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A

COMPENDIUM

OF THE

ANATOMY OF THE HUMAN BODY,

Intended principally for the use of Students.

BY ANDREW FYFE.

IN TWO VOLUMES.

VOL. II.

THIRD AMERICAN EDITION.

To this Edition is prefixed,

A COMPENDIOUS HISTORY OF ANATOMY,

AND THE

RUYSCHIAN ART AND METHOD

Of making Preparations to exhibit the Structure of the Human Body.

ILLUSTRATED

With a Representation of the Quicksilver Tray and its Appendages,

Which are not in the London Edition.

PHILADELPHIA:

PUBLISHED BY BENJAMIN C. BUZBY,

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1810.

ANNEX
Anat. Gen.

PART IV.

OF THE VISCERA,

AND

ORGANS OF THE SENSES.

OF THE COMMON INTEGUMENTS.

The Cuticle.

THE *Cuticle*, *Epidermis*, or *Scarf-Skin*, is a thin semi-transparent insensible Membrane, which covers the Skin, and adheres to it by small Vascular Filaments.

The Cuticle is readily *separated* from the Cutis by boiling water, or by putrefaction, and in the living body, by the application of blisters.

It is not every where of the same *density*, being even in the Fœtus, thickest in the Palms and Soles; in which parts, the thickness is afterwards much increased by pressure.

The *External Surface* is marked by *Furrows*, which correspond with those in the Cutis Vera.

Upon the Surface of the Body it is *perforated* by the termination of the Exhalent Vessels,—which throw out the Perspirable Matter, and which, when increased, is considered by most of the modern Physiologists, as forming the Sweat;—by the ends of the Excretory Ducts, which are found in particular parts of the Skin;—by the beginnings of the Absorbents, which take in certain Substances applied to the Surface of the Skin;—and by the different Hairs.

The *perforations*, or *Pores*, are most evident upon the Palms and Soles, and upon the Nose, Ears, and external parts of Generation.

The Cuticle *covers* the Skin through its whole extent excepting under the Nails.

From the External Surface of the Body, it is *reflected inwards*, to line the large Passages; as the Alimentary Canal, the Trachea, the Urethra, Vagina, &c.

In these Passages, however, the Cuticle becomes less uniform in its texture; and in some of them, as in the *Stomach*, is either a wanting, or is so much changed in structure, as to have the appearance of being so.

From the Surface of the Cuticle, certain *Processes* are sent into the Skin, which line the Passages by which the Cutis is perforated.

Many opinions have been advanced concerning the *origin* of the Cuticle: the latest and most probable is, that it is formed by a condensation of the Corpus Mucosum, or by the Extremities of Excretory Vessels;—its density, however, is such, that no vessels can be, traced in it, either by the Eye or by the assistance of glasses.

The Cuticle serves to protect the sensible parts under it; and regulate the proportion of the Fluids thrown out or taken in by the Surface of the Skin;—particularly to prevent too great a degree of evaporation.

Corpus Mucosum.

The *Corpus Mucosum* has been commonly called *Rete Mucosum*, from the supposition that it is formed of a *Mucous Net work*, and is situated under the Cuticle which it connects to the Cutis Vera.

It is composed of the terminations of extremely minute Vessels passing between the Cutis and Cuticle, which are surrounded by a Mucilaginous or Viscid substance, properly called *Corpus Mucosum*.

It is the chief cause of that *variety of colour* which characterises the natives of different climates, and different people of the same climate, being white, or rather of a light-grey semi-transparent colour in the European, black in the Ethiopian, brown in the Asiatic, &c.

It is *thicker* and *stronger* in the Negro than in the

white person, and can be readily separated in the former into two Layers.

It covers every part of the Surface of the Cutis, excepting below the Nails, where it is a wanting ; and is of such a light colour in the Palms and Soles of the Negro, as to have been supposed by some authors to be deficient there also.

Its *origin* has not yet been sufficiently ascertained, nor is it fully determined what particular purposes it serves.

Among other purposes, however, it contributes to preserve the structure of the tender Vessels, Ducts, and Papillæ, placed between the Cutis and Cuticle ; and in the Negro, it is supposed to serve as a defence against the heat of the climate, by preventing the rays of the Sun from penetrating the Skin.

Cutis Vera.

The *Cutis Vera*, or *Skin*, properly so called, lies immediately under the Corpus Mucosum, and gives a general covering to the whole Body.

It is *formed* of Fibres intimately interwoven, and running in every direction, and is so plentifully supplied with Nerves and Blood-vessels, that the smallest puncture cannot be made in any part of it, without occasioning pain and bringing Blood.

The *Blood-vessels* of the Cutis are so numerous, as to appear to form almost the whole of its Substance, and are of such a size as to be readily injected.

It is strong and elastic, and may be elongated in every direction, after which it recovers its former dimensions.

It forms the body of the Skin, and is that part in Quadrupeds of which Leather is made.

The *outer part* of it is dense and firm, the inner loose and gradually degenerating into the common Cellular Substance.

It is thicker and looser on the posterior than on the anterior part of the Body, and thicker and firmer in the Palms and Soles than in the other parts of the extremities.

The *colour* of the Cutis also differs in different parts of the body, in proportion to the quantity of Blood in

the extreme Vessels, and to the thinness of the Cuticle.

At the *edge of the Eye-lids*, the *red part of the Lips*, and *margin of the Anus*, the Cutis becomes so immediately and remarkably thin, as to appear to be lost.

Upon the Surface of the Cutis, *small Eminences* are observed, called *Papillæ*, *Papillæ Nervosæ*, and *Papillæ Pyramidales* ; the term being borrowed from the Papillæ of the Tongue, which were first discovered, and to which the name is most applicable.

They are considered as forming the Organ of Touch, from their being extremely sensible ; and from their being very Vascular, they are also regarded as furnishing a passage to part of the Perspirable Matter.

The *Papillæ* are most evident in the Palms and Soles where they are placed in double rows upon the ridges, which on the points of the Fingers and Toes, generally run in a somewhat spiral and parallel direction.

The Ridges are supposed to defend the Papillæ, and to increase the Surface for Perspiration.

In some places, as in the red part of the Lips, the Papillæ are termed *Villi*, from their resemblance to the pile of Velvet.

Various kinds of *folds* are observed in the Skin ; some depending upon the form of the Cellular Substance, as in the Hips ; others on Muscular Contraction, as in the Fore-head ; and others on Articular Motion, as at the Joints of the extremities,—particularly those of the Fingers and Toes ;—and these folds are thinner than the rest of the Skin, to allow easy motion.

In an *inflamed Skin*, as in the case of Small-pox, a Reticular Texture of Vessels is observed, which can be easily injected, and has been considered by some as the Corpus Mucosum, and by others as an additional Cuticle ;—but no such appearance is to be met with in the sound Skin.

The Cutis Vera serves to cover and give form to the Body, it unites the different parts, and defends them from injury. It forms the external Organs of Sensation or of Touch, and gives passage to the Fluids which are Perspired or Absorbed.

APPENDAGES OF THE SKIN.

Nails.

The *Nails* were formerly regarded as a continuation of the Papillæ of the Cutis, but are now more generally considered as a continuation of the Cuticle.

They are removed along with it by boiling water, or by maceration.

Like the Cuticle also, they are insensible, are renewable after having been separated, and have no evident Vessels.

They differ from it, however, in structure, being formed of *Plates*, and these of *Longitudinal Fibres*, which are closely compacted.

They begin by a square root, a little before the last Joint of the Fingers and Toes.

When separated from the Skin, they are *transparent* like Horn, but are coloured in the living Body by the Vessels of the Cutis, to which they adhere, and from which they derive their nourishment.

They are fixed at their roots to a *semilunar fold* of the Cutis, and are there covered by a reflection of the Cuticle, which firmly adheres to them.

They grow from the roots, and not from the points.

The nails strengthen and defend the ends of the Fingers and Toes, and thereby serve as Buttresses.

In the Fingers they increase the power of apprehension, being useful in laying hold of minute objects.

Hairs.

The *Hairs* arise by roots or bulbs, which are situated in the Cellular Substance under the Skin.

The *Bulbs* are of various shapes in different parts of the Body, and have Blood-Vessels dispersed upon them for their nourishment.

Each of the Bulbs has *two Membranes*, or *Capsules*, containing an Oily Fluid between them, which gives colour to the Hair, and for want of which, as on advanced life, or in certain diseases, the hair is supposed to change its colour, and become white. It may be re-

marked, however, that the Hair, after being cut off continues uniformly to preserve its colour.

The body of the Hair consists of smaller hairs inclosed in a Membrane, and is somewhat of the nature of the Nails. Like them also, it grows only from the root.

The *use* of the Hair is not yet fully known.—It serves in general for the ornament, warmth, or protection of the different parts on, or near which it is placed.

Sebaceous Ducts or Follicles, and Miliary Glands.

The *Sebaceous Follicles* derive their name from the Fluid they contain becoming like Suet, after acquiring a certain degree of consistency, or being inspissated by stagnation.

They are seated under the Cutis, and are found in greatest abundance in those parts which are exposed to the air, or to attrition ; as in the Nose, Ears, Nipples, Groins, and external parts of Generation.

The *Sebaceous* or *Miliary Glands*, are so called from their contents, and from their resemblance to *Millet Seeds*, and are seated in the Axilla.

Other Miliary Glands are described by Authors as being placed under the Skin over the whole surface of the Body, and as serving for the secretion of Perspirable Matter ; but they are not demonstrable to such a general extent ; and the Sweat is considered as being derived from another source.

These Follicles and Glands secrete a fluid which serves to lubricate the Skin, and defend it from the inclemency of the weather, or from the effects of friction.

Membrana Cellularis, or Tela Celluloisa, or Reticular, or Cellular Substance.

This is generally considered as one of the Integuments, though common to these and to the other parts of the Body.

It is *composed* of a fine web, formed of many Membranes joined irregularly together, and these made up of Cells, which communicate freely with each other wherever they are found.

It is very elastic, may be drawn out to a considerable extent, after which it suddenly recoils, and may be condensed or compacted to a great degree.

It lines the Skin, covers the Muscles in general, and enters in between their different Fibres;—is an universal covering to all the other parts, and even enters into the composition of almost every one of them.

It is thickest where the parts are most exposed to pressure, as in the Hips, Palms, and Soles.

The different Cells of which it is composed, are constantly moistened by an Interstitial Fluid, and in many parts of the Body are filled with Fat.

It has little or no sensibility, can be handled freely, or cut or punctured without giving pain.

It serves to connect parts to each other,—but so as to prevent them from growing together;—it covers them, supplies them with sheaths to move in, and contains the Fat.

Corpus Adiposum, Adeps, Pinguedo, or Fat.

The *Fat* is lodged in the common Cellular Substance, but without communicating with it, and is made up of Masses composed of small Vesicles containing the Fat, and these are surrounded by a net work of Blood-vessels, from which the Fat is supposed to be secreted, without the intervention of Glands.

The *vesicles* are not found to have any communication with each other, nor have any Excretory Ducts yet been perceived in them,—the Fat being supposed to transude from the Cells.

It is of *different consistency* in different parts of thebody: In the living Body it is generally fluid, though in some parts it approaches to a solid, and is altogether of this nature in the dead Body.

In the Bones it forms the *Marrow*, which has been formerly described.

The Fat is chiefly *situated* immediately under the Skin, and covers almost the whole Surface of the Body. It is also found between the different Muscles and Fibres of Muscles,—within the Orbits, and in the Cheeks, in the Substance of the Mammæ, and about the Heart.

It *abounds* in the Abdomen, about the Kidneys, Loins, Omentum, and Mesentery;—and in the Joints it forms the Substances called *Glands of the Joints*, already mentioned.

The Fat is *a wanting* in the Scrotum, Penis, and Eye-

Lids, and is found only in small quantity in the Forehead, or about the Joints, where, from its bulk, it would have been inconvenient.—It is also a wanting in the Substance of the Vicera situated in the great Cavities of the Body; as the Brain, Lungs, Liver, Spleen, Kidneys, &c.

The Fat serves to lubricate every part of the Body to which it is connected, and facilitates the action of the Muscles. It fills the Interstices, so as to give form and smoothness, and guard against pressure. It serves also as a reservoir of nourishment.

Panniculus Carnosus,

Described by the Ancients as an

Additional Covering.

This is a general Covering found in the Quadruped, and formed by a thin Subcutaneous Muscle, which serves to agitate the Skin.

It is found only in certain parts of the Human Body; as in the Forehead, where it is formed by the Occipito-Frontalis Muscles; and in the Neck, where it is formed by the Platysma Myoides.

OF THE BRAIN.

The term *Brain* is applied to the whole of that Mass which, with its surrounding Membranes, fills the Cavity of the Cranium; and is larger in Man, in proportion to the size of the body, than in any other animal.

The *Membranes* of the Brain were called *Meninges* and *Maters* by the Ancients, from an idea that they gave birth or origin to all the other Membranes of the Body.

They consist of the *Dura Mater*, *Tunica Arachnoidea*, and *Pia Mater*.

The *Dura Mater*, named from its being of a firmer texture than the other two Membranes, incloses the

Brain and all its Appendages, and lines the different parts of the Cranium.

It is *composed* of one Membrane, which, in several parts, is divisible by maceration into two, or even more layers of Fibres.

The *texture* of the Dura Mater is very dense. It is the thickest and strongest Membrane of the Body, and is composed of Tendinous-like Fibres, which have a shining appearance, particularly in its inner Surface. In many parts these Fibres run in a variety of directions, and decussate each other at different angles.

The Dura Mater *adheres* every where to the Surface of the Cranium, in the same manner as the Periosteum adheres to the Bones in the other parts of the Body; but it is more firmly connected at the Sutures and Foramina than elsewhere; and so much more firmly in Children than in Adults, that in separating it from the Cranium, it is apt to bring along with it some of the Fibres of the Bone to which it is attached.—In the Adult, the separation of the Bone from the Membrane is less difficult, in consequence of many of the Fibres being obliterated.

The *inner Surface* of the Dura Mater, which is remarkably smooth, is in *close contact* with the Brain, but *adheres only* where the Veins go into the Sinuses,—and is lubricated by a Fluid discharged through its Vessels, which guards the Brain from danger, according as it may be affected by the different states of Respiration.

The Dura Mater serves as a *defence* to the Brain, and supplies the place of a *Periosteum* to the inside of the Bones of the Cranium, giving nourishment to them,—as is evident from numerous drops of blood which appear after removing the Skull-cap.

From the inner side of the Dura Mater, *Processes* are sent off, which divide the Brain into certain parts, and serve to keep it steady, *viz.*

I. The Falx, *Superior Longitudinal Process*, or *Septum Cerebri*, which is formed by a doubling of the Dura Mater, and is situated between the Hemispheres of the Brain.

It *begins* at the middle of the Sphenoid, and Crista Galli of the Ethmoid Bone, and runs along the upper and middle part of the Head, adhering first to the Fron-

tal, then to the joining of the Parietal, and afterwards to the middle of the Occipital Bone.

In its passage it becomes gradually broader, extends from the Cranium to near the Corpus Callosum, and terminates behind in the middle of the Tentorium.

It runs from behind forwards in a straight direction, and has some resemblance in shape to a *Sickle* or *Scythe*, from which circumstance it has obtained the name of *Falx*.

Between the under edge of the Falx and Base of the Cranium, there is a *large Space, of an oval form*, occupied by that part of the Brain which is common to the two Hemispheres.

The Falx supports the Tentorium, and prevents the two sides of the Brain from pressing upon each other.

II. The TENTORIUM CEREBELLI, or *Transverse Septum*, or *Lateral Processes* of the Dura Mater.

The *Tentorium* is continued laterally from the Falx, is connected behind to the inner Transverse Ridges and Grooves of the Occipital Bone, and at the fore and outer Edges, to the Ridges and great Angles of the Temporal Bones, and terminates at the Posterior Clinoid Process of the Sphenoid Bone.

Between the middle and inner edges of the Tentorium and Posterior Clinoid Process of the Sphenoid Bone, there is a large *Notch*, or *Foramen Ovale*, where the Brain and Cerebellum are united, or where the Tuber Annulare is chiefly situated.

The Tentorium keeps the Falx *tense* and forms a *floor* or *vault* over the Cerebellum, which prevents the Brain from pressing upon it.

III. The FALX MINOR, or *Septum Cerebelli*, which is placed between the Lobes of the Cerebellum. It descends from the under and back-part of the Falx in the middle of the Tentorium, adheres to the inferior Longitudinal Spine of the Os Occipitis, and terminates insensibly at the edge of the Foramen Magnum of that Bone.

Besides the Processes of the Dura Mater already described, there are four of inferior consideration, two of which are situated at the sides of the Sella Turcica and two at the edges of the Foramina Lacera.

Several other Processes pass out at the different open-

ings of the Cranium, to be connected to the Pericranium, or to accompany the Spinal Marrow and Nerves :— These of the last description shall be afterwards taken notice of.

The *Arteries* of the Dura Mater are derived partly from the external Carotids, and partly from the internal Carotids and Vertebrals.

The *Veins* of this Membrane are of two kinds. One set of them, like the Veins in other parts of the Body accompany the Arteries ;—the others are termed *Sinuses* and differ from Veins only in this, that they are of a triangular figure, and inclosed in a doubling of the Dura Mater, which is so tense over them, as to become affected in consequence of the pressure from surrounding parts.

In the bottom of the Sinuses are *small Transverse Chords* termed *Chordæ* WILISII, which may add a little to their strength, and assist in preventing them from being too much distended.

The Sinuses serve to carry the blood from the Brain, and convey it to the Veins of the Neck, for which purpose they are properly fitted, their covering from the Dura Mater giving them strength, and their frequent communications preventing congestion.

The Principal SINUSES *are,*

I. The *Superior Longitudinal Sinus*, which begins at the Crista Galli of the Ethmoid Bone, runs along the upper edge of the Falx, becomes gradually larger in its progress, and terminates in the Lateral Sinuses.

II. The *Torcular Herophili*, or *fourth Sinus* of the Ancients ; the term *Torcular* is applied to it from the supposition that the blood is squeezed in that Sinus as in a Wine press.—It is chiefly formed of the Vena Galeni, runs between the Falx and Tentorium, and terminates with the former Sinus in the beginning of the Lateral Sinuses.

III. The two *Lateral Sinuses*, which are formed by the Longitudinal and Torcular Sinuses, run in depressions of the Occipital and Temporal Bones, first transversely, then in a winding direction downwards, and terminate at the Base of the Cranium, in the beginning of the Internal Jugular Veins.

Besides the Sinuses mentioned above, several others of less consideration will be pointed out in the particular description of the Veins.

The *Nerves* of the Dura Mater are so very minute, that they have not as yet been distinctly traced, and it is found to possess very little sensibility in the sound state.

Upon the side of the superior longitudinal Sinus, and contiguous parts of the Brain, there are *numerous small Granulations*, of a *whitish* colour, called *Glandulæ Pachioni*

Besides the Granulations, there are others of the same name, of a *Fleshy* colour, situated on certain parts of the outer surface of the Dura Mater, and frequently projecting so much as to form deep pits in the Scull.

The nature of these Granulations is still unknown.—By some they have been supposed to belong to the Lymphatic System.

The *Tunica Arachnoidea*, named from its cob-web appearance, is an exceedingly thin, tender, and transparent membrane, in which no vessels have been hitherto observed.

It is spread uniformly over the surface of the Brain, inclosing all its Convolutions, without insinuating itself between any of them.

At the upper part of the Brain, it adheres so closely to the subjacent Coat by fine Cellular Substance, that it can scarcely be separated from it; but in different parts of the Base of the Brain, particularly about the Tuber Annulare and Medulla Oblongata, it is merely in contact with the Membrane under it, and may readily be raised from it by the assistance of the Blow-pipe.

The Tunica Arachnoidea, like the Cuticle, covers and defends the parts under it.

The *Pia Mater*, named from its tenderness, is somewhat of the nature of the former covering, but is extremely Vascular.

It covers the Brain in general, enters double between all its Convolutions, and lines the different Cavities called Ventricles.

It serves to contain and support the Vessels of the Brain, and allows them to divide into such minute parts, as to prevent the Blood from entering the tender substance of this Viscus with too great force.

The *Arteries* of the Pia Mater, are the same with those of the Brain, and are derived from the Internal Carotids and Vertebrals.

The *Veins* differ in no respect from those of the other Viscera, excepting in this, that they do not accompany the Arteries.

The Brain is divided into *Cerebrum, Cerebellum, Tuber Annulare* and *Medulla Oblongata.*

Cerebrum.

The *Cerebrum* is situated in the upper part of the Cranium, which it completely fills.

It is divided into two halves, termed *Hemispheres,* which are separated from each other by the Falx.

Each of the Hemispheres is of an *oval form,* or they somewhat resemble an egg cut into two longitudinal halves. The inner sides are flat, the upper and outer parts convex, and the under Surface irregular.

