the Spaces where any Object being plac’d, it is not perceiv’d in that Eye in which the Cone ends; because all the Rays of Light from an Object so plac’d, fall upon the entrance of the Optic Nerve in that Eye. (Vid. Page 243.) These Cones divaricating as they proceed from the Eyes, they can never coincide, and consequently, tho’ an Object may be from this Cause undiscern’d by one Eye, there is no place from which it will be upon this account undiscern’d by the other Eye.
TABLE XXIX.

**Figure 1.**

Shews what will be the effect of an Opakeness, in the fore-part of the Crystalline Humour.

**Figure 2.**

Shews what will be the effect, when Parts of the Retina are not sensible of the Light that falls upon them.

**Figure 3.**

Shews what will be the effect of an Opakeness, in the Vitreous Humour.

By considering the effects of Diseases within the Eyes in this manner, the Situation and Extent of a Disease in the Eyes may, in most Cases, be known to great exactness.
A Stone taken out of the Bladder of a Boy five Years old, who was Cut for the Stone, and Cur'd by Mr. James Berne, in St. Thomas's-Hospital.

B The Head of a large Needle upon which the Stone was form'd.

C The Point of the Needle by which it was discover'd before the Stone was Saw'd. The Mother of the Child cou'd give no account of this Needle's getting in; but Dr. Mead, who has this Stone, thinks it went through the Peri-neum.

D Part of a Stone form'd on the side of a Musket Bullet, shot through the upper and back-part of the Thigh, into the Bladder of a Soldier, at the Siege of Life in Flanders; who was Cut and Cur'd the Spring following, by the late Mr. Ridoue, in St. Thomas's-Hospital. This Stone is in the Possession of Dr. Mead.

E Two Stones, with a Polish'd Joint, taken out by Mr. Sturgeon, an eminent Surgeon at St. Edmund's-Bury in Suffolk. I had formerly the Account of this Case from Dr. Craske of Bury, who visited the Patient; but I choose rather to give it from Mr. Sturgeon's own Account.—My Patient had never before any Symptoms of the Stone; he
he had a total Obstruction of Urine for Ten Days before I was sent for: I found a Mortification begun on one Side of the Perineum, the same Side of the Scrotum and Penis, with all the Region of the Os Pubis. I first pass'd a Catheter, and finding the Stone, I immediately Cut thro' the Mortification in Perineum, without a Staff, and took out the bigger Stone, and upon observing the Joint in the Stone, made a farther Search, and took out the other Stone, and then took care of the Mortification, which in time cast off. The Urine came through the Wound twenty Days; and now the Patient is in every respect well.

F Two Stones taken from the Valves of the Aorta.
Table XXXI.

Fig. 1. A Rettilineal Muscle.
Fig. 2. A single Penniforme Muscle.
Fig. 3. A double Penniforme Muscle.
Fig. 4. Is a Scheme to explain the different Properties of Rettilineal and Penniforme Muscles.

CC, Two Weights hung perpendicular, balancing a less Weight at B, but so much as the Weight B is less than the Weights CC, so much the Velocity of the Weight B (it being put in Motion) exceeds the Velocity of the Weights CC; for while the Weights CC descends from DD to EE, the Weight B ascends to A, but all the way the Weight B ascends to A, the Weight B must be lessen'd, as the Sine of the Angle made by the two oblique Cords which sustain the Weight B encreases, and the Velocity of the Weight B will encrease in the same proportion: The Weights CC, descending uniformly.
THE HABITAT.

The habitat of the rodent is generally found in piles of wood, straw, or similar materials. The rodent constructs its burrow by excavating underground tunnels and chambers. The burrow system is complex and may consist of multiple entrances, main tunnels, and living chambers. The rodent's burrowing behavior is a survival strategy that provides shelter, protection from predators, and access to food sources. The burrow is typically made of earth and plant material, and it may be extended or modified over time. The rodent's diet includes various food items such as seeds, fruits, and insects, which it forages for both above and below ground.
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WARMTH OF THE SUN

The sun is one of the most important objects in our solar system. It provides light and heat to the planets and is a vital source of energy for life on Earth.

The sun is a star that is located at the center of our solar system. It is a giant ball of hot gas, primarily composed of hydrogen and helium, that generates energy through nuclear fusion.

The sun's surface, known as the photosphere, is about 6,000 degrees Celsius and is visible to the naked eye. The sun's atmosphere, or corona, extends millions of kilometers into space and is visible during a solar eclipse.

The sun has a diameter of about 1.4 million kilometers and is about 150 million kilometers from Earth. It is estimated to be about 4.6 billion years old and is expected to continue burning for another 5 billion years.

The sun's gravity is what holds the planets in orbit around it, keeping them in a stable arrangement. It also provides the energy that drives the Earth's weather systems and supports the growth of plants.

In conclusion, the sun is a vital source of energy and life on Earth. Its importance cannot be overstated, and continued research is essential to understanding its role in our solar system and beyond.