The under Surface is divided into *two Anterior, two Lateral,* and *two Posterior Lobes,* or *Processes.*

The *Anterior Lobes* are situated in the fore-part of the Base of the Cranium.

The *Lateral* or *Middle lobes,* are lodged in the Fossæ formed by the Temporal and Sphenoid Bones.

The *Posterior Lobes* are placed over the Cerebellum, and are separated from it by the Tentorium

Between the Anterior and Lateral Lobes, there is a *Furrow* formed by the Anterior Clinoid Processes of the Sphenoid Bone, which has been termed *Fossa,* or *Fissura Magna* Sylvii.

The Surface of the Brain is divided into many turnings or windings, termed *Circumvolutions,* which run in various directions, and are of different sizes and lengths on different parts of the Brain.

The Circumvolutions are every where connected to the Pia Mater by an infinite number of small Vessels, —called by Ruysch, *Tomentum Cerebri*—which run into the substance of the Brain ; as may be readily seen, upon separating the Circumvolutions a little from each other.

Between the Hemispheres a white Substance is observed, called *Corpus Callosum,* from its being a little firmer than the rest of the Brain.—It goes across the

Brain, under the Falx, and is merely a continuation of Medullary Substance, running horizontally, and joining the two sides of the Hemispheres to each other.

In the middle of the Corpus Callosum there is a longitudinal *Raphe*, with a Medullary Cord on each side, from which many transverse streaks issue. These Cords, like the Corpus Callosum itself, become gradually broader towards the posterior extremity.

An horizontal Section, a little above the middle height of the Brain, or upon a level with the Corpus Callosum, shews the division of the Substance of the Brain into outer or inner, or *Cortical* and *Medullary* parts.

The outer Substance is termed *Cineritious*, from its being of a *greyish* or *ash* colour,—though a little tinged with brown ;—and *Cortical*, from its *surrounding* the inner part of the Brain, as the Bark does the Pith of a Tree.

It is termed by some Authors Glandular, and by others *Secretory*, from a supposition that a Fluid was secreted in it.

The *Cineritious Substance* covers the Brain in general, and enters deep between its Convolutions, of a soft consistence, and composed of numerous small Vessels carrying red Blood ; but it is uniform, and without any appearance of a Fibrous texture.

The inner Substance is termed *White* or *Medullary*, and is considered as giving origin to the different Nerves. It has been by some called *Excretory*, having been supposed to be formed of hollow Tubes continued from the Vessels of the Cortical part ;—but no Cavities have ever been observed in the soft Fibres of which it is composed.

It is greater in quantity, and somewhat firmer in texture, than the Cineritious Substance, and is so intimately connected as to appear to be a continuation of it.—The soft Fibres or streaks of the Medullary Matter, run in general in a parallel and transverse direction.

In many parts of the Cineritious Substance, Medullary Matter appears ; and, on the contrary, in different parts of the Medullary Substance, Cineritious Matter is found ; the two being frequently blended together in the form of streaks. *See* MONRO *on Nervous System.*

The *Centrum Ovale* of *Vieussens*. This is the Medullary Substance of the Brain, forming a kind of Nucleus, which is seen after removing the Cineritious Substance, and all the Medullary parts mixed with it, which lie between the Cortical Convolutions.

To obtain a proper view of the Centrum Ovale, the Nucleus ought to be cut in such a manner as to preserve the Corpus Callosum, and the same convexity with that of the general convexity of the Brain.

The Centrum Ovale forms an *arch* or *roof* over the two Lateral Ventricles; and the under part of this roof which is smooth and uniform, constitutes the upper part of these Ventricles.

Vieussens considered the Centrum Ovale as the *great Dispensatory of the Animal Spirits.*

The *Ventricles* of the Brain are four in number, two of which are called *Lateral.*

The four Ventricles have their sides contiguous to each other, are chiefly formed of Medullary Matter, and are lined with a continuation of the Pia Mater, which differs from that covering the exterior surface of the Brain, in having fewer vessels dispersed upon it.

They are constantly moistened by a Fluid, which prevents their opposite sides from adhering to each other.

The *use* of the Ventricles, like many other parts of the Brain, is still unknown.

The *Lateral,* formerly called *Superior Ventricles,* are situated in the Hemispheres, one in each, and run horizontally in the same direction with the Hemispheres themselves.

They are of an irregular form, lying under the Centrum Ovale, and have each three winding corners, compared to Ram's Horns, which are therefore called *Cornua.*

The *Anterior Cornua* are separated only by the Septum Lucidum.

The *Posterior Cornua,* called also *Digital Cavities,* are at a considerable distance from each other, but approach nearer at their pointed extremities; while the *inferior Cornua,* the beginning of which is seen, run downwards and forwards, and terminate in the Lateral Lobes of the Brain.

In each of the Posterior Cornua there is an Elongation, which terminates in a point, and is called *Ergo*, by the French, from its resemblance to the Spur of a Cock ; or *Hippocampus Minor*, from its similarity to, and connection with, the substance termed *Hippocampus Major*.

In the fore-part of the bottom of the Lateral Ventricles, are two large Eminences, called *Corpora Striata*, which become gradually narrower, and recede from each other at their posterior extremities.

The *Structure* of these is Cineritious externally, and mixed with Medullary Striæ within, some of which form large Transverse Medullary Arches, and others run more in a straight direction.

Between the posterior parts of the Corpora Striata, are situated the *Thalami Nervorum Opticorum*, which have a roundish form and Medullary Surface, and are of a Striated appearance within, but the Striæ are less distinct than in the Corpora Striata.

Upon the Surface of these Bodies, there are small *Eminences* or *Tubercles*, some of which are placed upon their superior, and others upon their inferior extremities.

The inner parts of the Thalami are flat and contiguous, and above they are so closely connected as to form one continued Surface, called *Commissuri Mollis* of the Optic Thalami

The posterior parts of the Thalami turn downwards and outwards, after which they are elongated, to form the two white Cords, called *Tractus Optici*.

In the Groove between the Corpora Striata and Thalami, there is a Medullary Band on each side, called *Centrum Semicirculare Geminum of* VIEUSSENS, or *Tænia Semicircularis of* HALLER, or simply *Tænia*.

Over the Thalami is placed the *Choroid Plexus*,—named from its being composed of a Chorus of Vessels and Membranes. It is a fine Vascular Web, consiting of small ramifications of Arteries and Veins, connected by the Pia Mater, and spread upon the Surface of the Thalami, and some of the adjacent parts.

The Choroid Plexus frequently contains numerous round *Globules*, resembling Hydatids which have been considered by some Authors as Lymphatic Glands.

Under the Raphe of the Corpus Callosum, is placed the *Septum Lucidum*, which, when viewed laterally, is observed to be broad before, curved at its edge, and to become gradually narrower towards its posterior extremity.

It is connected above to the Corpus Callosum, below to the Fornix, and forms a distinct partition between the lateral Ventricles.

It is formed of two Cineritious and Medullary *Laminæ*, more or less separated from each other at their fore-part, by a small Cavity, called *Fissure*, or *Fossa* of SYLVIUS, or *Sinus* of the Septum Lucidum, which, however, does not communicate with the Lateral Ventricles, though in some subjects it reaches a considerable way backwards, and, as well as the other Cavities of the Brain, has been found full of water in Hydrocephalous cases.

Under the Septum Lucidum is placed the Substance which has been compared in shape to a *Vault* by the Ancients, and from that has obtained the name of *Fornix*.

The *Fornix* is merely a continuation of the Corpus Callosum, and forms a sort of hollow Ceiling, with four *Pillars* called *Crura*, or *Cornua*, from their winding direction, of which there are two anterior and two posterior.

The *two Anterior Crura* are short, run close together, and become enlarged at their inferior parts The *two Posterior Crura* are long, considerably distant from each other, and form Curvatures which correspond with the course of the Inferior Cornua of the Lateral Ventricles.

That part of the Crura Fornicis lying in the Inferior Cornua of these Ventricles, forms thin borders, getting the name of *Corpora Fimbriata*; but, according to the VIC D'AZYR, they are more properly termed *Tænia Hippocampi*, from being united with the great Hippocampus.

The body of the FORNIX is *narrow* anteriorly, and becomes considerably *broader* behind, where it is incorporated with the Corpus Callosum.

The under Surface of the posterior part of the body of the Fornix, is impressed with numerous transverse

and oblique Lines, which have been called *Psalterium*, or *Lyra*, from some resemblance they bear to the ancient musical instruments of these names.

The body of the Fornix is joined above to the Septum Lucidum : below it is connected to the Thalami Optici, by a Vascular Membrane, called *Tela Choroidea*, which spreads over the Thalami, and unites the Choroid Plexus of the Lateral Ventricles.

The *Pedes Hippocampi*, *Great Hippocampus*, or *Cornua Ammonis*,—named from a supposed resemblance to these parts,—are two Medullary Eminences, which arise from the sides of the posterior extremity of the Corpus Callosum, and are situated in the inferior Prolongations of the Lateral Ventricles.

They run through the whole extent of the Prolongations, first behind, then at the outer part of the posterior pillars of the Fornix, and are so intimately connected with them, that they have been considered by some Authors as forming part of the Pillars themselves.

They are small at their origin, from which they continue to increase to their farther extremity.

Like the greater part of the Ventricles, they are covered externally with a Medullary Lamina ;—internally they are found to consist of Medullary and Cineritious Laminæ, of a convoluted appearance.

At the inner edge of the Pedis Hippocampi, there is a *plaited*, *serrated*, or *indented Margin*, which, in the generality of Quadrupeds, is much larger, in proportion to the size of the Brain, than it is in Man.—The resemblance, however, to the human kind, in the structure of this particular part of the Brain, is more striking in the Ape than in any other Quadruped.

In the bottom of the Lateral Ventricles, behind the anterior Crura of the Fornix, and before the meeting of the Choroid Plexuses of these Ventricles, below the anterior part of the body of the Fornix, and over the fore-part of the third Ventricle, there is a Hole, of an *oval form*, by which the Lateral Ventricles communicate freely with each other. *See* Monro's *Obs. on Nerv. Syst.* 1783, and *Treatise on the Brain*, 1797.

After dividing and turning back the Fornix, another communication from the above passage is found, called *Foramen Commune Anterius*, *Vulva*, or *Iter ad Infundi-*

bulum; but properly, *Iter ad Tertium Ventriculum*, or Passage to the third Ventricle.

Between the Commissura Mollis of the Optic Thalami, and Substance called Pineal Gland, there is a small passage termed *Anus*, or *Foramen Commune Posterius*, which has been supposed by some Authors to form a communication between the back-part of the third Ventricle and Lateral Ventricles; but it is completely shut up by the Tela Choroidea, and also by the Fornix, which adheres closely to this membrane.

The *Third Ventricle* is in form of a deep Fissure, placed between the inner ends of the Thalami Optici, having the Commissura Mollis of these Thalami situated above, and the Crura Cerebri below, and the bodes of the Thalami on each side.

The *Infundibulum* is a passage of considerable size, of a Cineritious and Medullary structure, which leads downwards and forwards, gradually contracting, and becoming solid at its under end, where it terminates in the *Glandula Pituitaria*, and thus, contrary to the opinion of the Ancients, preventing the passage of any Pituitous Fluid from it to the Nose.

The *Glandula Pituitaria* is of an oval form, about the size of a Field-bean, lodged in the Sella Turcica, and surrounded by a doubling of the Dura Mater.

On the outside it is of a brownish colour, being formed of Cineritious Matter; it is whiter within, where it is mixed with Medullary Substance.

The Glandula Pituitaria was formerly supposed to absorb a Fluid from the Infundibulum, and transmit it to the Nose. It has been already mentioned, however, that the Infundibulum is impervious; and the real use of this Gland, as well as of the other Tubercles of the Brain, seems still unknown.

At the fore-part of the third Ventricle, and immediately before the Anterior Crura of the Fornix, there is a white Medullary Cord, which runs transversely through the Corpora Striata, and has the name of *Commissura Cerebri Anterior*.

At the back-part of the third Ventricle, and under the root of the Pineal Gland, there is another Cord similar to the former, but shorter, called *Commissura Cerebri Posterior*. The *Commissuræ Cerebri* assist in uni-

ting the two sides of the Brain to which they are fixed.

From the under and back-part of the third Ventricle, there is a Passage which leads to the fourth, under the name of *Iter ad Quartum Ventriculum Canalis Medius*, or *Aquæductus Sylvii*.

After the posterior part of the Fornix, and the Tela Choroidea to which it adheres, have been removed, there appears at the back-part of the third Ventricle, behind the Thalami, and over the Iter a Tertio ad Quartum Ventriculum, the *Nates* and *Testes*, or *Tubercula Quadrigemina*, and *Pineal Gland*.

The *Nates*, or *Tubercula Quadrigemina Anteriora*, are placed uppermost, and are of a rounder form than the *Testes*, or *Tubercula Quadrigemina Posteriora*,—which lie immediately below the former.—The Testes are broader from one side to the other than from top to bottom, and of a white colour.

A longitudinal Section shews the Tubercula to be covered externally with a thin Medullary Lamina, and to be Cineritious within.

In Man they are more nearly of an equal size than in Quadrupeds, as in the Ox, Sheep, &c. in which the Nates are large, round, and of a brown colour, and the Testes small and long.

Over the *Nates* and under the back-part of the *Fornix* is placed a small body, of a Cineritious nature, about the size of a Garden-Pea, and of a Conoid figure, called *Glandula Pinealis*, from its resemblance in shape to a *Pine* or *Fir Cone*.

In consequence of being always present, and seldom found in a diseased state, it has been celebrated by Des Cartes, as being, according to his supposition, the *Seat of the Soul*.

The *Pineal Gland* is fixed at its root to the Commissura Cerebri Posterior, and sends out *two long Medullary Peduncles*, or *Foot-stalks* to be fixed to the upper and inner side of the Thalami and to the anterior Crura of the Fornix.

Near, or in the Substance of the Pineal Gland, small Calcareous Concretions are sometimes found, called by Soemmering, *Acervulus Cerebri*, from their being generally found collected in a heap.

They do not appear to be the effects of disease; nor are they met with till after the age of Puberty.

Cerebellum.

The *Cerebellum* is situated in the inferior Fossæ of the Occipital Bone, under the Posterior Lobes of the Brain, and is separated from these Lobes by the Tentorium.

It is somewhat of a roundish form, though a little broader from one side to the other than from before backwards. It is only about a fifth or sixth part of the size of the Cerebrum, and much simpler.

It is divided behind by the Falx Minor into two Lobes or Hemispheres, but has no separation above like the Brain.

Its Surface is divided into numerous Circumvolutions, which form arches, decussating each other in many parts, at sharp angles.

The Circumvolutions run chiefly in a Lateral direction, and are formed of Laminæ, with deep Sulci between them, into which as in the Brain, the Pia Mater insinuates itself, which may be readily seen by making a puncture into the Arachnoid Coat, and blowing in air till it distend the Cellular Substance, and separate the Coats from each other.

It has two middle Eminences, called *Appendices Vermiformes*, from their resemblance to Earth-worms, one of which is situated anteriorly and superiorly, the other inferiorly and posteriorly.

Each of the Lobes of the Cerebellum is again divided into *Monticuli* or *Lobules*, which have different names according to their relative situations, connections with other parts, &c. They vary a little in the different Subjects, but are best distinguished from the direction of their Convolutions.

The Substance of the Cerebellum consists of Cineritious and Medullary Matter, as in the Cerebrum; but the Cineritious bears a greater proportion to the Medullary in the former than in the latter.

When the Cerebellum is cut in a vertical direction, the Medullary part is then found to bear a striking resemblance to the branching of the shrub called *Arbor Vitæ*, from which circumstance it has obtained the name of this shrub.

When cut in slices nearly parallel to the Base of the Brain, the Medullary Substance appears in Laminæ,

corresponding to those of the Surface of the Cerebellum; and when cut to a considerable depth, there is a Centrum Medullare uniting the Lateral Lobes as in the Brain.

Between the Cerebellum; the under part of the Tuber Annulare, and upper part of the Medulla Oblongata, the *Fourth Ventricle* is situated, which extends from the Eminences called *Testes* to the posterior inferior Notch of the Cerebellum.

A little lower than the Testes, the Ventricle becomes wider, and forms an angle behind, from which again it contracts, and becoming narrower and pointed below like a writing pen, is called *Calamus Scriptorious.*

Over the under end of the Aquæductus Sylvii, and upper part of the fourth Ventricle, there is a thin Medullary Lamina, called *Valvula*, but properly *Velum Vieussenii.*

At the sides of the Velum Vieussenii there are two Medullary tracts, called *Processus ad Testes*, or *Columnæ Valvulæ Vieussenii.*

The under end of the Ventricle is found to be shut up by its Choroid Plexus, which prevents any communication between this cavity and that of the Spine.

UNDER SURFACE OF THE BRAIN.

Near the middle of the Base of the Brain, and between its Lateral Lobes there are two small, round, white bodies, termed *Eminentiæ Mammilares*, or *Corpora Albicantia*, Medullary without, Cineritious within, mistaken by some Authors for Glands.

In the Corpora Albicantia, various Medullary *Strata* terminate, which come from different parts of the Brain.

Immediately before the Corpora Albicantia, two large white cords are observed, called *Crura*, or *Pedunculi Cerebri*, or *Crura Anteriora Medullæ Oblongatæ*, which arise from the Medullary Substance of the Brain, and gradually approach each other in their course, till they unite with the Tuber Annulare.

Their Surface is flat, and composed of distinct Medullary Fibres; internally they are composed of a Mixture of Cineritious and Medullary Matter, the former of which being of a darker colour at one particular part

than in any other of the Brain, has been termed *Locus Niger Crurum Cerebri.*

Between the Crura Cerebri and Corpora Albicantia, there is a Cineritious Substance, called *Pons Tarini*, which joins these two bodies of the opposite sides together, and assists in forming the bottom of the third Ventricle.

From the Medullary part of the Cerebellum, which forms the Trunk of the Arbor Vitæ two white cords arise, under the name of *Crura Cerebelli* or *Crura Posteriora*, or *Pedunculi Cerebelli*, which unite with the Crura Cerebri, to compose the *Tuber Annulare*, or *Pons Varolii*, so named from forming a Ring or Bridge over the Crura. This ring is intimately incorporated with, and formed by these Crura.

The *Tuber Annulare* is situated over the back-part of the body of the Sphenoid and Cuneiform Process of the Occipital Bone. Many transverse streaks run on its Surface, and it is divided into two lateral parts by a longitudinal depression, occasioned by the situation of the Vertebral Artery.

At the fore and back parts of the Tuber, are the *Foramina Cæca Anterius et Posterius*, the former placed between the third, and the latter between the sixth Pair of Nerves: These two Foramina penetrate only a little way at the edges of the Tuber, and receive a Plexus of Vessels.

In the Substance of the Tuber, there is much Cortical Matter, which is formed into *Striæ*, running in different directions.

Continued from the Tuber, there is a large Substance in form of an inverted Cone, which extends to the Foramen Magnum of the Occipital Bone, under the name of *Medulla Oblongata.*

Upon the Surface of the Medulla Oblongata, two small Eminences appear, which run longitudinally and contiguous to each other, and from their shape have the name of *Corpora Pyramidalia*, or *Eminentæ Pyramidales.*

Between the Corpora Pyramidalia, there is a deep Fissure, into which the Pia Mater penetrates, and where Blood vessels pass into the interior part of the Medulla.

At the outside of the former Eminences, are two o-

thers, somewhat of the form of Olives, from which they are termed *Corpora Olivaria*, or *Eminentæ Olivares*.

More externally than these, are two other Eminences, less evident than the former, which have been described by some Authors by the name of *Corpora Pyramidalia Lateralia*.

The Medulla Oblongata is divided into two lateral portions, by an anterior and posterior Fissure, and the two portions are formed of Medullary Matter without and a large proportion of Cineritious Matter internally, and joined together by Medullary Fibres.

The BRAIN is the *Grand and Primary Organ of Sense*, with which the mind is supposed to be most immediately and intimately connected, and from which the Nervous Influence is found, by experiment, to be communicated to all the other parts of the Body.

Origin of the Nerves.

The Nerves arise from the Medullary parts of the Brain, some in solid Cords, others in separate Threads which afterwards unite into Cords; and have their name in numerical succession, according to their situations, beginning anteriorly.

The *First*, or *Olfactory Pair of Nerves*, arise from the back-part of the posterior lobes of the Brain, and run towards the Crista Galli of the Ethmoid Bone, over which each forms a brownish coloured Bulb, from whence numerous small Nerves are sent off.

The *Second Pair*, or *Optic Nerves*, are the continuations of the Thalami Optici. They are united immediately before the Infundibulum, and form an intimate intermixture of parts, and again separate previous to their passing into the Orbits.

The *Third Pair* arise by numerous Threads, which are soon collected into Trunks.

The *Fourth Pair*, which are the smallest Nerves of the Body, arise behind the Testes, and have a long and winding course.

The *Fifth Pair*, which are the largest Nerves in the Brain, have each an anterior small, and a posterior large Fasciculus, which arises from the side of the Tuber Annulare.

The *Sixth Pair*, arise from the beginning of the Me-

dulla Oblongata, where it joins the Tuber Annulare. Each of the Nerves of this Pair has a small Thread at its inner part.

The *Seventh Pair* arise from the beginning of the lateral parts of the Medullary Oblongata, and are divided on each side into a *Portio Mollis*, and *Portio Dura*.

The *Eighth Pair* arise by small Fasciculi from the Corpora Olivaria.

The *Ninth Pair of Nerves* also arise by small Fasciculi, a little below the former, from the Corpora Pyramidalia.

The origin of the Nerves will be described at greater length in a subsequent part of the Volume.

OF THE EYE.

The EYES, which constitute the Organ of Vision, are situated in the Cavities of the Orbits, and are surrounded by several parts, some of which protect them from injury, and others assist in the performance of their various motions.

The *Orbits* are formed of two Cones, situated in the fore-part of the Cranium, with their Apices behind their Axes in an horizontal situation, and their Bases turned obliquely outwards.

Each of the Orbits is formed of different Processes of the following Bones, viz.

The upper part of each Orbit, by the Orbitar Plate of the Frontal Bone ;—the inferior, by the Orbitar Plates of the superior Maxillary and Malar Bones ;—the internal, chiefly by the Orbitar part of the Os Unguis and Pars Plana of the Ethmoid Bone ;—the external, by the Orbitar Plates of the Sphenoid and Malar Bones ;—the posterior, by the Sphenoid and Palate Bones ;—and the anterior edge of the Orbit, by the Frontal, superior Maxillary, and Malar Bones.

The cavities of the Orbits are lined with Productions

of the Dura Mater, which pass out at the Foramina Optica and Lacera, and, at the anterior edges of the Orbits, join the Periosteum of the Face, where they supply the place of Ligaments of the Palpebræ.

Supercilia.

The *Supercilia*, or *Eye-Brows*, which are peculiar to the Human species, are the arches of Hair situated upon the Superciliary Ridges of the Frontal Bone. The Hairs are placed obliquely, with their roots towards the Nose, and the Arches elevated a little above the rest of the Forehead, by a considerable quantity of Cellular Substance lying under the Skin.

They are moved in different directions by the action of the Frontal Corrugator, and Orbicularis Palpebrarum Muscles.

They are intended partly for ornament, and partly as shades over the eyes, thereby preventing them from being injured by extraneous Matter, or by too great a quantity of light. They also assist in expressing the passions of the Mind.

Palpebræ.

The *Palpebræ*, or *Eye-lids*, are chiefly composed of a doubling of the Skin, inclosing part of the Orbicularis Palpebrarum Muscle, and the Cartilages called *Tarsi*, and forming angles at their outer and inner extremities, termed *Canthi*, or *Corners of the Eye*.

The *Upper Eye-lid* is one which moves principally in closing or opening the Eye, the under moving only when the Eye-lids are shut with uncommon force.

The *motions* of the Eye-lids are performed by the action of the Orbicularis and Levator Palpebrarum Muscles.

The Eye-lids serve as curtains or Veils, to defend the Eyes during sleep: They likewise prevent them from being injured by extraneous objects, or by too much light. By their frequent motion they increase the secretion of the Tears, apply them properly to the Surface of the Eye, and conduct what remains, after washing the Eye, to the Puncta Larcymalia.

Tarsus.

This is a *thin Cartilaginous Arch*, situated in the edge

of each Eye-lid, that in the upper one being considerably broader than the one below, and each broader at its middle than towards its extremities.

Their edges are so placed, that when the Eye-lids are shut, a groove is left next the Eye by which the Tears are conveyed towards the Nose —They terminate at a little distance from the inner angle of the Eye.

They serve to keep the Eye-lids extended, allow them to be accurately applied to each other, and prevent them from being collected into folds.

Glandulæ Sebaceæ, *Ciliares*, or *Meibomianæ*,—the last term obtained from their being described by *Meibomius*, —are placed between the Tarsus and lining of the Eye-lids, and are formed of a series of white lines or Follicles, running in serpentine directions, which when viewed through a magnifier, appear like rows of Pearls, from which an Oily or Sebaceous Matter, resembling little worms, may be readily squeezed out through the Foramina or Puncta Cilaria, placed upon the edges of the Eye-lids.

The Matter of the Sebaceous Glands facilitates the motion of the Eye-lids, and prevents their accretion during sleep.

Cilia.

The *Cilia*, or *Eye-lashes*, are stiff Hairs placed in the edges of the Eye-lids. Those of the upper Eye-lid are bent upwards, and are considerably longer than those of the under Eye-lid, which are bent in the opposite direction. In both Eye-lids, they are a wanting near the inner Angle.

The Cilia prevent dust, insects, &c. from getting into the Eye, and assist in moderating the quantity of light sent into it, and add to the beauty of the Face.

Glandula Lacrymalis.

The *Glandula Lacrymalis*, called, till of late years, the *Glandula Innominata* GALENI, is situated upon the upper and outer part of the Eye, in a hollow behind the outer end of the Superciliary Ridge of the Frontal Bone. It is a Gland of the Conglomerate kind, of a yellowish colour, of an oblong form, and a little flatted, with one end pointing to the Nose, the other to the outer angle of the Eye.

Besides this, their is a chain of *Smaller Glands*, lying between the principal Gland and upper Eye-lid, and connecting them together.

In the direction of the Smaller Glands, there are several Excretory Ducts,—described by Dr. Monro, 1758,—which run nearly parallel to, but do not communicate with each other.

The Excretory Ducts, on account of their smallness, are not often seen, and are difficult of injection. They terminate on the inner side of the upper Eye-lid, near the outer angle of the Eye, and upper edge of the Tarsus.

The *use* of this Gland is to secrete the Tears, which are spread over the Surface of the Eye by their own weight, and by the motion of the Eye-lids, for the purpose of preserving the delicacy of the Eye, and particularly the transparency of the Cornea.

Puncta Lacrymalia.

The *Puncta Lacrymalia* are two small Orifices placed near the inner angle of the Eye, one in the upper, the other in the under Eye-lid, at the extremity of the Tarsus, and opposite to each other.

Each Punctum is seated obliquely upon a small eminence, and is surrounded with a Cartilaginous Circle, which keeps it constantly open.

The Puncta Lacrymalia are the Orifices of two small canals which run in the direction of the edges of the eye-lids towards the side of the Nose, where they approach each other, and terminate together in the Lacrymal Sac.

The Tears which remain after moistening the Eye are absorbed by the Puncta, after the manner of Capillary attraction, and are conveyed through their Ducts into the Lacrymal Sac by the impulse of the Eye-lids.

Caruncula Lacrymalis.

The *Caruncula Lacrymalis* is a small Gland of a reddish colour of the Conglomerate kind, situated between the inner angle of the eye-lids and Ball of the eye, which supplies Sebaceous Matter to this part of the eye-lids and serves in particular to separate the Puncta Lacrymalia, and to direct the Tears to them while the eye-lids are shut.

Minute Hairs are found upon the Surface of this Body, serving to entangle objects which get into the eye.

Valvula Semilunaris.

The *Valvula Semilunaris* is a small doubling of the Tunica Conjunctiva, which lies between the Caruncula Lacrymalis and Ball of the eye.

It is larger in the Ape and other Quadrupeds than in the Human species, and still larger in Birds, in which, as well as in Quadrupeds, it is called *Membrana Nictitans.*

It is in form of a Crescent, the horns of which are turned towards the Puncta Lacrymalia, and assists the Caruncula in conducting the Tears to the Puncta.

THE BALL OF THE EYE.

The *Ball, Globe,* or *Bulb* of the eye, is of a spherical form to collect the rays of light into a proper Focus, and is surrounded behind by a quantity of soft Fat, to allow the eye and its Muscles to move with facility.

The Ball of the eye is composed of *Coats, Humours, Vessels,* and *Nerves,* to be next described.

COATS.

Tunika Adnata.

The *Tunica Adnata,* or *Conjunctiva,* named from its connecting the eye to the Orbit, is a reflection of the Skin continued from the eye-lids over the whole forepart of the Ball of the eye.

It adheres slightly, by means of Cellular Substance, to the White of the eye, but so firmly to the Cornea, as to be separated from it with difficulty.

It is so remarkably thin, that the colour of the subjacent parts shine readily through it.

Between this Coat and the white part of the eye, there is a quantity of loose Cellular Substance, which is very Vascular, and is the common seat of *Ophthalmia.*

The Tunica Adnata supports the Ball of the eye, prevents extraneous bodies from getting to the backpart of it, and forms a smooth covering to lessen the friction between the eye and eye-lids.

Cornea.

The *Cornea,* so called from its resemblance to Horn,

is termed by many Authors *Cornea Lucida*, to distinguish it from the Sclerotica, named *Cornea Opaca*.

It forms the anterior Pellucid Covering of the eye, is more convex than the rest of the Ball, and is joined to the Tunica Sclerotica, like the Segment of a small Sphere to that of a larger one. The convexity, however, varies in different persons, so as to form a short or long sighted Eye, according as the Cornea is more or less prominent.

In a recent subject, it is hard dense, and transparent; but after maceration in water, it becomes soft and opaque, and may be readily separated, especially in young Animals into a different Lamellæ, the anterior of which is the continuation of the Tunica Adnata.

By a slight degree of putrefaction, it may also be separated from the Tunica Sclerotica.

In the Whale, the edge of the Cornea is received into a distinct Groove formed by the Sclerotica.

In a sound state, it has no Vessels which carry red Blood, though such are frequently seen on it when the Eye is inflamed.

Its nerves are too small to be traced; yet it possesses exquisite sensibility.

It collects the rays of light, and transmits them to the Eye, protects the tender parts within it, and contains the Aqueous Humour.

Iris.

The *Iris*, which is named from being in some persons of different colours, is the only Coat which possesses motion. It was considered as a continuation of the Choroid Coat, until described by Zinn, who shews that it is only connected to this Coat by the medium of the Ciliary Circle.

It is placed at a little distance from the Cornea, begins a small way behind the junction of that Coat with the Sclerotica, and running across, it forms a Septum, a little convex anteriorly and perforated in the middle by a Hole, called the Pupil, or sight of the Eye.

The term *Pupil* is applied, because it represents objects no larger than a Pupilla or Puppet.

In the Fœtus, the Pupil is covered with a Vascular Membrane, termed *Membrana Pupillaris*, which gene-

rally disappears between the seventh and ninth month of gestation.

Upon the back-part of the Iris, there is a dark-coloured Pigment, considered by the Ancients as a posterior Layer of the Iris, called by them *Uvea*, from its resemblance in colour to the Grape.

When the Paint is washed off, the Iris exhibits two sets of Fibres,—concerning which Authors have entertained various opinions,—one in the form of Radii, the different colours of which give the diversity of colour to the Eye; the other circular, and surrounding the inner edge of the Iris, and considered by Dr. MONRO as the Sphincter Muscle of the Pupil.

The Iris has also many Blood-vessels, which can be readily injected; and has a greater portion of Nerves than almost any other part of the Body.

It floats in the Aqueous Humour, and is of such a nature, that upon exposure to a strong light, or when the Eye looks upon a near object, the diameter of the Pupil is diminished; and vice versa.

The different motions of the Iris are supposed to be excited by the sensibility of the Retina, and the quantity of light falling upon that Nerve.

The Iris serves to regulate the quantity of light sent to the bottom of the Eye.

Tunica Sclerotica.

The *Tunica Sclerotica*, which is named from its hardness, is the largest and strongest Coat of the Eye, covering the whole Ball, excepting the parts occupied by the entrance of the Optic Nerve behind, and by the Cornea before.

It is so firmly fixed to the edge of the Cornea, as to have been considered by many Anatomists as a continuation of the same substance; but it differs from the Cornea in the following particulars; it is of a pure white colour, is formed of Fibres running in every direction, and closely interwoven with each other, is not divisible into Layers, and may be separated from it by art, as has been already mentioned.

It is thickest posteriorly, and receives a little tinge on the inner Surface, from the Choroid Coat, with which it is in contact.

It gives form and strength to the Eye, and supports the tender parts within it.

The Tendons of the four Recti Muscles of the Eye are fixed to the fore-part of the Tunica Sclerotica; and these, or the Cellular Vaginæ covering them, have been supposed to give an additional whiteness to the eye; and the part giving this whiteness has been termed *Tunica Albuginea*:—But the Sclerotic Coat is every where of a pure white, and can receive little additional brightness from any such covering.

Tunica Choroides.

This Coat derives its name from the Vessels with which it abounds, forming a *Chorus*; or from its supposed resemblance to the Membrane called *Chorion*, which surrounds the Fœtus in Utero.

The *Choroides* lies under the *Sclerotica*, and is connected to it by the Trunks of Vessels and Nerves which pass from the one Coat to the other, and also by a tender Cellular Substance, of a brown colour, with which the inner Surface of the Sclerotica is tinged.

It begins at the entrance of the Optic Nerve into the eye, runs between the Sclerotica and Retina, nearly to the Crystaline Lens, where it is more firmly connected to the Sclerotic Coat than it is elsewhere, by means of the Ciliary Circle.

The *Ciliary Circle*, or *Ciliary Ligament*, as it is called, is composed of a quantity of condensed shining Cellular Substance, which forms a white Ring connecting the fore-part of the Choroides, and the root or outer Margin of the Iris, to the Sclerotica.

The Choroid Coat is much thinner and more tender than the Sclerotic, and is one of the most Vascular parts of the Body, seeming at first sight to be entirely composed of Vessels.—The greater number of those on the outside run in whirls: while those on the inside, running nearly parallel to each other, gave rise to the supposed existence of the *Membrana Ruyschiana*.

It is also furnished with numerous Nerves, which are united with its Vessels by a fine Cellular Texture.

In the human eye, the Choroides is of a dusky brown colour, both externally and internally; but the colour varies considerably in the eyes of different animals.

The inner Surface of this Coat, which is *Villous*, was described by RUYSCH as a *Distinct Lamina*, and has been termed by many Anatomists *Tunica Ruyschiana*; HALLER however, and ZINN, and many others who followed them, have demonstrated this Coat to consist of only one Lamina; though in Sheep, and in some other animals, it appears to be double.

Upon the inner side of the Choroides, there is a dark coloured Mucus, called *Pigmentum Nigrum* —supposed to be produced from the vessels of this Coat,—which is blackest and thickest at the fore-part of the eye, where it adheres so tenaciously as to be removed with difficulty; but behind it is thinner, more fluid, and more easily removed: becoming gradually less evident, and almost disappearing round the Optic Nerve.

In advanced age, the Pigmentum Nigrum becomes more diluted, and of a lighter colour; so that the Vessels of the Choroid coat may be seen shining through the Vitreous Humour.

Though HALLER denies that the *Membrana Ruyschiana* can ever be separated, in the Human Eye, from the Choroides —he retains the name, to denote the black Surface of this Coat.

In grameniverous animals, in fishes, and in those animals which go in quest of prey in the night, the Paint is of a light and shining colour in the bottom of the eye, and is called *Tapetum*.—In an entirely white Rabbit, the Paint is a wanting, and the eye has a red colour from the Vessels of the Choroid coat; but the redness disappears when the animal is dead.

At the fore-part of the Choroid coat, and opposite to the Ciliary circle, there is a black radiated Ring, called *Corpus Ciliare*, which is about the sixth part of an inch in breadth towards the Temple, but somewhat narrower towards the Nose.

In the posterior portion of the Corpus ciliare, there are numerous pale radiated *Ciliary Striæ*, but so covered with the Pigmentum Nigrum, as not to be distinctly seen till the Paint is removed.

Near the connection of the Corpus Ciliare with the root of the Iris, these Striæ become gradually broader and more elevated, and form about twenty white *Plicæ*

or *Folds*, termed *Processus Ciliares*, the intervals of which are also covered with Pigmentum Nigrum.

The *Processus Ciliares*, which obtain their name from their resemblance to the cilia of the eye-lids, are commonly formed each of two or more Striæ, are not all of an equal size, and many of them forked at their extremities.

The Corpus Ciliare, formed of the ciliary Striæ and ciliary Processes, has no appearance of Muscularity, though the contrary has been supposed, by some Authors. A fine injection shews it to be chiefly formed of a continuation of the Blood-vessels of the Choroid coat, the branches of which divide into such minute parts, as to give the whole a Villous appearance.

The corpus ciliare is glued to the Retina, at the forepart of the Vitreous Humour, and a little behind the edge of the crystaline Lens; but the ciliary processes float in the Aqueous Humour in the posterior chamber of the eye at the inner side of the root of the Iris, and may be readily turned back behind the edge of the Lens, to which they are contiguous, but do not adhere.

The Choroid coat, with its dark Paint, serves to suffocate the rays of light which pass through the Retina, and thereby to allow a distinct image to be formed upon the bottom of the eye, and to prevent the rays from being reflected so as to form a second image.

In these animals in which this coat or its paint is of a bright colour, it acts as a mirror to reflect light, and make the impression stronger.

Optic Nerve and Retina.

The *Optic Nerve*, in its passage through the Orbit, is covered by a continuation of the Membranes which surround the Brain.

At the Foramen Opticum, the *Dura Mater* is divided into *two Laminæ*, one of which assists in forming the Periosteum of the Orbit; the other, which is again divided into two Laminæ, furnishes a sheath to the Nerve, and accompanies it to the Tunica Sclerotica, to which it is so firmly connected by cellular Substance, as to have induced some Authors to describe the Sclerotica as a continuation of the Dura Mater.

The Body of the Nerve is still more closely invested by the *Pia Mater*, which also forms sheaths round the Nervous Fasciculi, and accompanies the Nerve into the eye.

At the back-part of the Ball of the eye, and a little removed from the Axis, towards the nose, the *Fasciculi* of the Optic Nerve pass through a Cribriform part of the Sclerotic coat.

The Nerve is contracted at its entrance through the Sclerotic coat, but immediately after its ingress, it expands to form the Retina,—so called from its supposed Reticular appearance.

In the middle of the entrance of the Optic Nerve, the Artery is seen dividing into branches, which are dispersed upon the inner Surface of the Retina.

The Retina advances between the Choroid coat and Capsule of the Vitreous Humour, to the fore-part of the eye, and terminates or disappears upon the anterior part of the edge, or greatest diameter of the Capsule of the Crystalline Lens.

The Retina is contiguous to the Choroid coat and Capsule of the Vitreous Humour, but does not adhere to either, by Blood-vessels or otherwise, till it reaches the Corpus Ciliare.

Under the Corpus Ciliare, the Retina is so covered externally, with the Pigmentum Nigrum, and adheres internally so closely to the Capsule of the Vitreous Humour, as to be prevented from being seen till the black Paint be washed off, or till all the coats be removed posteriorly, and the eye viewed through the medium of the Vitreous Humour.

The Retina is composed of a tender and Pulpy like Substance, is semi-transparent, and of a light-grey colour, resembling that of ground glass.

From the entrance of the Optic Nerve, to the edge of the Corpus Ciliare, the Retina is of an equal and uniform Substance, and is so easily torn and separated from the edge of that body, as to be described by many Authors as terminating there.

Under the Striæ and Processes of the Corpus Ciliare, the Retina is thinner than in the posterior part of the eye, and is so impressed by these bodies, as also to have the appearance of Striæ, which terminate in nu-

merous minute Fibres, like Nerves in other parts of the Body.

The Retina is the seat of Vision, and therefore the primary part of the eye, to which all the other parts within the Orbit are subservient.

Humours.

Aqueous Humour.

The *Aqueous Humour* is lodged in the space between the Cornea and Crystalline Lens.

This space is divided into two Cavities called *Chambers*, the anterior of which is situated between the Cornea and Iris, and is the larger of the two.

The posterior is placed between the Iris and Crystalline Lens, and is so much smaller than the former, that its existence has been denied by some authors, though it is a distinct cavity, demonstrable, not only in the Adult, where the Pupil is open, but in the Fœtus before the Pupil is formed.

The Aqueous Humour is clear as the purest Water, but is somewhat heavier, possesses a small degree of viscidity, contains a little Salt, and is about five grains in weight

In the Fœtus, and for the first month after birth, it is reddish and turbid.

When evacuated, it is quickly renewed; for within forty-eight hours after it has been let out by a puncture the Cornea is observed to be again perfectly distended.

It is supposed to be secreted from the neighbouring Arteries, particularly from those on the fore-part of the Iris and Ciliary Processes.

It serves to keep the Cornea distended, and by its roundish form and pellucidity, it collects and transmits the rays of light to the inner parts of the eye. It likewise guards the Iris and Lens, and admits of the motions of the former.

Crystalline Lens.

The *Crystalline Lens*, which has its name from its resemblance to Crystal, and from its Lenticular form,—though a solid body, which may be moulded into various shapes, has always been classed among the Humours of the eye

It is situated behind the Aqueous Humour, opposite

to the Pupil, and the whole of its posterior parts is received into a depression on the fore-part of the Vitreous Humour.

Like a common Lens, or magnifying Glass, it has two convex Surfaces, the anterior of which is in general less convex than the posterior, the two being formed of segments of spheres of an unequal size.

The anterior Surface, according to the experiments of PETIT, forms the segment of a sphere, the diameter of which is between seven or eight lines, or twelfths of an inch; while the posterior Surface is only equal to the segment of a sphere of about five lines in diameter.

It has been observed by ZINN,—that the figure of the Lens varies at different periods, being in the Fœtus almost of a spherical form, but becoming gradually flatter on the anterior and posterior Surfaces, till about the age of thirty, after which its form does not appear to vary.

As the figure, so also the colour and consistency are found to change at different times of life.—In the Fœtus, not only the Capsule, but the Lens also is of a reddish colour; but immediately after birth, they become perfectly transparent.—In a person considerably advanced in years, the Lens is observed to acquire a certain degree of yellowness, which appears first in the centre, and afterwards extends gradually to the circumference, and in extreme old age, this yellow tinge becomes so deep as to resemble Amber.

An Aqueous Fluid is described as being situated between the Crystalline Lamellæ, which is supposed to decrease in quantity, and become yellowish, the Lens at the same time increasing in solidity as the person advances in life. This difference however, of convexity, colour, and consistence, according to the difference of age, is not uniformly met with.

The Lens becomes opaque soon after death, and acquires an additional opacity when put into spirit of wine.

It is composed of concentric Lamellæ, laid over each other like the coats of an Onion. These Lamellæ, are connected by a fine Cellular Substance, and are more closely compacted the nearer they are to the centre.

This lamellated structure may be readily observed

in the eye of an Ox, or any other large animal, but is most evident when the Lens has been macerated in Water or Vinegar.

When the maceration is continued for some time, the Lamellæ put on a radiated appearance, the Radii running in a vertical manner, or issuing from the centre to the circumference, dividing the Surface into Isoscular Triangles.

The Lamellæ were discovered by LEUWENHOECK, to be of a Fibrous structure. By a late writer, these Fibres have been considered as Muscular,—but this opinion of the Muscularity of the Lens, seems to have gained very few proselytes.

The substance of the Lens somewhat resembles half-melted gum, is very soft and tender on the outside, but becomes gradually firmer and tougher towards the centre, where it forms a Nucleus.

The Lens is surrounded by a very pellucid proper Capsule, called *Tunica Aranea* or *Crystallina*, which is much thicker and more elastic than the Capsule of the Vitreous Humour, but adheres so slightly, and is so easily lacerated, that after a small puncture is made in it, the Lens start out, upon applying gentle pressure to the Capsule.

The posterior part of the Capsule is much thinner, softer, and weaker than the anterior; but is quite a *distinct Membrane* from the Tunica Vitreæ; yet so firmly connected to it by Cellular Substance, that it is difficult to separate them without lacerating both the Vitreous coat and its Humour.

Some Authors describe an *Aqueous Humour* as seated between the Lens and its Capsule; while others, of no small respectability, deny the existence of this Humour as well as of that which is said to be situated between the Lamellæ of the Lens.

The *Vessels* of the Lens are not to be seen in the eye of an Adult; but in that of a Fœtus, PETIT found vessels passing from the Corpus Ciliare, over the fore-part of the Capsule of the Lens.

WINSLOW afterwards observed, that in the Fœtus, and in new-born children, a fine injection succeeded so well as to discover the Vessels of the Membrana Crystallina and Vitrea;—and in a Fœtus of about six months,

the injected liquor seemed to him to have penetrated a part of the Crystalline and Vitreous Humours.

ALBINUS derives these Vessels from a double source. In the eye of a Whale, he demonstrated Vessels passing from the Ciliary Processes to the Substance of the Lens ;—and, at a later period, he injected in the human eye, a small branch arising from the Central Artery of the Retina, which proceeded in a straight direction through the Vitreous Humour, and divided in the posterior part of the Capsule into numerous branches, many twigs of which plunged into the Substance of the Lens.

This artery and its branches have been frequently and successfully injected by succeeding Anatomists.

Vitreous Humour.

The *Vitreous Humour*, so called from its resemblance to melted Glass, is situated in the back-part of the Cavity of the eye, which it occupies from the insertion of the Optic Nerve to the Surface of the Crystalline Lens.

It is round at the back-part and sides, where it is covered by the Retina, but is concave before, where it forms a bed for the Crystalline Lens.

It is by much the largest of the three Humours, occupying upwards of nine-tenths of the whole eye, and has a Gelatinous appearance,—or is somewhat like the glare of an Egg.

In an Adult it is always very transparent, and in an Old Person it does not, like the Lens, degenerate into a yellow, or any other colour.

In the Fœtus, like the Aqueous Humour, it is of a reddish colour.

The liquor with which the Vitreous Humour is filled, is similar to the Aqueous,—very fluid, transpires readily through the Capsule, though that coat be entire, and, like the Aqueous Humour, is somewhat thicker, heavier, and more viscid than Water.

When this Humour is evacuated by puncture, in the living Body, it is very seldom, though sometimes renewed.

Upon the surface of this Humour there is a coat, termed *Vitrea*, as transparent as the Humour itself, and so thin and Cobweb-like, as to have the name of *Arena*.

The *Tunica Vitrea* is remarkably smooth on its outer Surface ; but within, it sends Processes into the body of the Humour.

Some Authors, and among these WINSLOW, have described this coat as consisting of two Laminæ, but SABATIER, and other late writers, seem sufficiently satisfied that it is a single Layer ; and even this single Layer cannot be raised but with difficulty, though it is demonstrable by making a puncture to allow the Humour to escape, and by afterwards distending the part with air.

The structure of the humour consists in a set of delicate Cells, which contain the liquor within them, as may be seen by the assistance of Acids, or by boiling Water, or by Congelation.

The Cells of the Humour communicate freely with each other, as appears from the liquor oozing out by the smallest puncture made in the general Capsule.

Under the Corpus Ciliare, the Capsule of the Vitreous Humour sends off an external Lamina, which accompanies the Retina, and is inserted with it into the fore-part of the Capsule of the Lens, a little before its anterior edge. It is termed *Membranula Coronæ Ciliaris*, or *Zomula Ciliaris*, from its Striated appearance and circular form, and assists in fixing the Lens to the Vitreous Humour.

After sending off the Ciliary Zone, the coat of the Vitreous Humour goes behind the Capsule of the Lens, to which it firmly adheres.

Between the Ciliary Zone and part where the Capsule of the Vitreous Humour adheres to that of the Lens,—which is at the same distance behind the edge of the Lens, with the distance of the insertion of the Ciliary Zone before it,— a Passage is formed, named *Canalis Petitianus*, after PETIT, who discovered it.

The Membranes forming this Passage are pervaded by transverse Fibres, in such a manner, that when air is introduced, it goes freely round the edge of the Lens; but the Passage has a Cellular appearance, being contracted and dilated alternately.

The Canal of PETIT is nearly of the same breadth with the Corpus Ciliare, is always empty, and has no

communication with the Capsules of the Vitreous or Crystalline Humours.

No vessels are to be seen in the Vitreous Humour of an Adult, but in the eye of a Fœtus, an artery is observed to arise from the central one of the Retina, which passes through the middle of the Vitreous Humour, sending twigs to the Cellular Texture of this Humour, while the principal Trunk is continued to the Capsule of the Crystalline Lens, as has been already observed.

The Vitreous Humour serves to give shape to the eye, to keep the coats properly expanded, to preserve the due distance of the Lens, and direct the rays of light to the Retina.

MUSCLES OF THE BALL OF THE EYE.

The Ball of the eye is moved by *six Muscles*, which are divided, on account of their direction into *four straight* and *two oblique* Muscles, obtaining their respective names from their size, situation, direction, or use.

Of the straight Muscles, one is situated above the eye, another below it, and one on each side. Of the oblique, one is placed at the upper and inner, and the other at the under and outer part of the eye.

The *Recti* Muscles are not straight, as the name imples; for on account of the situation of the eye and shape of the Orbit, the internal, or that next the Nose, is the only one which runs in a straight direction.

Neither are they all equally long, the internal being the shortest, the external the longest, and the other two nearly of the same length.

The four straight Muscles, which bear a strong resemblance to each other, arise by a narrow beginning a little Tendinous and Fleshy, from the edge of the Foramen Opticum, where they embrace the Optic Nerve at its entrance into the Orbit.

In their passage forwards, they form Fleshy Bellies, which send off broad and very thin Tendons, to be inserted into the Sclerotic coat, under the Tunica Andata, about a quarter of an inch behind the edge of the Cornea, and at equal distances from each other.

At the place of their insertion they are so intimately connected with the Sclerotica, that they cannot be se-

parated from it, or be brought as far as the Cornea, without evident laceration.

The different Muscles of the Ball of the eye, where they lie upon the Ball, are covered with a Cellular Sheath, which afterwards degenerates into that Cellular Substance which is interposed between the Sclerotica and Conjunctiva.

Levator Oculi;

Or Rectus Attollens, or Superbus.

Origin: From the upper part of the Foramen Opticum, below the Levator Palpebræ Superioris.

Insertion: Into the upper and fore-part of the Tunica Sclerotica.

Action: To raise the fore-part of the Ball of the eye.

Depressor Oculi;

Or Rectus Deprimens, or Humilis.

Origin: From the inferior part of the Foramen Opticum.

Insertion: Opposite to the former.

Action: To pull the fore-part of the eye downwards.

Adductor Oculi;

Or Rectus Adducens, or Bibitorius.

Origin: From the Foramen Opticum, between the Obliquus Superior and Depressor.

Insertion: Opposite to the inner angle.

Action: To turn the fore-part of the eye towards the Nose.

Abductor Oculi;

Or Rectus Abducens, or Indignabundus.

Origin: From the Bony Partition between the Foramen Opticum and Lacerum.

Insertion: Into the Ball of the eye, opposite to the outer angle.

Action: To turn the fore-part of the eye towards the Temple. When two of the opposite Recti Muscles, or all of them act together, they draw the eye into the Orbit.

When two of the adjacent Recti Muscles act, they turn the fore-part of the eye obliquely in a direction towards their Origins.

Obliquus Superior ;

Or Obliquus Major, or Trochlearis.

Origin : Like the straight Muscles, from the edge of the Foramen Opticum, between the Levator and Adductor Oculi. From thence it runs straight forward, sends off a long round Tendon, which passes through a Cartilaginous Pulley fixed behind the Internal Angular Process of the Os Frontis: from this it runs a little downwards, and returns backwards and outwards, passing under the Levator Oculi, to have its

Insertion : By a broad thin Tendon, into the Tunica Sclerotica, about half-way between the insertion of the Levator Oculi and entrance of the Optic Nerve.

Action : To roll the Ball of the eye, by turning the Pupil downwards and outwards.

Obliquus Inferior ;

Or Obliquus Minor.

Origin : By a narrow beginning, from the anterior edge of the Orbitary Process of the Superior Maxillary Bone, near the Lacrymal Groove, from which it passes obliquely outwards, backwards and upwards, round the Ball of the eye.

Insertion : By a broad thin Tendon, into the Sclerotic coat, between the entrance of the Optic Nerve and insertion of the Abductor Oculi, and opposite to the insertion of the Superior Oblique Muscle.

Action : To roll the Ball of the eye, by turning the Pupil upwards, and inwards, and with the assistance of the Superior Oblique Muscle, to pull the eye forwards, thereby becoming an antagonist to the Recti Muscles.

The two Oblique Muscles, on account of rolling the eye, and assisting it in the expression of certain passions, have been called *Rotatores*, or *Amatores*.

VESSELS OF THE EYE.

The *Frontal*, *Fascial*, and *Temporal Arteries*, which are branches of the External and Internal Carotids, supply the Palpebræ, and communicate with those which are dispersed within the Orbit.

Some small branches of the *Internal Maxillary Artery* pass through the Inferior Orbitar Fissure, to be

dispersed chiefly upon the Periosteum of the Orbit and Fat of the eye.

The *Ocular Artery*, which is a branch of the Internal Carotid, passes through the Foramen Opticum, in company with the Optic Nerve, and supplies the Fat, Muscles and Ball of the eye, and also the Lacrymal Gland and Tunica Conjunctiva.

The branches which belong to the Ball of the eye, have the name of *Ciliares* :—They perforate the Sclerotica in different places, and are afterwards dispersed chiefly upon the Choroid coat and Iris.

One branch of the Ocular Artery, called *Centralis Retinæ*, perforates the Optic Nerve, and is dispersed upon the Retina.

The *Veins* which correspond with the Arteries of the eye, communicate freely with each other, and pass partly to the External Jugular Vein, by branches situated about the fore-part of the Orbit, and partly to the Internal Jugular Vein by the Cavernous Sinus.

NERVES OF THE EYE.

Besides the *Optic Nerve*, already taken notice of, the eye receives the Third and Fourth Pairs, and branches from the first part of the Fifth Pair, together with the Sixth Pair, and branches from the Seventh.

The parts about the fore-side of the Orbit are supplied by branches from the Fifth and Seventh Pairs ;—the Ball of the eye by Nerves called *Ciliary*, which come from the third and Fifth Pairs ;—the fat, Muscles, Lacrymal Gland, &c. are supplied by the Third, Fourth, Fifth, and Sixth Pairs.

The *use* of the eye is, to receive and collect the rays of light in such a manner as to form upon the Retina the image or picture of the object which the eye looks at ; and the point where these different rays meet is called the *Focus*.

The object is painted upon the Retina in an *inverted* manner, the rays from above falling upon its under, and those from below upon its upper part ; and it is supposed to be by habit, or rather by instinct, that we judge of the *real* situation of any object.

That the rays of light may terminate distinctly on the Retina, it is necessary that both the Cornea and

Crystalline Lens should have a certain degree of convexity.

If either the one or the other be too prominent, the Focus will be formed before it reach the Retina, as is the case in short-sighted people, who require concave glasses to enable them to see objects distinctly, at the proper and ordinary distance.

If, on the contrary, the Cornea or Lens be too flat, or the retractive power of the Humours be in any way dimished, the Focus will then be imperfectly formed, till the object is viewed at a greater distance than ordinary, as is the case with persons advanced in life, to whom the assistance of convex glasses becomes necessary.

How an object, viewed with both eyes, appears single, has been ascribed by the generality of Authors to custom and habit; and by others to instinct, which regulates the uniform motion of the eye, and the accurate application of both to one point.

The eye is enabled to judge of, or accommodate itself to objects at different distances. by the action of its Muscles increasing or diminishing the length of its Axis, and by the motions of the Iris allowing a greater or smaller quantity of light to be thrown into the eye.

OF THE NOSE.

The Nose, which is the Organ of Smell, and contributes to the general purpose of Respiration, is divided into the External Prominent Part, and the Internal Cavity, which is separated by the Septum Narium into two smaller Cavities;—or, it is divided into hard and soft parts.

The External part, or Nose, properly so called, is composed superiorly of Bones, inferiorly of Cartilages, and has a partial covering from the Muscles, and a general one from the common Integuments.

On the outside of the Nose are observed,—the *Radix*,

or upper part;—the *Dorsum*, or middle prominence;—the *Apex*, or point;—the *Alæ*, or lateral moveable parts;—and *Columna*, or under part of the partition next the Upper Lip.

The Osseous part of the Nose is formed by the *Ossa Nasi*, properly so called, the *Ossa Maxillaria* and *Os Frontis*, which constitute the upper and fore-part:

By the *Os Ethmoides* and *Ossa Unguis*, which form the upper, inner, and lateral parts:

And by the *Ossa Maxillaria Superioria*, *Ossa Palati*, *Os Sphenoides*, *Ossa Spongiosa Inferiora*, and *Vomer*, which form the under, inner, and back-part.

The *two Cavities*, or *Nostrils*, terminate anteriorly in the Face, and posteriorly in the Fauces, and are much enlarged by the different Sinuses which communicate with them.

The under and fore-part of the Nose consists of *five Cartilages*, of a somewhat regular figure, and of some smaller pieces, which are more irregular, and of an indeterminate number.

Of the five Cartilages, one is situated in the middle, and the other four laterally.

The middle Cartilage is the most considerable, and supports the rest: It constitutes the Cartilaginous part of the Septum Narium, and is joined to the anterior edge of the Nasal Lamella of the Ethmoid Bone, to the anterior edge of the Vomer, and to the fore-part of the Spinous Process of the Superior Maxillary Bones.

Of the lateral Cartilages, two are placed anteriorly, forming by their curved union the Tip of the Nose; and two posteriorly, which form the Alæ Nasi.

Between the anterior and posterior Cartilages, are spaces filled with additional Cartilages, the number, size, and figure, varying in different bodies.

The elasticity of the Cartilages contributes to the defence of the Nose against external injuries.

The Nose is covered by the common Integuments, and perforated at its under and outer-part by the Ducts of Sebaceous Glands, the contents of which may be readily squeezed out by the pressure of the Fingers.

The Cartilages of the Nose are moved in different directions, by the following Muscles, which have been already described, viz. the *Compressor Narium*, the

Nasal part of the *Frontal* Muscle, the *Levator* and *Depressor Labii Superioris Alæqui Nasi*.—The Nose may also be moved by the neighbouring Muscles, which, in many instances, become assistants to the others.

The internal Nares or Cavities of the Nose extend upwards to the Cribriform Plate of the Ethmoid, and to the Body of the Sphenoid Bone.

At the inner side they are bounded by the Septum Narium, which is formed by the Nasal Lamella of the Ethmoid Bone, by the Vomer, and by the middle Cartilage of the Nose.

On the outside, or that next the Cheek, the Ossa Spongiosa project a considerable way into their Cavities, and increase the Surface of the Membrane of the Nose, for enlarging the Organ of Smell.

In animals which smell acutely, the Ossa Spongiosa are remarkably large and complex.

The bottom of the Nostrils runs directly backwards, so that a straight probe may be passed through either of them to the Throat

In the fore-part of the Nostrils there are stiff Hairs, called *Vibrissæ*, which prevent the Mucus from constantly flowing out, and insects, or other extraneous matter from entering.

The general Cavity of each Nostril is divided by the Ossa Spongiosa into *three Meatus*, or *Passages*, which run from before backwards, and are described by HALLER according to their situations, viz.

The *Meatus Narium Superior*, placed at the upper, inner, and back-part of the Superior Spongy Bone.

The *Meatus Medius*, situated between the Superior and Inferior Spongy Bones.

The *Meatus Inferior*, situated between the Inferior Spongy Bone and bottom of the Nose.

The inside of the Nose is lined with a thick Spongy *Membrane*, termed *Mucosa*, or *Pituitaria* of SCHNEIDER, or *Schneiderana*, which lines the whole internal Nares, and is also continued to the different Sinuses, to the Lacrymal Sacs and Palatine Ducts, to the Pharynx, Palate, and Eustachian Tubes.

This Membrane is very *Vascular* and *Nervous*, and is the primary Organ of Smelling. It is constantly lubricated and preserved in a proper degree of moisture by

the *Mucous* of the Nose, which is discharged upon its Surface from numerous small Follicles.

The different *Sinuses* of the Bones of the Head, after having run obliquely backwards in a short winding direction, terminate by small openings in the Cavity of the Nose.

The *Frontal Sinuses* pass downwards into the anterior Ethmoid Cells, which terminate in the upper part of the Nose, behind the beginning of the Lacrymal Sacs.

Besides the Passages common to the Frontal Sinuses and anterior Ethmoid Cells, there are others proper to the Posterior Ethmoid Cells, which terminate in the upper and back-part of the Nose near the openings of the Sphenoid Sinuses.

The *Sphenoid Sinuses* open, behind the Cells of the Ethmoid Bone, into the upper and back-part of the Nose.

The *Maxiliary Sinuses* open at their upper and inner sides, by one, and sometimes two passages, into the middle of the space between the Superior and Inferior Spongy Bones, nearly opposite to the under edge of the Orbits.

At the upper part of the Maxillary Sinuses, *Appendices* described by HALLER, are sometimes found, which communicate with the Ethmoid Cells.

The Sides, or Walls of the Maxillary Sinuses, are formed of thin Plates of Bone, excepting where the Processes project and give them additional strength. Below, they have only thin Plates between them and the Dentes Molares, the roots of which are sometimes found to perforate the Septum.

The different Sinuses are lined with a continuation of the *Membrana Schneideriana*; but in these it is thinner, less Vascular and Nervous, than that part of the Membrane which lines the general Cavity of the Nose.

They are constantly moistened, but not filled with a fluid.

The Sinuses increase and modulate the voice: Their hollow structure renders the Bones lighter; but they do not appear to constitute part of the Organ of Smell.

Their passages being directed backwards, prevent any kind of extraneous matter from getting into them.

The *Lacrymal Sac* is a Membranous Canal, situated

in the Lacrymal Groove, formed by the Superior, Maxillary, Lacrymal, and Inferior Spongy Bones.

The *Osseous Duct*, in its descent, runs a little obliquely backwards to the lower and lateral part of the Cavity of the Nose, where it terminates at the inner and fore-part of the Antrum Maxillare, under the Os Spongiosum Inferius, a little behind the anterior extremity of that Bone, and in a direct line upwards from the second Dens Molaris.

The upper part of the Osseous Passage forms only a semi-canal, the under end a complete one.

The Lacrymal Sac is situated in the upper part of the Lacrymal Groove, behind the Tendon of the Orbicularis Muscle of the Eye-Lids. About a fourth part of the Sac is situated above the Tendon, forming a kind of *intestinum Cæcum*, and the rest is placed below.

Towards the inner angle of the Eye, behind the Tendon of the Orbicularis Muscle, the Sac is perforated by the Lacrymal Ducts.

The under part of the Sac becoming a little narrower, but without forming any Valve, passes into the Nose, under the name of *Lacrymal Duct*, *Canalis Nasalis*, or *Ductus ad Nasum*, and terminates at the inferior extremity of the Osseous Canal.

The substance of the Lacrymal Sac and Duct is similar to that of the *Membrana Schneideriana*, is defended with the same kind of Mucus with which this Membrane is lubricated, and is firmly connected to the Periosteum of the Osseous Canal.

The *use* of this passage is,—to convey the superfluous Tears to the Nose, so as to prevent them from passing over the Cheek.

The *Ductus Incisivus*, or *Nasalo Palatinus* of Steno, is a small Canal, which, as has been already observed in the description of the Bones, is only sometimes met with in the Human Body, though it is always to be found in the Ox, Horse, Sheep, &c.

When present, it takes its origin from a small Pit, formed in the fore-part of the bottom of the Nostril, under the termination of the Lacrymal Duct. It runs obliquely downwards and forwards, placed in such a manner as to receive and conduct Tears into the Mouth.

The *Arteries* of the Nose come chiefly from the external Carotids.

Those of the outer part of the Nose come from the Facial and Internal Maxillary Arteries;—those of the inner, from the Maxillares Internæ;—and a few twigs are furnished by the Ocular Arteries.

The *Veins* go to the External Jugulars;—they likewise communicate with the Ocular veins, and of course with the Lateral Sinuses and Internal Jugulars.

The *Nerves* with which the outer part of the Nose is chiefly supplied, come from the second branch of the Fifth, and from the Portio Dura of the Seventh Pair.

The inner part is principally supplied by the First, or Olfactory Nerves, and by some branches from the first and second portions of the Fifth Pair.

OF THE EAR.

The ear, or Organ of Hearing, is divided into the *External* and *Internal Ear*.

External Ear.

The *External Ear* comprehends the *Auricle*, or *Ear*, properly so called, and the *Meatus Auditorius Externus*.

It is again divided into the *Pinna*, or *Ala*, which constitutes by much the greater part of it;—and *Lobus*, which is placed at its under end.

The *Pinna* or *Ala*, is chiefly composed of Cartilage, and is divided at its fore-part, into several *Eminences* and *Cavities*, which have obtained particular names, viz.

The *Helix*, or outer Bar, or Margin, so called from its winding direction. It arises behind at the Lobe of the Ear, surrounds its upper edge, and terminates below, nearly opposite to its origin, dividing the Concha into two parts.

The *Antihelix*, *Anthelix*, or inner Bar or Margin, which is situated within the former, and is composed superiorly of two Ridges, uniting together below.

The *Tragus*, so called from the Hairs which frequenly grow from it having a resemblance to the beard of a Goat.

It is a small eminence which lies over the Meatus Externus, and is connected to the under and fore-part of the Helix.

The *Antitragus*, so named from its being opposite to the Tragus, below the posterior extremity of the Antihelix.

The *Cavitas Innominata*, situated between the Helix and Antihelix.

The *Scapha*, or *Fossa Navicularis*,—compared in shape to that of a Boat,—situated between the two limbs of the Antihelix.

The Concha, so called from its resemblance to a Fish-shell of that name. It is a large cavity under the Antihelix, divided by the Helix into two parts, the inferior of which leads to the Meatus Auditorius.

The back-part of the External Ear exhibits only one considerable *Eminence*, which is the convex Surface of the Concha.

The *Lobus*, which is the inferior soft part of the Ear, is composed of Cellular Substance, with a small quantity of Fat.

The Ear is covered by a continuation of the common Integuments, which is thinner here than on the rest of the Body, and is perforated in many parts by the mouths of Sebaceous Ducts, which are placed immediately under the Skin.

The motions of the Ear, which are very limited, are regulated by several *Muscles*, some of which are common to the Ear and Head, and others proper to the Ear itself. The common Muscles have been already described. The Muscles proper to the Ear lie close upon the Cartilage, and, in the generality of subjects, are so thin, white, and indistinct, as to receive from some Authors the name of *Muscular Membranes*.—They are as follow.

Helicis Major.

Origin: From the anterior acute part of the Helix, upon which it ascends.

Insertion: Into the Helix.

Action: To pull that part into which it is inserted a little downwards and forwards.

Helicis Minor.

Origin: From the under and fore-part of the Helix.

Insertion: Into the Helix, near the Fissure in the Cartilage opposite to the Concha.

Action: To contract the Fissure.

Tragicus.

Origin: From the middle and outer part of the Concha, at the root of the Tragus, along which it runs.

Insertion: Into the point of the Tragus.

Action: To pull the point of the Tragus a little forwards.

Antitragicus.

Origin: From the internal part of the Antitragus, upon which it runs upwards.

Insertion: Into the tip of the Antitragus, as far as the inferior part of the Antihelix, where there is a Fissure in the Cartilage.

Action: To turn the tip of the Antitragus a little outwards and depress the extremity of the Antihelix towards it.

Transversus Auris.

Origin: From the prominent part of the Concha, on the Dorsum, or back part of the Ear.

Insertion: Into the outside of the Antihelix.

Action: To draw the parts to which it is connected towards each other, and to stretch the Scapha and Concha.

The *use* of the External Ear is to collect the sound, and convey it to the Meatus Externus,—the Muscles giving tension to it, so as to render the sounds more distinct

The Cartilage of the External Ear is *connected* to the Temporal Bone by the common Integuments, and by its Muscles; and is furnished with Ligamentous Membranes, which fix it to the roots of the Zygoma and of the Mastoid Process.

The *Meatus Auditorious Externus* leads inwards, from the Concha, and in its course proceeds forwards and upwards, turning a little downwards at its farthest extremity, at the Membrana Tympani.—The turns, however, are so inconsiderable, that the bottom of the passage can be readily seen in a clear light, upon pulling the ear backwards.

It is somewhat of an *oval* form, a little contracted in the middle, and upwards of an inch in length.

Its outer end, which is a continuation of the Concha, is Cartilaginous, and has two or three *Interruptions* or *Fissures* in it.

On the upper and back-part of its circumference, there is a *Large Interruption* terminating in an oblique Margin, which is fixed to the rough edge, at the under part of the Osseous portion of the Meatus.

At the upper and back-part of the Meatus, the Cartilage has but little connection with the Bones, being there fixed by the Skin which lines the Canal.

The Osseous Canal is continued from the Cartilage of the Meatus, and is the longer of the two, particularly at the upper and back-part of the Passage.

The Meatus is lined with a continuation of the Skin, which fills up the interruptions in the Cartilage, but is thinner than on the rest of the Body.

Under the Skin of the Meatus, and near its outer end, there are numerous small glands, of a yellowish colour, placed in a Recticular Substance, formed of the Corpus Mucosum, and termed *Glandulæ Ceruminosæ*, which discharge the Wax of the Ear through small Excretory Ducts.

The *Arteries* of the External Ear come Interiorly from the Temporal, and posteriorly from the Occipital, both of which are branches of the External Carotid Artery.

The *Veins* pass partly to the External, and partly to the Internal Jugulars.

The fore-part of the Ear is supplied with *Nerves* from the third of the Fifth, and from the Portio Dura of the Seventh Pair; the under and back-part, by branches from the first and second Cervicles.

The Meatus Externus conveys the sound from the Outer towards the Inner Ear, and is supposed to do this to greater advantage, on account of the winding nature of the Passage.

The Wax lubricates the Passage, and defends it from the injuries of the air, and being of a viscid and bitter quality, assists in the exclusion of insects.

In the Fœtus, the Meatus is entirely Cartilaginous,

and only adheres to an imperfect Bony circle, in which the Membrana Tympani is fixed.

At the inner end of the Meatus Externus, the *Membrana Tympani* is situated, which has its name from covering the outer part of the *Tympanum* or *Drum* of the Ear.

It is firm, almost transparent, and of an oval form.

It is fixed in a *Groove* which divides the Meatus from the Tympanum.

It is very tense, but has a small *depression* in the middle next the Meatus, with a corresponding *convexity* towards the Tympanum, where the extremity of the Malleus is fixed to it.

Its situation is somewhat oblique, the upper-part being turned outwards, and the under inwards, so that the lower side of the Meatus is a little longer than the upper.

It forms a complete *Septum*, and has no hole in it, such as has been described by some Authors.

It is formed partly of a continuation of the Lining of the Meatus, but chiefly of the Periosteum.

The Membrana Tympani has numerous small *Vessels* from the Temporal and Stylo-mastoid Arteries, which run in a radiated manner, and which are most abundant in the Fœtus.

It is the Conductor of sound from the Outer to the Inner Ear.

In the Fœtus, this Membrane is fixed in an imperfect Ring of Bone, and, along with the Meatus, is covered with a Mucous Membrane, which defends the parts from the too strong impulse of Sound.

THE INTERNAL EAR.

The *Internal Ear* comprehends the *Tympanum*, *Labyrinth*, and certain *Passages* leading into these.

The *Tympanum*, or *Drum* of the Ear, is situated at the inner side of the Membrana Tympani, approaches to a hemispherical figure, and is about half an inch in width.

Between the Tympanum and Cavity called Labyrinth, there is an *Osseous Septum*, which forms the bottom of the Tympanum, where there are *several Eminences*, viz.

The *Promontory*, which forms the beginning of the

Scala Tympani, and divides the Tympanum into anterior and posterior regions.

A *Protuberance* at the upper and back-part of the Tympanum, formed by the Aquæducts Fallopii.

A *Projection*, called *Eminentia Pyramidals Tympani*, situated behind the Fenestra Ovalis, in which is the Passage for the Stapedius Muscle.

An *Eminence* at the upper and fore-part of the Tympanum, containing a semi-canal, for lodging part of the Tensor Tympani Muscle.

In the Tympanum there are various *Passages*, which communicate with the neighbouring parts, viz.

The *Iter a Palato ad Aurem*, or *Eustachian Tube*, which goes off from the upper and fore-part of the Tympanum, and runs obliquely forwards and inwards to the posterior opening of the Nostril, and terminates at its outer edge, above the arch of the Palate.

The posterior part of the Tube is formed in the Pars Petrosa, at the upper and outer part of the Canal for the Carotid Artery.

The anterior portion is formed above, by the Spinous Process, and root of the Pterygoid Process of the Sphenoid Bone ;—and below, by Cartilage and Membrane.

It is narrow next the Ear, where it can only admit the point of a Surgeon's probe ; but becomes gradually wider towards the Nose, where it terminates by an oblique opening with prominent sides, sufficiently large to admit a Goose-quill.

It is lined by a Membrane similar to that of the Nose, of which it appears to be a continuation ; and on the edge of the Mouth of the Tube, it is so thick as to add considerably to its prominency.

The Eustachian Tube preserves the balance of Air between the Outer and Inner Ear, and prevents it from pressing too forcibly upon the different Membranes placed in the sides of the Tympanum.

It has been supposed to convey the sound of a person's own Voice to the Inner Ear ; but experiment does not favour this opinion, nor is it found to render Sound more distinct when the Mouth is open ;—though persons who are dull of hearing are observed frequently to listen after this manner.

The *Cells of the Mastoid Process*, which open into the

upper and back-part of the Tympanum, opposite to, but a little higher than the Eustachian Tube.

They are very irregular, and have many windings and turnings, which communicate freely with each other, and are lined, like the Cells of other Bones, with the Periosteum Internum.

They assist the Tympanum in reflecting the Sound.

In Quadrupeds, which hear acutely, there are large Cavities connected with the Tympanum, which seem to supply the place of Mastoid Cells.

Above the Promotory, a *Hole*, called *Fenestra Ovalis* the upper and under edges of which are convex upwards,—for lodging the Base of the Stapes.

The inner edges of this Hole are contracted by a narrow border, upon which the end of the Stapes rests.

Below the Fenestra Ovalis, and at the under and back-part of the Promontory, a *Hole*, smaller than the former, called *Fenestra Rotunda*.

It is placed obliquely backwards, and outwards, leads to the Cochlea, but is shut up by a Membrane which assists in communicating Sound to the Labyrinth.

The *Sides*, or *Walls* of the Tympanum, which likewise assist in conveying Sound to the Labyrinth, are lined with Periosteum, which is reflected into the different Passages leading from it.

The Cavity of the Tympanum contains four small Bones, called *Ossicula Auditus*, which form a chain stretching across from the Membrana Tympani to the Labyrinth.

The *Ossicula Auditus* are,—the *Malleus*, the *Incus*, the *Os Orbiculare*, and the *Stapes*;—these names being derived from substances which they are supposed to resemble in shape.

The *Malleous*, or *Hammer*, consists of a round Head, a small Neck, a Manubrium or Handle, and two small Processes, one in the Neck, long and very slender, and therefore called *Gracilis*; the other in the upper end of the handle, called *Processus Brevis*.

The *Handle* is by some Authors considered as one of the Processes, and is then called the longest of the three. It forms an angle with the Neck, becomes gradually smaller, and is bent, at its extremity, towards the Membrana Tympani.

In the natural situation, the *Head* is turned upwards and inwards, and the *Handle* down upon the Membrana Tympani, to which it adheres.

The *Incus*, compared in shape to an *Anvil*, but more resembling one of the Dentes Molares, with its roots widely separated, is situated behind the Malleus, and is formed of a *Body* and *two Crura* of unequal lengths.

The Body has a *Cavity* and *two Eminences*, corresponding to that part of the Malleus with which it is articulated.

The *Short Crus* extends backwards, and is joined by a Ligament to the edge of the Mastoid opening.

The *long Crus* is turned downwards, with the point a little flattened, and bent inwards.

The *Os Orbiculare* is the smallest Bone of the Body, being considerably less than a grain of Mustard-seed.

It is articulated with the point of the long Process of the Incus, and is so firmly fixed to it, that in separating the small Bones of the Ear from each other, it is apt to adhere to the Incus, and has on this account been frequently considered as a Process of that Bone.

The *Stapes* is named from a striking resemblance it has to a *Stirrup*. It is divided into *Head*, *Crura*, and *Base*.

The *Head* is placed upon a small flat neck, and is articulated with the Os Orbiculare.

The *Crura*, like those of the Incus, are unequal in length, and have a groove within, which is occupied by a Membrane.

The *Base* is of an oval shape, and has no perforation in it. Its edges correspond with those of the Fenestra Ovalis, with which it is articulated.

The Stapes is placed horizontally, being nearly at a right angle with the inferior Crus of the Incus.—Its two Crura are placed in the same plane,—the longest backwards.

The small Bones of the Ear are *articulated* with each other by *Capsular Ligaments*, proportioned to their size, and are covered by the Periosteum, which likewise fixes them to the Membrana Tympani and Fenestra Ovalis.

The small Bones have the following *Muscles* fixed to them, which serve for their different motions.

Tensor Tympani, or Internus Auris.

Origin: From the Cartilaginous extremity of the Eustachian Tube, near the entery of the Artery of the Dura Mater. From thence, its Fleshy Belly runs backwards in a Canal peculiar to it, at the upper and inner part of the Osseous Portion of the Tube, being covered only by a thin plate of Bone. It sends off a slender Tendon, which makes a turn in the Tympanum, and passes outwards.

Insertion: Into the posterior part of the Handle of the Malleus, a little below the root of its long Process.

Action: To pull the Malleus and Membrana Tympani inwards, by which the Membrane is rendered more concave and tense, and better adapted for the impression of weak sounds.

Laxator Tympani.

Origin: By a very small beginning, from the extremity of the Spinous Process of the Sphenoid Bone, behind the entry of the Artery of the Dura Mater; after which it runs backwards and a little upwards, at the outside of the Eustachian Tube, in a Fissure of the Os Temporis, near the Fossa which lodges the Condyle of the Lower Jaw.

Insertion: Into the long Process of the Malleus, within the Tympanum.

Action: To draw the Malleus obliquely forwards and outwards, and thereby to render the Membrana Tympani less convex, or to relax it when Sounds are too strong.—HALLER denies the existence of Muscular Fibres in this Substance.—SABATIER describes it, but doubts of its Muscularity.

Stapedius.

Origin: By a small Fleshy Belly, from a little cavern in the Pars Petrosa, near the Cells of the Mastoid Process. Its Tendon passes forwards through a small Hole in that Cavern, and goes into the Tympanum.

Insertion: Into the posterior part of the Head of the Stapes.

Action: To draw the Head of the Stapes obliquely upwards and backwards, by which the posterior part of its Base is moved inwards, and the anterior part

outwards, and the Membrana Tympani thereby put upon the stretch.

Labyrinth.

The *Labyrinth*, so called from its Sinuosities and windings, is situated at the inner-part of the Tympanum, and is formed of the *Vestible*, *Cochlea*, and *Semicircular Canals*, together with the *Canalis Follopii* and *Meatus Auditorius Internus*.

The *Vestible*, named from its forming a porch or entry to the Cochlea and Semi-circular Canals, is of an oval figure, nearly of the size and shape of a clean grain of Barley, and is situated at the inner side of the Base of the Stapes.

There are three contiguous *Cavities* in the Vestible, one of which, the *Semi-oval*, is situated above; another the *Hemispherical*, below; and the third, or *Sulciform*, which is the orifice of the Aquæductus Vestibuli, is placed behind.

In the Vestible there are several Holes which communicate with the neighbouring parts, viz.

The *Fenestra Ovalis* situated at the outside, by which it communicates with the Tympanum.

A *round Hole*, situated at the fore and under-part by which it communicates with one of the Canals of the Cochlea.

Five Similar Foramina behind, by which it communicates with the Semi-circular Canals.

Next the Meatus Auditorius Internus, it has four or five *Cribriform Perforations*, for the transmission of Nerves.

The *Cochlea* is situated next the anterior extremity of the Os Petrosum, and at the fore-part of the Vestible, in such a manner as to have its Base towards the Meatus Auditorius Internus, and its Apex in the opposite direction,—or facing outwards.

It has two *Canals* or *Gyri*, called *Scalæ*, from a supposed resemblance to Stair-cases, the Gyri or turns of which are very close to each other, and run in a spiral direction, like the Shell of a Snail, from which the part has obtained its name.

The Cochlea forms two *Circumvolutions or turns and a half*, the first of which is much larger and wider than

the other Turn and a half, which becomes suddenly smaller.

The two Canals are upon the same level, the inner one next the Base, and the outer next the point of the Cochlea.

The *Gyri* go round a Nucleus, Axis, or central Pillar, which is nearly horizontal, and is formed of *two hollow Cones*, with their points turned to each other, the one termed *Modiolus*, from its resemblance to the Spindle of a winding Stair-case, the other *Infundibulum*, or Funnel.

The *Modiolus* forms the inner and larger portion of the central Pillar, and is that Cavity seen in the under and fore-part of the Meatus Auditorius Internus.

It lodges that branch of the *Portio Mollis* of the Seventh Pair of Nerves, which goes to the Cochlea, and is Cribriform, or full of small Holes for the passage of the twigs of that branch.

The Modiolus consists of *two Plates*, with numerous *Cells* and *Passages* between them, and terminates in the middle of the second Gyrus of the Cochlea.

The *Infundibulum* is an imperfect Funnel, the Apex of which is common with that of the Modiolus, and the Base is covered by the Apex of the Cochlea, which is termed *Cupola*.

Between the Scalæ of the Cochlea there is a Partition called *Lamina Spiralis*, or *Septum Scalæ*, the larger portion of which, next the Modiolus, is formed of Bone: The remainder, or that part next the opposite side of the Scalæ, is Membranous, and termed by VALSALVA *Zona Cochlæ*.—This drops out by maceration, so as afterwards to leave only a partial Septum.

The Osseous part of the Lamina Spiralis is composed of *two Extremely thin Cribriform Plates*, which gradually approach each other at their opposite edges, where they are perforated by numerous Holes.

The termination of the Lamina Spiralis, and of the Scala Tympani, forms a *Hamulus*, or small Hook, which projects into the Infundibulum.

One of the Canals or Scalæ of the Cochlea, opens into the under and fore-part of the Vestible, and is termed *Scala Vestibuli*: The other, which is the smaller of the two, communicates with the Tympanum by the Fenestra Rotunda, and is called *Scala Tympani*.

The Partition between the two Gyri or Turns of the Cochlea, like the Osseous part of the Lamina Spiralis, is formed of *two Plates*, with a small *Cavity* between them.

The *Volute*, or Spiral of the Cochlea, begins below, runs forwards, and then round, so as to form, as has been already mentioned, two circles or turns and a half, the direction of the Gyri corresponding with those of the Shell of a Snail.

The Canals of the Cochlea are conical, becoming gradually smaller towards the Apex, where they communicate freely with each other, through the medium of the Infundibulum.—This communication is called by CASSEBOHM, who gives the fullest Treatise upon the Ear, *Canalis Scalarum Communis*.

The *Semi-circular Canals* are three in number,—the *Superior* or *Vertical*, the *Posterior* or *Oblique*,—and the *Exterior* or *Horizontal*.

The *Superior* is placed transversely, in the upper part of the Pars Petrosa, with its convex side upwards.

The *Posterior* is farther back than the former one, and is parallel to the length of the Pars Petrosa, with the convex side turned backwards.—One of its extremities is placed above, and the other below, the upper extremity joining with the internal one of the Vertical Canal, by which a common Canal is formed.

The *Exterior* is less than the other two, which are more of an equal size, is placed next the Tympanum, and has its extremities and curvatures nearly upon the same plane; with the curve placed backwards.

Each of the Canals forms upwards of three-fourths of a circle, can admit the head of a small Pin, and has an Enlargement, Ampulla, or Cavities Elliptica, at one end, the other extremity being nearly of the same size with the rest of the Canal.

The *Orifices* are only five in number, two of the Canals having a common termination. Of these Orifices, three are situated at the inside, and two at the outside of the Vestible, into the posterior part of which they open.

In the bottom of the Meatus Auditorius Internus, which is situated in the posterior Surface of the Pars Petrosa, there is a large under, and a small upper *Fossula*, separated by a sharp Ridge.

The fore-part of the inferior Fossula leads towards the Cochlea, and is perforated with numberless *Small Holes*, through which branches of the Portio Mollis of the Seventh pair of Nerves pass to the Cochlea.

One Hole in the centre, larger than the rest, transmits a branch of that Nerve to the Infundibulum.—This Hole, however, is frequently enlarged, in consequence of the Bone, which is extremely thin, being broken while preparing it.

In the back-part of the inferior Fossula, three or four *Cribriform Holes* appear, for the transmission of branches of that part of the Portio Mollis destined for the Vestible and Semi-circular Canals.

In the upper Fossula of the Meatus Internus, there are *two Passages*, one posterior and smaller, transmitting Nerves into the Elliptical Cavity of the Vestible.

The other, the anterior and largest, is termed *Canalis* or *Aquæductus Fallopii*,—from a resemblance it bears to an Italian Aqueduct, and serves for a transmission of the Portio Dura of the Seventh Pair of Nerves.

The *Canal* of *Fallopius* goes through the upper-part of the Pars Petrosa, passes downwards and backwards between the Foramen Ovale and external Semi-circular Canal, and terminates in the Foramen Stylo-Mastoideum.

In its passage though the Pars Petrosa, it communicates with the Foramen Innominatum, situated on the upper and fore-part of the Process.

In Children, the Labyrinth is almost as large as in Adults, its Substance complete and hard, while the Bone which surrounds it is soft and spongy; on which account it is easily separated from the rest of the Pars Petrosa.

The different Cavities and passages of the Labyrinth are lined with the Periosteum, which in the Vestible fills the Fenestra Ovalis, and of consequence covers the Base of the Stapes.

The Periostea of the two Canals of the Cochlea form, by their union, the Membraneous portion of the Lamina Spiralis, which, together with the Osseous part, completes the Septum between the two Scalæ.

The Periosteum of the Cochlea also assists that of the Tympanum, in forming the Membrane of the Fe-

nestra Rotunda, and which is sometimes called *Membrana Tympani Secundarii*, from a resemblance to the Membrani Tympani, and from being, like it, a little concave on the outer, and convex on the inner Surface, or where it faces the Scala to which it belongs.

Besides the Periosteum, the Vestible, Cochlea, and Semi-circular Canals contain a *Pulpy Membrane*, upon which the Portio Mollis is irregularly dispersed.

In the Vestible, the Pulpy Membrane forms a *Sac*, in shape resembling that of the Osseous Cavity which contains it, and which is described and beautifully delineated by SCARPA.

When the Sac is laid open upon the upper and outer part, a *Partition* appears, of the nature of the Sac, termed by Dr. MECKEL, *Septum Vestibuli Nervoso Membranaceum*.

In the Cochlea, the Pulpy Membrane is in contact with the Periosteum, but can be separated from that Membrane without much difficulty.

In the Semi-circular Canals, it is at some distance from the Periosteum of these Bones, and is considerably smaller, but, like them, it forms distinct Tubes, which communicate with the Vestible. Like the Osseous Canals also, the Membranous Canals form Ampullæ, or Elliptic Cavities at one end.

The *Arteries* of the Labyrinth arise by one or two small branches, chiefly from the Vertebral Artery, and pass through the Cribriform Plate, at the bottom of the Meatus Externus which belongs to the Labyrinth.

From the Labyrinth one or two *Veins* return, and terminate in the end of the Lateral Sinus.

The Cavity of the Vestible contains no Air, but is constantly filled with a *Watery Fluid*, supposed to be secreted from the Arteries of the Periosteum, and which is found to resemble the Aqueous Humour of the Eye.

The Aqueous Fluid fills the Vestible and Scalæ of the Cochlea, and likewise surrounds the Membranous Semi-circular Canals.

The *Aqua Labyrinthi* is considered as a medium by which sounds are commdnicated from the Membrane filling the round and oval Holes, and from the Base of the Stapes to the Pulpy Membrance placed in it.

The superfluous part of the Aqua Labyrinthi is supposed by COTUNNIUS to be carried off by two small *Conical Ducts*, more particularly described by him than by some preceding Anatomists, who were partly acquainted with them, but considered them as Blood-vessels.

One of the Aqueducts of COTUNNIUS, called *Aquæductus Cochleæ*, begins at the under part of the Scala Tympani, near the Fenestra Rotunda, and after passing through the Pars Petrosa, is seen, in the figures he gives of it, terminating by a wide triangular opening, upon the surface of the Dura Mater, between the passages of the Seventh and Eighth Pair of Nerves.

The other Duct, called *Aquæductus Vestibuli*, begins under the termination of the common Canal, in the Vestible from which it descends, and terminates by a triangular opening between the Layers of the Dura Mater, behind the Meatus Internus, and half-way between the upper edge of the Pars Petrosa and Diverticulum of the Internal Jugular Vein.

For a full account of these Ducts, and the other parts of the Labyrinth, see *a Description of them by* DR. MECKEL, *of Berlin.*

The *Nerves* of the Labyrinth are derived entirely from the Seventh Pair.

The *Auditory Nerve* is composed of two branches, one of which is called *Portio Dura*, and is harder than the other, termed *Portio Mollis*.

The Trunk of the Auditory Nerve passes into the Metus Externus, covered by the investing Membrane of the Brain.

The *Portio Dura* goes through the Canalis Fallopii, sending off, in its passage, branches through Perforations in its sides, to the Stapedius Muscle and Mastoid Cells.

One reflected branch passing through the Foramen Innominatum, in the Pars Petrosa, forms a connection between the Portio Dura and the second part of the Fifth Pair.

Another, called *Chorda Tympani*, passes across the Cavity of the Tympanum, between the inferior Crus of the Incus and handle of the Malleus, and at the outside of the Eustachian Tube, to join the Lingual branch of

the Fifth Pair. In its passage it supplies the Muscles of the Malleus and Membranes, &c. of the Tympanum.

The remainder of the Portio Dura is dispersed upon the Face.

The *Portio Mollis* is divided into two principal parts, one to the Cochlea, the other to the Vestible.

The branches of the Cochlea pass through the Cribriform Plates of the Modiolus, to the Pulpy membrane lying in the Scalæ.

The branches run between, and likewise on the outside of the Partitions which divide the Cochleæ into Gyri, and the Gyri into Scalæ, and are large and numerous in proportion to the part they supply.

The largest and most numerous of these branches are dispersed upon the Lamina Spinalis, where they form an intricate Plexus, the Threads of which are at first opaque, but are afterwards of the colour of the Retina of the Eye.

The branches terminate, and appear also to meet upon that part of the Pulpy membrane, which is most distant from the Modiolus.

Through the Cribriform Plate, common to the Modiolus and Infundibulum, the last branches of this portion of the Nerves pass, to be spread out upon the Membrane lying within the Infundibulum.—*For a particular description of that part of the Portio Mollis distributed to the Cochlea, and of the Cochlea itself, see* Dr. Monro's *Treatise on the Ear.*

Of that part of the Portio ollis destined for the Vestible and Semi-circular Canals, one branch goes through the posterior Hole in the upper-part of the Meatus Internus; the rest pass through the holes in the under and back-part of the Meatus, already pointed out in the description of that Passage.

After perforating the Foramina, the Nerves are seen first in distinct Plexus, but become afterwards transparent, and are lost upon the Sac contained in the Vestible and upon the Ampulla of the Membranous Semicircular Canals.

The *Portio Mollis* is the primary part of the Organ of Hearing, to which all the other parts are subservient, and may be regarded as being of the same service to the Ear, as the *Retina* is to the Eye.

OF THE

MOUTH, TONGUE, AND THROAT,

WITH THEIR APPENDAGES.

MOUTH.

THE *Osseous Parts* of the Mouth are,—the *Ossa Maxillaria Superiora*, the *Ossa Palati*, the *Maxilla Inferior*, and the *Teeth*;—all of which have been already described.

The *Soft Parts* of the Mouth consist of the *Lips* and *Cheeks*, the *Gums*, the *Palate*, the *Velum Palati*, the *Uvula*, the *Tongue*, the *Membrane* lining the Mouth and the *Salivary Glands*.

The *Lips* and *Cheeks* are principally composed of Muscles, are covered on the outside by the common integuments, and lined within by the membrane of the Mouth, under which there are numerous mucous Glands, which obtain their names from their situations.

The intervening space between the Masseter and Buccinator Muscles is occupied by a large quantity of Fat, which gives form to the Face.

The *Membrane* of the Mouth is covered with fine *Villi*; but these are most conspicuous upon the edges of the Lips, as may be readily seen after a fine injection, or after mascerating the parts till the Cuticle can be separated.

From the edges of the Lips, the Common Integuments (now become extremely thin) are converted into the Membrane which is continued into the Cavity of the Mouth, and which, opposite to the Dentes Incisores of the upper and under Jaws, forms a small doubling or *Frænum*, which fixes the Lips more firmly to the Jaws.

The Lips are serviceable in the general purposes of Speaking, Eating, Drinking, &c.

The *Gums* cover the sides of the Alveolar Border of

both Jaws, pass in between the different Teeth, and surround and adhere firmly to the Collar of each.

The Substance of the Gums is of a dense nature, very Vascular, and the Vessels united by a compact Cellular Substance.

They may be said to consist of the common Membrane of the Mouth and the Periosteum of the Jaws intimately connected.

They serve as a covering to the Jaws and assist in the security of the Teeth.

The *Arteries* of the Lips, Cheeks, and Gums, are from the Facial, Temporal, and Internal Maxilaries, which are derived from the External Carotids.

The *Veins* go chiefly to the External, and partly to the Internal Jugulars.

The *Nerves* come from the first and second branches of the fifth Pair, and also from the Portio Dura of the seventh Pair.

The *Palate* is divided into the *Palatum Dure* and *Palatum Molle*. The former is composed of the Palate-plates of the upper Jaw, and is covered by the Periosteum and common Membrane of the Mouth, which prevent the Bones from being injured.

The Membrane which covers the Bones of the Palate forms numerous *Rugæ*, which assist in the division of the Food.

It is nearly of the same structure with that of the Gums, but perforated by the Ducts of the Palatine Glands, for the excretion of Mucus, which serves to lubricate the Palate, and assists in dissolving the Food.

The *Palatum Molle*, *Velum Pendulum Palati*, or *Soft Palate*, is that part which depends from the posterior edge of the Ossa Palati, and from the Pterygoid Processes of the Sphenoid Bone, and forms a partition between the Nose and Mouth.

It is composed of the Membranes which line the Nose and Mouth, and of the expansions of the Circumflex and Levator Palati Muscles, and numerous Mucous Glands which serve to lubricate the Mouth and Throat, and facilitate deglutition.

The Palatum Molle conducts the Fluids of the Nose into the Mouth, and acts like a valve in preventing what we swallow from passing into the Nose.

In the middle of the posterior edge of the Velum Palati, the *Uvula* or *Pap* of the Throat, takes its origin, and hangs pendulous, from the Velum over the root of the Tongue.

It is of a Conical form, is covered by the Membrane of the Mouth, and has a small Muscle within it, by which it is elevated and shortened,—its other motions depending upon the Muscle of the Palate.

The *use* of the Uvula in Speaking and in Deglutition, is evident from the inconveniencies which result from its being destroyed by disease.

The *Arteries* of the Palate, &c. come from the Facial, and Internal Maxillary.

The *Veins* go into the External and Internal Jugulars.

The *Nerves* are chiefly from the second to the fifth, with some twigs from the eighth Pair.

Tongue.

The *Tongue* is of an *Oval Form*, and is divided into *Base*, *Body* and *Apex*.

The *Base*, or posterior part of the Tongue, is connected to the Os Hyoides, and by the medium of this, to the adjacent Bones and Muscles.

The *Body*, or middle part of the Tongue, terminates anteriorly in the loose moveable point.

On the Dorsum or upper Surface, there is a *Linea Mediana*, or middle Groove, running longitudinally, and dividing it into two lateral convexities.

The inferior Surface, which reaches only from the middle of the Tongue to the point, is connected to the parts below it by the Sublingual Ligament, or *Frænum Linguæ*, which is a doubling of the Skin, or lining of the Mouth.

The sides of the Tongue are fixed to the Lower Jaw and Styloid Processes, and parts adjacent, by *Membranous Ligaments*.

The Tongue is chiefly *composed* of the Fibres of the Muscles which serve for its motions.—These Fibres are disposed in various directions, and intermixed with a Medullary Fat.

The upper and lateral parts of the Tongue are composed of the Stylo-Glossi.—Its middle portion, between the two former Muscles, is formed of the Linguales.—

The lower part is chiefly formed of the Genio. Glossi ;—and behind, the Stylo-Glossi enter into its composition.

The Tongue is covered by a continuation of the common Integuments, which are preserved soft and moist by the Saliva.

The Cuticle forms Vaginæ for receiving the Substances called *Papillæ*.

The Corpus Mucosum of the Tongue is thicker than in other parts of the Body, but more moist.

The third covering of the Tongue, the Cutis Vera, is remarkably Nervous.—The Papillæ, which take their origin from it are very Vascular, especially near the Apex of the Tongue, but are a wanting on its under Surface.

The *Papillæ* are divided into three kinds, the *Maximæ*, *Mediæ*, and *Minimæ*.

The first class, called *Papillæ Maximæ*, *Lenticulares*, or *Capitatæ*, are by much the largest, and of a Lenticular form, having round Heads and short Stems.

They are placed at the Base of the Tongue, in superficial Fossulæ, and are dispersed in such a manner as to form an angle with its point backwards.

They are glands of the Salivary kind, and have each of them a small Perforation in the middle of its convex Surface, for the excretion of Mucous.

Besides the Papillæ Capitatæ, there are numerous *Mucous Follicles*, which cover the greater part of the Surface of the root of the Tongue.

At the root of the Tongue, and behind the angle formed by the Papillæ Maximæ, there is a Hole, called *Foramen Cæcum* of MORGAGNI, by whom it was first described.

It penetrates only a small way into the Substance of the Tongue, and receives the Mouths of several Excretory Ducts which terminate in it.

The second class called *Papillæ Mediæ*, or *Semi-lenticulares*, are much smaller than the former, and are scattered over the upper Surface of the Tongue at some distance from each other.

They are of a Cylindrical form, and terminated by a round extremity.

The third class, termed *Papillæ Minima*, or *Conicæ*, or *Villosæ*, are by much the most numerous, but very

minute. They occupy almost the whole upper Surface of the Tongue, but are most abundant towards the Apex, where the sensation of Taste is most acute.

This and the second class have been supposed to be formed chiefly of the extremities of Nerves, and to constitute the real Organ of Taste; though other parts, as the Palate, and even the Pharynx and Esophagus, possess the faculty of Taste in a certain degree.

The principal Blood-Vessels of the Tongue are large in proportion to the size of that Organ.

They are called *Linguales*, or *Raninæ*, on account of the dark-coloured branches which appear under the Tongue.

The *Arteries*, which are branches of the External Carotids, are not found to communicate so freely on the opposite sides of the Tongue, as they do in other parts of the Body.

The *Veins* open chiefly into the External Jugulars.

The *Nerves* like the Arteries, are large and numerous, and have little connection on the opposite sides.

They come from the Fifth, Eighth, and Ninth Pairs.

The first set supply the parts next the point of the Tongue, and are therefore considered as being principally concerned in conveying the sensation of Taste.

The second set supply the root, and the third the middle of the Tongue, and are chiefly dispersed upon its Muscles.—There is a considerable intermixture, however, between the three sets on the same side.

Besides being the principal Organ of Taste, the Tongue is the chief instrument of Speech, and of the articulation of the Voice,—It also assists in Manducation, Deglutition, Spitting, Sucking, &c.

The *Salivary Glands* consist of three large Glands on each side of the Face, viz.—the *Parotid*, the *Submaxillary*, and the *Sublingual*;—besides many small Glands, named from the parts to which they belong.

They are of a yellowish colour, and irregular on their Surface, being of the Conglomerate kind.

The *Parotid Gland*, which is the largest of the Salivary Glands, is named from its situation near the Ear.

It occupies the whole space between the Ear, Mastoid Process, and the angle of the Lower Jaw.

It extends superiorly to the Zygoma, and anteriorly to the Masseter Muscle, part of which it covers.

The under end of it lies contiguous to the Submaxillary Gland.

From the different parts of the Gland, numerous small Branches arise, which join together to form a large Duct, sometimes called STENO's *Salivary Duct*, or *Ductus Superior*, which passes from the upper and fore-part of the Gland.

The Parotid Duct is of a white colour and large size, but, from the thickness of its coats, the Cavity is small in proportion to the outside of the Duct.

It passes anteriorly, in a transverse direction, over the Tendon of the Masseter Muscle, by which it is free from compression, and descends a little to perforate the Buccinator Muscle, opposite to the second or third Dens Molaris of the Upper Jaw.

In crossing the Masseter Muscle, it receives sometimes one, sometimes two minute Ducts, from an equal number of small Glands, called by HALLER, *Glandulæ Accessoriæ*.

The *Inferior Maxillary*, or *Submaxillary Gland*, is smaller and rounder than the Parotid, and is situated on the inside of the angle of the lower Jaw, between it and the Tendon of the Digastric Muscle.

From the upper and fore-part of this Gland, a Duct arises, called by some Authors *Ductus* WHARTONII, or *Ductus Inferior*, which is much thinner in substance than the former Duct, but longer.

It passes forwards between the Mylo-Hyoides and Genio-Glossus Muscles, along the under and inner edge of the Sublingual Gland, to the side of the Frænum Linguæ, and terminates behind the Dentes Incisores, by a small orifice, in form of a Papilla.

The *Sublingual Gland* is smaller and softer than the Submaxillary, and is flat, and of an oval form.

It is situated under the anterior portion of the Tongue, above the Duct of the inferior Maxillary Gland near the Lower Jaw, between the Mylo-Hyoides and Genio-hyoglossus Muscles, the former of which sustains it.

Its extremities are turned forwards and backwards, and the edges obliquely inwards and outwards.

It is covered by a continuation of the Skin of the under side of the Tongue, which fixes the Gland in its place.

It opens by several orifices arranged in a line near the Gums, a little to the outside of the Frænum.

In many Quadrupeds, there is a distinct duct belonging to this Gland, like that of the Submaxillary.

Sometimes this Gland sends off a Branch which communicates with that of the Submaxillary, but generally it is otherwise

The smaller Glands of the Mouth are in great numbers, lying between the inner lining of the Mouth and its Muscles, and deriving their names from their situations.

They are small simple Glands, each sending a duct, which perforates the Skin of the Mouth, and opens into its Cavity,—They consist of—

The *Buccales*, which are placed all over the Cheek, but most plentifully near the termination of the Parotid Duct ;

The *Labiales*, lying on the inside of the Lips ;

The *Palatinæ*, upon the Palate ; and

The *Linguales*, at the root of the Tongue.

The *Arteries* of the Salivary Glands are from different Branches of the External Carotids.

The Parotid is supplied from the Temporal, the Inferior Maxillary from the Facial, and the Sublingual from the Lingual Artery.

The *Veins* of these Glands go to the External Jugulars.

Their *Nerves* are chiefly from the third part of the Fifth, and from the Portio-Dura of the Seventh Pair.

The Salivary Glands serve for the secretion of the Saliva, which they pour out in large quantity, and which is promoted by the motion of the Lower Jaw.—The Salva assists in the solution of the food in the Mouth, in lubricating the throat for its passage downwards, and in the digestion of it in the Stomach.

THROAT.

The *Throat* consists of the *Arches of the Palate*, of the *Pharynx and Larynx*, with the *Muscles, Vessels, Nerves*, &c. which surround them.

The *Arches of the Palate* are two in number, in each side of the Throat, one of which is termed the *Anterior*, the other the *Posterior*.

They are formed of a doubling of the Skin, with a few featured Muscular Fibres.

The *Anterior* arises from the middle of the Velum Palati, at the side of the Uvula, and is fixed to the edge of the Base of the Tongue.

The *Posterior* has its origin likewise from the side of the Uvula, and passes downwards, to be inserted into the side of the Pharynx.

The Anterior Arch contains the Circumflex Muscle of the Palate, and, with its fellow on the opposite side, forms the opening into the Throat, called *Isthmus Faucium*.

The Posterior Arch has within it the Levator Muscle of the Palate.

Between the Anterior and Posterior Arches, and close by the sides of the base of the Tongue, the *Amygdalæ*, *Tonsils*, or *Almonds* of the Ears are situated.

They are of a reddish colour, of the figure of Almonds, full of Cells which communicate with each other, and have large irregular openings, which convey the Mucus into the Throat, the discharge of which is promoted by the motion of the surrounding parts.

Pharynx.

The *Pharynx*, so called from its conveying Food to the stomach, and Air to the Lungs, is a large Muscular Bag, in form of an irregular Funnel, with the Tube called *Esophagus* descending from it, and forming the under end of that Funnel.

It is bounded above by the Cuneiform Process of the Occipital Bone, the Pterygoid Process of the Sphenoid Bone, and backpart of the Jaws, with all of which it is intimately connected.

The anterior margins of its Fleshy parts are connected to the edges of the Larynx, and its sides are covered by the great Blood-vessels of the Neck.

The fore-part of the Pharynx is formed by a Membrane common to it and to the back-part of the Larynx.

Behind, it lies flat upon the Cervical Vertebræ, and upon the Muscles which cover the fore-part of the sides of these Vertebræ.

It has several *Openings* by which it communicates with neighbouring Cavities.

Two of these lead upwards and forwards by the posterior Nares into the Nose;—two go laterally by the Eustachian Tubes to the Ears;—one passes forwards through the large opening, termed Fauces, or top of the Throat, to the Mouth;—one goes downwards and forwards, through the Larynx and Trachea, to the Lungs:—and another directly downwards by the Esophagus to the Stomach.

The Pharynx is surrounded by a loose Cellular Substance, and consists of different Layers of Muscles, called *Constrictores Pharyngis*, which have been already described.

On the inner side, it is lined by the continuation of the Membrane of the Mouth, which is perforated by the Ducts of numerous Glands, for the secretion of Mucus.

The lower end of the Pharynx, opposite to the under edge of the Cricoid Cartilage, describes a complete circle, which forms the beginning of the Esophagus.

The Pharynx is supplied with Blood by the Pharyngeal Branches, which come directly or indirectly from the External Carotids. It returns its blood to both Jugular Veins.—Its nerves are from the Eighth Pair.

The *Use* of the Pharynx is,—to receive the Aliments from the Mouth, and by the action of its Muscles to convey them to the Esophagus. It must likewise assist in the modification of the Voice.

Larynx.

The *Larynx*, so called from its being the principal Organ of Voice, is situated at the upper and fore-part of the Neck immediately under the Os Hyoides, which is placed at the root of the Tongue.

It is composed of Cartilages and Muscles, Ligaments, Membranes, and Mucous Glands; and is connected above to the Tongue and Os Hyoides, and behind to the Pharynx.

The *Cartilages* of the Larynx are generally considered as being five in number, though besides these, some choose to enumerate small Projections which are connected with them.

The *Five* Cartilages are,—the *Thyroid*, the *Cricoid*, the *Two Arytenoid*, and the *Epiglottis*.

The *Thyroid*, *Scutiform*, or *Shield-like Cartilage*, is placed at the upper and fore-part of the Larynx, and is the largest of the whole.

When spread out, it is of an oblong shape, but in the natural situation, it consists of two lateral Wings or Portions, of a quadrangular form uniting before in a longitudinal angle, which can be readily felt in the fore-part of the Throat, and which, from its projecting more in Men than in Women, has obtained the name of *Pomum Adami*.

The upper part of the angle is formed into a Notch, from which, and from the upper edge of the Cartilage in general, a *broad Ligament* ascends, to fix it to the under-part of the Os Hyoides.

From the posterior corners four processes project, called *Cornua*, two of which termed *Superior*, are long, and ascend to be joined by round Ligaments to the extremities of the Cornua of the Os Hyoides.

In the middle of these Ligaments, one or two small Cartilaginous, or even Osseous Substances, are frequently found.

The other two Cornua, called *Inferior*, are shorter than the Superior, and curved backwards, to be fixed to the sides of the Cricoid Cartilage.

The Thyroid Cartilage serves for the protection of the other Cartilages, and, along with the Os Hyoides, preserves the Passage open, for the transmission of the Food to the Stomach.

The *Cricoid*, or *Annular*, or *Ring-like Cartilage*, is placed below, and likewise behind the Thyroid, and like it, may be readily felt in the fore-part of the Throat.

It is narrower before, where it lies under the Thy-

roid Cartilage, and thick, broad and strong posteriorly, where it is placed behind that Cartilage.

Its Posterior Surface is divided by a *Ridge* into *two lateral Cavities*, for the reception of the posterior Crico arytenoid Muscles.

Its under edge is horizontal, and fixed to the beginning, or first Cartilage of the Trachea.

The upper edge slants considerably, and has its anterior narrow part fixed to the under edge of the Thyroid Cartilage.

It has four small Articular Surfaces, with distinct Capsular Ligaments, of which two are placed above, for the articulation of the Arytenoid Cartilages, and two at the under and lateral parts, for the connection of the inferior Cornua of the Thyroid Cartilage.

The Cricoid Cartilage forms part of the general Tube of the Trachea, consitutes the Base of the Larynx, and gives a firm support to the Arytenoid Cartilages.

The *two Arytenoid Cartilages*, named from a supposed resemblance to an Ewer, or Drinking-cup of the Ancients, are much smaller than the other Cartilages, and are placed upon the upper posterior, and lateral parts of the Cricoid Cartilage, at a small distance from each other.

They are of a *triangular* form, and a little twisted, and are bent back, so as to have a broad concave Surface behind.

Their upper extremities are turned towards each other, and are considered by some Authors as distinct Cartilages.

Their Bases are *broad* and *hollow*, where they are articulated by Capsular Ligaments with the Cricoid Cartilage, upon which they are moved in different directions, by the action of various Muscles.

They are connected to each other, and to the adjacent Cartilages, by different Muscles and Ligaments.

The Arytenoid Cartilages form a part of the opening called *Glottis*, and give attachment to its Ligaments.

The *Epiglottis*, obtaining its name from its situation above the Glottis, is of an oval form when surrounded by its Ligaments and Membranes, but, when divested

of these, it is found to be narrow below, broad above, and rounded at its upper extremity.

It is convex towards the Tongue, and concave towards the Glottis, with its point reflected a little forwards.

It is placed behind the upper part of the Thyroid Cartilage, is situated obliquely over the Glottis, and may be seen and examined by pressing down the root of the Tongue.

Its under end is fixed by a broad and short Ligament to the middle Notch of the Thyroid Cartilage, and by two lateral Ligaments to the whole length of the Arytenoid Cartilages.

It is fixed to the roots of the Os Hyoides and Tongue by another Ligament, which is a doubling of the inner Membrane running along the middle of its anterior Surface, and forming the *Frænum Epiglottidis*.

It is very elastic, and is much more pliable than the other cartilages, being of a Cartilago ligamentous nature.

It is found to have a number of *Fissures*, in which *Lacunæ* are placed, and to be perforated by numerous *Foramina*, which are the Mouths of so many Mucous Follicles, and which are in a great measure concealed by the Membrane which covers it.

It breaks the current of the Air coming from the Mouth and Nose, and prevents it from rushing too forcibly into the Cavity of the Lungs.—Pressed and drawn down by the Tongue and by small Muscles, it defends the Glottis, and shuts it completely in the time of swallowing. After the Action of swallowing, it is raised by its own elasticity, and by the root of the Tongue to which it is fixed, returning to its former position.

Ligaments of the Glottis.—From the fore-part of the body of each of the Arytenoid Cartilages, a *Ligamentous Cord* passes horizontally forwards, to be fixed by its other extremity to the inside of the anterior angle of the Thyroid Cartilage.

The *opening* formed between these Ligaments is called *Glottis*, from the Greek : It is also called *Mouth of the Larynx*, and *Rima Glottidis*, and is of a triangular figure, the Ligaments being at a greater distance behind than at their anterior extremity.

Under these two Ligaments there are two others, larger and more distinct than the former, and which are commonly considered as the *proper Ligaments of the Glottis*. They arise from the Base of the Arytenoid Cartilages, and run in the same direction with the former, to be fixed also to the Thyroid Cartilage.

In the Interstice of the Superior and Inferior Ligaments, on each side there is a *Fissure*, which leads to a small Membranous Cavity or Depression, with its bottom turned outwards.

These are the *Ventricles of the Larynx* of GALEN.—They are chiefly formed by the inner Membrane of the Larynx.

They differ in size in different people, have Mucous Follicles opening into them, and are found to be serviceable in the modulation of the Voice.

On the anterior Surface of the Arytenoid Cartilages there is a small Depression filled by a *Glandular Body*, which not only covers the fore-part of these Cartilages, but is continued over the posterior extremity of the Ligaments of the Glottis.

The *Arytenoid Glands* are larger in some subjects than in others. They were discovered, and are particularly described and delineated, by MORGAGNI.

The Ligaments which connect the Epiglottis to the Notch of the Thyroid Cartilage, and to the under side of the Os Hyoides, and one which ties the Base of the Os Hyoides, from a *triangular space*, which is also occupied by Cellular Substance and by Mucous Glands.

The Cavity of the Larynx is lined by a Membrane which is extremely irritable, and is every where perforated by the Mouths of small Mucous Glands, for the purpose of moistening it.

The Larynx has a number of Muscles, for its different motions; all of which have been already described.

The *Arteries* of the Larynx are the two superior Laryngeals, which come from the External Carotids, and the two inferior Laryngeals, which are sent off from the Subclavian Arteries.

The *Veins* return to the External Jugulars.

The *Nerves* are chiefly the superior and inferior Laryngeals, which are branches of the Eighth Pair.

The Larynx serves the purpose of Respiration, forms

and modulates the Voice, and is also useful in Deglutition.

It is the principal Organ of Voice ;—for, if a hole be made in the Trachea, and the passage of the Larynx stopped, the Air escapes by that opening without producing Voice.

Voice is formed by the Air, in its passage through the Glottis, acting upon the Ligaments of the Glottis and Cartilages of the Larynx and Trachea, and thus producing a Tremour ;—and is different in different persons, according to the Form and Structure of the Larynx.

The strength of Voice is in proportion to the quantity of Air expired, and the narrowness of the Glottis.

A Tone is acute in proportion to the tension of the parts of the Larynx and Trachea in general, and of the Ligaments of the Glottis in particular.

A Tone is grave in proportion to the reverse of the above.

Speech is performed chiefly by the different parts of the Mouth, assisted by the Cavity of the Nose,—the Larynx moving only in a small degree.

When the Air passes through the Larynx without producing a Tremour it occasions a Whisper.

When a person speaks during inspiration, the voice is thereby very materially altered ; and, by practice, may be made to appear as coming from other places than the Mouth of the speaker ; as is the case with those who call themselves *Ventriloquists*.

OF THE THORAX.

The *Thorax*, or *Breast*, extends from the Neck to the Diaphragm, and is divided into *External* and *Internal* Parts.

EXTERNAL PARTS OF THE THORAX.

The *External* Parts of the Thorax, besides the common Integuments and Mammæ, are,

The *Muscles*, consisting of the *Pectorales*, *Subclavii*, and under end of the *Platysma Myoides* on each side, which are situated anteriorly.

The *Serati Magni*, which are placed laterally.

The *Trapzii*, *Latissimi Dorsi*, and numerous other Muscles on the Back, which are placed posteriorly.

The *Intercostales* and *Sterno-Costales*, which are situated, the former between, and the latter on the inner side of the Ribs.

The *Bones*, consisting of *Sternum*, *Ribs*, *and Dorsal Vertebræ*.—All these Parts, excepting the Mammæ, have been already described.

Mammæ.

The *Mammæ* are two Glandular Bodies, of a circular form, situated on the anterior, and a little towards the lateral parts of the Thorax, adhering loosely by Cellular Substance to the Surface of the large Pectoral Muscles.

The term *Mammæ* is peculiar to the Breasts of Women —In Men these parts are called *Mammillæ*;—and, in the Brute-kind, *Ubera*.

In the *Ape*, and a few other animals, they are placed, as in the Human Body, upon the Thorax;—but, in the generality of Quadrupeds, they are situated under the Abdomen.

The common number of the Mammæ, in the Human species, is well known to be two.—BARTHOLINE, however, mentions the case of a Woman, who had two Mammæ on the left side, and one on the right; and another, where there were two on each side.

Dr. VAUGHAN narrates the case of a Woman he has examined, who has a supernumerary Nipple, at the under side of the right Mamma, from which milk flowed when the central one was pressed, and *vice versa*.

The Mammæ vary in size in different Women, and in the same Women at different periods of life.

In Girls, previous to the age of Puberty, they are remarkably small.

About the age of fourteen, at which time the Menses, in this climate, most commonly begin to appear, they evolve and become prominent.

During Gestation they increase in size, and soon after Delivery they arise at their greatest extent.

After the age of forty-five, or from that to fifty,—the period when the Menses generally disappear, they decrease in size, and become soft, pendulous, and flaccid.

Under the Skin, there is a large quantity of *Fat* which constitutes a considerable portion of the bulk of the Mamma, and defends the Glandular Part, and is not found to pass into, or communicate with, the Lactiferous Ducts.

The *Glandular* Part of the Mamma is of a whitish colour of the Conglomerate kind, and therefore irregular in its Substance.

It is composed of a number of smaller Masses or Glands, which are also separated by Fat; and these again are divided into still smaller parts, in which the Milk is originally secreted or formed.

Near the centre of the Mamma, is the *Papilla* or *Nipple*, which is of a Cylindrical form, and of a redder colour than the rest of the Skin of the Breast.

It is of different sizes in different ages and constitutions, and is always larger in the time of Gestation, or of Nursing.

It is capable of distention from titillation, or when influenced by the passions of the Mind.

It is composed of a *tough Cellular* or *Ligamentous Substance*, which incloses the Lactiferous Tubes, and which is so elastic, that after the part is drawn out or distended, it readily recovers its former dimension, when the cause of distention has ceased to act.

Upon the Apex of the Nipple, the *Orifices* of the Lactiferous Ducts appear and are of the same number with those which enter its Base.

Around the Nipple, there is a *circle* or *disk*, called *Areola*—of a different colour from the rest of the Skin of the Breast.

This Disk, however, varies in colour at different times of life, being florid in young Girls, of a pale brown in Women a little more advanced in life, and in old age, of a livid and dull colour.

During Pregnancy, it is of a darker colour than at other times, in consequence of a change which takes place in the corpus Mucosum which forms it.

Under the Skin of the Areola, there are numerous *Sebaceous Glands*, or *Follicles*, the Orifices of which dis-

charge an oily Mucous, to defend the Nipple and Areola around it.

The *Arteries* of the Mamma are partly from the Internal, and partly from the External Mammaries or Thoracics, the former of which are sent off from the Subclavian, and the latter from the Axillary Artery,—the Branches entering the Mamma at many different places.

The *Veins* accompany the Arteries, and are distinguished by the same names.

The *Absorbents* of the Mamma are also numerous, the greater part of which pass through the Axillary Glands, others penetrate the Interstices of the Ribs, near the Sternum, and enter the Glands which belong to the Internal Mammary Vessels.

The *Nerves* are chiefly from the Axillary Plexus, a few Branches being also sent off from the Intercostals.

From the extremities of the Arteries in the Substance of the Mamma, numberless Tubes arise, called *Ductus* or *Tubili Lactiferi*, which gradually unite into Trunks, and run in a radiated manner towards the root of the Nipple.

They become greatly enlarged in the time of Sucking, and serve as Reservoirs in which the Milk is contained.

The Lactiferous Ducts are accompanied, in the Substance of the Mamma, by a *tough white elastic Substance*, which follows them to the Nipple.

At the root of the Nipple, they become contracted, and are there from *Twelve* to *Eighteen* in number.

Either from the want of uniformity, however, with respect to their number in different subjects, or from the difficulty of perceiving them, they have been variously estimated by different authors.

Near the root of the Nipple, they have been supposed by Dr. Meckel, to form a circle of communication;—but this has been ascribed by still later Anatomists, to a laceration of Vessels; and numerous preparations and experiments,—particularly that of throwing in an injection at one Duct, and finding that it fills one part only of the Mamma, without returning by any other Duct,—seem sufficiently to indicate, that there is no such circular communication.

In the Substance of the Nipple, the Laciferous Tubes are at a little distance from each other, and are coiled up in such a manner, that the spontaneous flow of the Milk is prevented, unless it be accumulated in a larger quantity.

But when the Nipple is drawn out and extended,—as by the application of the Child's Mouth,—the Ducts become straight and parallel to each other, so as to allow an uninterrupted flow of the Milk.

After the action of Sucking, the Nipple, and of consequence its Ducts, immediately recover their former situation.

Sometimes one or more of the Lactiferous Ducts terminate upon the Surface of the Areola, from which, MORGAGNI supposed that the Glands there were of the Lactiferous kind.

In Children of both sexes, the Mammæ are merely Cutaneous Tubercles, and at the time of birth contain a *Milky-like Fluid*, which can be readily squeezed out.

This Fluid commonly disappears a short time after Birth ;—but there are various examples on record, where Milk has been brought to the Breasts, both of young Girls and old Women, by the frequent application of a Child to the Nipples, and where there was no cause for suspicion of Impregnation being present.—Nor are instances a wanting of Milk being brought to the Mammillæ of Men, by the same application.

The Mammæ add much to the ornament of the person, but serve in particular for furnishing nourishment to the Child, which is conveyed to it through the medium of the Nipple.

The Secretion begins soon after Delivery, and continues to flow for many months, and even for some years, if the Woman suckle her Child ; and the more frequently the Milk is extracted, the greater is the quantity received in a given time.

The operation of Sucking depends upon the principles of the Air-pump.—The child embraces the Nipple closely with its Lips, which prevents the external Air from entering, draws the Ducts to a straight line, and prepares a space for the Milk, which is forced from the Breast by the pressure of the Atmosphere, and flows to

the Mouth in the manner a Fluid follows the Pistern of a common Pump or Syringe.

INTERNAL PARTS OF THE THORAX.

The Mammæ and Muscles, covering the fore and lateral parts of the Thorax, being turned aside, and the Ribs afterwards cut from the Sternum and turned back, the *Internal Parts* of the Thorax are brought into view.

They consist of the *Pleura*, which lines the Thorax; the *Mediastinum*, which divides it into right and left Cavities, and contains several Vessels, Nerves, &c. between its Layers;—the *Pericardium* and *Heart*, which occupy the middle,—and the *Lungs*, which surround the Heart, and fill the greater part of the Thorax.

The Pleura.

The *Pleura* is a Membrane of considerable strength, which lines the inner side of the Thorax, and covers the most of its contents.

Its External Surface is *Cellular*, and adheres closely to the parts which surround it.

Its Internal Surface is *smooth* and *polished*, being moistened by a Serous Fluid, which exudes from its Arteries.

It is divided into *two lateral Sacs* or *Pleuræ*, the form of which corresponds exactly with that of the surrounding Bones of the Thorax.

The Pleuræ adhere to the Periosteum of the Ribs, line the Intercostal and Sterno Costal Muscles, the Sternum, and Dorsal Vertebræ, and cover the Pericardium, Lungs, and Lateral or Fleshy parts of the Diaphragm.

Behind the Sternum, the Pleuræ are contiguous to each other, and form a *Partition* called *Mediastinum*, which extends between the Sternum and Vertebræ, but is intercepted by the Heart and Root of the Lungs, and divides the Thorax into two distinct Cavities, which have no communication with each other.

The *Arteries* of the Pleura are from those of the adjacent parts, viz. from the Intercostal, Mammaries, Diaphragmatics, Bronchical, and Esophageal.

The *Veins*, which return the Blood, accompany the Arteries, and are distinguished by the same names.

The *Nerves* are from the Intercostals and Diaphragmatics, but too small to be traced without difficulty; and the Membrane itself is not observed to possess much sensibility in the sound uninflamed state.

The Pleura serves to render the inside of the Thorax smooth, for the easy motion of the contiguous parts, to divide it into Cavities, and to strengthen the containing and contained parts of the Thorax.

Mediastinum.

The *Mediastinum*, so named from its situation in the middle of the Thorax, is formed by a reflection of the Pleura, and is of course double.—It contains between its Layers a considerable quantity of Cellular Substance, by which they are united.

It is divided into *Anterior* and *Posterior* Mediastinum, the former of which is situated at the fore, and the latter at the back-part of the Thorax.

The *Anterior Mediastinum* is connected before, to the Sternum; and behind, to the Pericardium and large Vessels of the Heart.

The two Layers of the Anterior Mediastinum are closely applied to each other, excepting at the upper-part of the Thorax, where they are separated by the remains of the *Thymus Gland*.

At the upper-part of the Thorax, it lies exactly behind the middle of the Sternum; but in its descent, it inclines gradually to the left edge of that Bone.

In consequence of its obliquity, a pointed instrument, pushed through the centre of the Sternum, is generally found to pass into the right Cavity of the Thorax.

Frequent deviations, however, from this general rule, have been met with.—In particular, LIEUTAUD and SABATIER relate several instances where the Anterior Mediastinum was found to descend along the middle of the Sternum; and others, though rare, where it descended even to the right side of this Bone.

The *Posterior Mediastinum* reaches from the root of the Lungs and back-part of the Heart, to the Dorsal Vertebræ.

Between the Layers of the Posterior Mediastinum, a *triangular space* is formed, in which are situated the under end of the Trachea, the Esophagus, and Aorta

Descendens, the Vena Azygos, and Thoracic Duct, with the Eighth Pair of Nerves.

The *Blood-vessels* of the Mediastinum are from those of the neighbouring parts :—The Anterior Mediastinum is supplied by Branches from the Subclavian, Internal Mammaries, and Diaphragmatics,—and the Posterior Mediastinum, by Branches from the Intercostals and Esophageals.

The *Veins* accompany the Arteries, and have the same names.

The Mediastinum divides the Thorax into two Cavities, supports its general Contents, hinders one Lung from pressing upon the other, when the person lies on his side, and prevents Fluids,—which, in consequence of accident or disease, may be contained in the Cavity of the Thorax,—from passing from one side to the other.

Pericardium.

The *Pericardium*, *Sac*, or *Capsule* of the Heart, is one of the strongest Membrane of the Body, and its size such as to be properly adapted to that of the Heart, which it contains.

It is formed of *two Layers*, the *External* of which is a continuation of the Anterior Mediastinum, which afterwards passes to the Lungs and lateral parts of the Diaphragm.

The *Internal Layer* is smooth, tendinous like, and polished on its inner Surface, and is stronger than the other.

It adheres so firmly to the Tendinous part of the Diaphragm, as not to be separated from it without much difficulty.

The Pericardium extends a considerable way beyond the Base of the Heart, and includes the large Blood-vessels, as far as the roots of their first principal Branches, in consequence of which it forms several angles, which have been termed *Cornua* of the Pericardium.

While the External Layer is reflected to cover the parts which surround it, the inner one is also reflected, first over the roots of the large Blood-vessels, and then over the Heart, to form its proper covering, in the same manner the Tunica Conjunctiva is reflected from the Eye-lids to cover the fore-part of the Eye.

From the ends of the Extreme Arteries, upon its Surface, a Fluid, called *Liquor Pericardii*, is discharged, by which it is lubricated, and the effects of Friction diminished.

The Liquor Pericardii is commonly found after death, in the quantity of a few drachms, though not unfrequently of one or two ounces.

Its colour is redder in a young subject, than in a person advanced in life, in whom it becomes paler, or more of a straw colour.

The *Arteries* of the fore-part of the Pericardinum are from the Internal Mammaries and Diaphragmitics; those of its fore-part from the Bronchial and Esophageal.

The *Veins* correspond with the Arteries, and have the same name.

The *Use* of the Pericardinum is, to preserve the Heart in situ, to defend it from being injured by the parts which surround it, and to restrain its inordinate motions.

OF THE HEART.

The *Heart* is a hollow Muscle, divided into different Cavities, and inclosed in the Pericardium.

It is situate in the Cavity of the Thorax, behind the Sternum, between the Right and Left Lungs.

It is of a *Conical* figure, flattened at one side, and is divided into *Base*, *Body*, and *Apex*, with a *Superior* and *Inferior Surface*, and a *Right* and *Left Margin*.

The *Base* is placed backwards next the Spine, while the Body and Apex are turned forwards, and obliquely over to the left side.

In Quadrupeds, the Heart is placed upon a line with the Sternum, the point only touching the Diaphragm: In the Human Body, the Apex, or point of the Heart, is but little lower than the Base, and projects between the two lobes of the left Lung, behind the Cartilages of the Fifth and Sixth True Ribs of the left Side, or a little below the left Nipple, where the Pulsation may be felt,

The situation, however, varies a little, according to the position of the Body, and state of Respiration.

Though this be the common situation of the Heart, a few rare and singular instances have occured, where it has been found to occupy the right side of the Thorax; and a displacement has sometimes happened, in consequence of different kinds of tumours in the left side of the Thorax.

The *Superior* or *Anterior Surface* of the Heart is convex, and is opposed to the Posterior Surface of the Sternum, the anterior edges of the Lungs intervening.

The *Inferior* or *Posterior Surface* is flat, and rests upon the Tendon of the Diaphragm which supports it; the Heart is not much affected, however, by the motions of that Muscle in time of Respiration, its Tendon moving only in a small degree.

The right side of the Body of the Heart is sharp, and is called *Margo Acutus*.

The left side of the Body of the Heart is round, and is termed *Margo Obtusus*.

The Base is formed of a right and left *Auricle*, and the Body of a right and left *Ventricle*.

When the Heart is distended, the right Auricle, and part of the corresponding Ventricle, occupy the right, and the rest of the Heart the left Cavity of the Thorax.

The Heart is connected above and behind to the upper and back-part of the Thorax, through the medium of the *great Vessels* which go into, or pass out from it.

The other parts of the Heart are free, being merely contiguous to the inside of the Pericardium.

The External Surface of the Heart is covered with a thin smooth *Membranous Coat*, which is a reflection of the inner Layer of the Pericardium, and which gives additional strength to its Fleshy Fibres.

Between the Coat and Substance of the Heart, there is commonly a considerable quantity of Fat, which lubricates it, and facilitates its motions.

The Substance of the Heart consists of *Muscular Fibres*, firm and more closely connected than the generality of Fibres of Muscles in other parts of the Body.

The Fibres run in different directions, longitudinal and transverse, but most of them oblique.

Many of them run over the Point of the Heart from one Surface to the other, and the whole so much twisted and folded, and so variously intermixed, as to be difficult to be unravelled or described :—In general, however, their course is such as to lessen the Cavities of the Heart in all their dimensions.

The *Cavities* of the Heart are lined with a Membrane extremely thin, but dense and strong, to defend them against the pressure of the Blood.

The Heart is formed of an *anterior* or *right*, and a *posterior* or left side, or of a *right* and *left Heart*, joined together by a *Partition*, which prevents the two sides from having any direct communication with each other. The terms Right and Left, however, are more applicable to the Heart of the Quadruped, and those of Anterior and Posterior to the Human Heart.

Each side of the Heart is furnished with a set of *Veins*, with an *Auricle*, a *Ventricle*, and an *Artery*, and also with two sets of *Valves*,—one between the Auricle and Ventricle, the other between the Ventricle and Artery.

At the right side of the Heart are two Veins, called from their large size *Venæ Cavæ*, the one *Superior*, the other *Inferior*.

The *Superior Vena Cava*, called also *Vena Cava Descendens*, returns the Blood from the upper parts of the Body ; and the *Inferior Vena Cava*, termed likewise *Ascendens*, return it from the lower parts ; and both terminate in the right Auricle. It is prevented from returning by the fulness of the Veins, and by the pressure of the Blood *a tergo*.

The Auricle is situated upon the right, and partly upon the back-part of the Heart, and is divided into the right *Sinus Venosus* and *proper Auricle*.

The *Sinus Venosus* is formed by the Union of the two Venæ Cavæ, which swell out towards the anterior and left side. It is notched at its anterior edge, as a Muscular Bag of considerable strength, and is uniform and smooth, both upon its outer and inner Surface.

At the upper and left side of the Sinus, is the projection or *Appendix*, termed *Proper Auricle*, from its supposed resemblance to the Ear of a Quadruped :—It is formed by a blind Sac, which is serrated and notched

on its posterior edge, and convex or rounded on the other, and terminates obliquely in an obtuse point.

The Sinus and proper Auricle form one common Cavity, have no Valve between them, and are therefore filled and emptied at the same time.

Where the two Cavities meet in the Hearts of Quadrupeds, there is a projection seen in the Sinus Venosus, called *Tuberculum* LOWERI, which is supposed to prevent the Blood of the one Cava from rushing upon that of the other, and to direct it into the Auricle.

At the meeting of the two Cavæ in the Human Heart, an angle is formed, which also has frequently got the name of Tuberculum LOWERI :—That substance, however, is peculiar to the Hearts of Brute-Animals.

Under this Angle, or joining of the Venæ Cavæ, there is the Vestige of the *Foramen Ovale*, which in the Fœtus, forms a communication between the right and left Auricles ; but, in the Adult, is filled up by its Membrane, and forms the *Fossa Ovalis*.

The *Fossa Ovalis* has thick and strong sides, called *Columnæ Foraminis Ovalis, isthmus* VIEUSSENII, or *Annulus Fossæ Ovalis*.

At the left side of the Mouth of the Inferior Cava, where it joins the Sinus, is the *Valve* of EUSTACHIUS.

It is in form of a Crescent, with the Convex edge fixed to the union of the Sinus and Cava, and the concave edge turned obliquely upwards, reaching about half-way over the Mouth of the Cava.—Its size and appearance, however, vary much in different Subjects.

Its posterior Cornu is continued with the left side of the Isthmus of the Foramen Ovale ; the other end vanishes in the opposite side of the Sinus.

It is equally distinct in the Adult as in the Fœtus; but in the former it is frequently found reticulated, or Cribriform, which appearance is seldom, though sometimes, met with in the latter.

In the Adult, it is supposed to prevent the Blood of the Auricle from passing into the Inferior Cava ; and in the Fœtus, to direct the Blood of the Inferior Cava to the Foramen Ovale.

Upon the left side of the Valve of EUSTACHIUS, in the under part of the Auricle, is the *Orifice* or *Termination* of the great Coronary Vein of the Heart.

Over the Orifice of this Vein, there is a Semilunar Valve, to prevent the Blood in the Auricle from passing into the Vein.

The inner side of the proper Auricle is readily distinguished from the Sinus, by having a number of *Columnæ Carneæ*, or *Fleshy Pillars* in it, which, from their supposed resemblance to the Teeth of a Comb, sometimes obtain the name of *Musculi Auriculæ Pectinati*.

The Musculi Pectinati have smaller Columns running in different directions, giving the whole a reticulated appearance.

Between the Columnæ Carneæ, are *Depressions* or *Furrows*, in which the sides of the Auricle are thin, and semi-transparent, being chiefly formed by the outer and inner Membrane of the Auricle.

At the under and left side of the Sinus Venosus, and opposite to a *Groove*, situated externally between the Auricle and Ventricle, there is a *Hole*, above an inch in diameter, which opens into the upper and right part of the corresponding Ventricle.

The right Auricle receives the Blood from the Venæ Carvæ and Coronary Veins, and, by its Muscular contraction, discharges it into the corresponding Ventricle, out of which it is prevented from returning by a Valve, called *Tricuspid*, placed within the Ventricle.

The *Right* or *Plumonary Ventricle*, is situated on the fore-side of the Heart, is of a triangular form, and much thicker and stronger than the corresponding Auricle.

It has many strong Eminences, Columns, Lacertuli, or Cords, called *Columnæ Carneæ*.

The *Columnæ* run in different directions, but the strongest of them longitudinally, and are of various sizes, forming so many distinct Muscles, which are extremely compact in their structure, and compose a beautiful, intricate, and irregular Net-work.

In general, they adhere through their whole length to each other, or to the sides of the Ventricle; but many of them are loose in their middle, and many be raised by a probe put under them.

They assist the Ventricle in its *Systole* or contraction, and prevent it from being overstretched in its *Dyastole*

or dilatation, and agitate the Blood in its passage throughthe Ventricle.

They are supposed to bring the opposite sides of the Ventricle completely together, during its contraction.

Between the Columnæ are many deep Grooves, Pits, or Foveæ, into all of which the Blood readily enters.

Around the Passage, between the Auricle and Ventricle, there is a *Tendinous Margin* or *Ring*, from the whole edge of which a circular Membrane is sent off, called *Valvula Tricuspis*, or *Triglochin*, from its having three principal points or divisions.

From the edge of the Tricuspid Valve, many small round *Tendinous Cords* are sent off, of unequal size.

The *Chordæ Tendineæ* descends obliquely within the Ventricle, in the same direction with the Valve from which they arise.

They are fixed to the extremities of a few strong Papillæ or Columnæ, Carneæ, which are joined by their other extremities to the corresponding sides of the Ventricle.

The Tricuspid Valve prevents the reflux of the Blood to the Auricle, during the contraction of the Ventricle.

The Tendons allow the Valve to be pushed back by the Blood, until a Septum or Partition is formed by it at the Mouth of the Ventricle, during the contraction of the latter.—The Papillæ, by their contraction, prevent the Valve from going into the Auricle.

The Valve is opened and pressed back by the Blood in its passage from the Auricle to the Ventricle.

The upper and left side of the Ventricle becomes smooth and uniform, and leads to a large opening, about an inch in diameter, which is the Mouth of the Pulmonary Artery.

The right Ventricle, by its dilatation, receives the Blood from the Auricle, and sends it by a strong and sudden convulsive contraction, to the Pulmonary Artery, from whence it is prevented from returning, by three Valves placed in the Mouth of the Artery.

The Valves at the Mouth of the Pulmonary Artery are called *Valvulæ Semilunaries*, or *Sigmoideæ*, from the resemblance of their edges to those of a Crescent.—Two of them are placed in the fore, and one in the back part of the Artery.

Each of them forms a *small Sac*, one edge of which adheres to a third part of the circumference of the inside of the Artery ; the other edge is loose in the Cavity of that Vessel, and is somewhat thicker and stronger than the rest of the Valve,—the thickened edges serving as Ligaments to it.

The loose edge has a *general Curve*, divided into *two smaller ones*, which meet in a *point* in the middle.

The Valves are chiefly formed of a doubling or extension of the inner coat of the Artery.

In the middle point or loose edge of each of the Valves, there is a small hard *triangular Granula*, of a somewhat redder colour than the rest of the Valve, called, from its reputed discoveries, *Corpusculum* AURANTII, or *Corpusculum* MORGAGNI ; or from its resemblance in shape to the Sesamum seed, *Corpusculum Sesamoideum*.

The Corpuscles complete the Valves at the centre of the Artery, and enable them to make a stronger resistance against the Blood, while the Artery is in action.

The Semilunar Valves are *concave* towards the Artery, *convex* towards the Ventricle, and when shut, their loose edges are opposed to each other, so as to enable them to form a complete *Partition* between the Ventricle and Artery.

Opposite to the Semilunar Valves, the Artery bulges out, and forms *three projections*, which have corresponding Pitts or Depressions within, and are called, from their discoverer, *Sinus* VALSALVAE.

The *Sinuses* of VALSALVA are of the same nature with those Dilatations which are found in the Veins and Lymphatics, between their sides and Valves ; and, like them, are partly formed by the pressure of the Fluids upon the sides of the Vessels.

The Pulmonary Artery receives the Blood from the right Ventricle, and by its contractile power, assists the Ventricle in driving it through the Lungs.

The Semilunar Valves, pressed back by the Blood in the Artery, prevent its return into the Ventricle.

The Valves are opened again by being driven towards the sides of the Artery by the current of the Blood, upon the next contraction or stroke of the Ventricle.

The Plumonary Artery passes behind the Sternum, and separates into *right* and *left Branches*, which go to the corresponding parts of the Lungs.

The two Branches of the Pulmonary Artery, like those of the Arteries of the Viscera in other parts of the large Cavities, suddenly divide into still smaller Branches.

From the extreme Arteries of the Lungs, corresponding Veins arise, and are merely the continuation or reflection of the Arteries, without any intermediate Cells or Dilatations.

The Pulmonary Veins, in the Substance of the Lungs, gradually unite, and form *four principal Trunks*, which terminate in, and carry the Blood to the left Auricle.

Of the Pulminary Veins, *two* come from the right, and *two* from the left lung, and terminate in the corresponding sides of the left Auricle.

The *left Auricle* is considerably thicker and stronger than the right, and, like it, is divided into Sinus Venosus and proper Auricle, which form one common Cavity without the intervention of any Valve.

The *left Sinus Venosus*, called also *Sinus Pulmonalis*, is turned towards the Spine, is more of a cubic form than the right one ; but resembles it in the uniformity and smoothness of its outer and inner Surface.

From the fore and left part of the Sinus, the *Proper Auricle* projects, and forms a distinct flat *Appendix*, or *Bag*, with different Cervatures or Indentations upon its edges.

The inner part of the Proper Auricle is *longer*, but *narrower* than that on the right side ; like it, however, is formed of Columnæ, Carneæ with Furrows between them.

The Proper Auricle is somewhat less capacious than that on the right side ; but the Sinus is as much larger as to render the two common Cavities of the right and left Auricles nearly equal.

The two Auricles have a *Fleshy Septum* between them, in which, as has been already mentioned, there is the *Foramen Ovale* in the Fœtus ;—but in the Adult the Partition is generally perfect.

From the under part of the Sinus Venosus, a *Passage* leads down to the Cavity of the Left Ventricle, and is

opposite to a *Groove* seen externally between the Auricle and Ventricle, similar to that on the right side.

The Left Auricle receives the Blood from the Pulmonary Veins, and by its Muscular contraction, drives it into the Left Ventricle, from which it is prevented from returning by a Valve in the Ventricle, called *Mitralis*.

The *Left Ventricle* is situated in the posterior and left part of the Heart

Its sides are about *three times thicker* and *stronger* than those of the Right Ventricle, being in proportion to the force required to propel the Blood of the most remote parts to the Body.

It is *narrower* and *rounder*, but considerably *longer*, both on its External Surface and in its Internal Cavity, than the Right Ventricle, and generally descends someway below the other, and forms the Apex cordis, or Point of the Heart.

The Cavity is commonly described as being less than that of the Right Ventricle ;—but the apparent difference, which takes place after death, is accounted for with seeming propriety by some Authors,—from the left Ventricle being then for the most part found empty, and the Right one full, and from the greater degree of contractility in the former.

That the capacity of the Cavity of the right and left Sides of the Heart, is more nearly equal during life than after death, or that it is generally supposed to be, is evident from the appearance of the Heart of the Human and also of the Brute kind, and from injections into the two sides of the Heart where the force applied is in proportion to the relative strength of each side.

The inner Surface of the Left Ventricle has the same general appearance with the Ventricle of the right side, and only differs from it in having its Columnæ Carneæ larger, firmer and stronger.

In the Passage of communication between the Auricle and Ventricle, there is a *Ring*, from which a *Circular valve* goes off, with all its apparatus similar to that between the right Auracle and Ventricle, and differing in no respect from it in structure and use, excepting in being stronger, and being divided into two principal portions only.

This Valve has been supposed to bear some resemblance to a *Bishop's Mitre*, from which it has been called *Vavula Mitralis*.

One of the portions of this Valve is larger than the other, lies over the Mouth of the Aorta, and is supposed to cover it while the Ventricle is a filling.

The *Valvula Mitralis* prevents the reflux of the Blood during the contraction of the Ventricle.

After the contraction is over, the Valve returns to its former situation by the impulse of a fresh current of Blood from the Auricle.

Between the Right and Left Ventricle, there is a thick strong impervious *Partition*, which forms a share of the general Septum Cordis, and is composed partly by the wall of the right, but chiefly by that of the left ventricle, the right being united to the left, almost in the form of an Appendix.

The Partition prevents any direct communication between the two Ventricles.

Opposite to the outer edge of the Septum, both upon the upper and under Surfaces of the Heart, there is a *Groove* in which some of the principal Trunks of the Coronary Vessels are situated.

At the fore and right side of the Valvula Mitralis, and behind the beginning of the Pulmonary Artery, there is a *round Opening*, which is the Mouth of the Aorta, and which is nearly of the same size with that of the Pulmonary Artery.

Under this opening, the Surface of the Ventricle becomes *smooth*, and *equal*, having none of the Columnæ Carneæ which are seen on the other parts of its Cavity.

The Left Ventricle receives the Blood sent to it from the Auricle, and by a contraction similar to, but much stronger than that of the Right Ventricle, propels it to the Aorta.

At the Mouth of the Aorta, there are *three Semilunar valves*, with their *Corpuscula* AURANTII, perfectly similar to those of the Pulmonary Artery ;—but a little stronger.

On the outside of the Semilunar Valves, are the *Sinuses* of VALSALVA, like those of the Pulmonary Artery, but a little more prominent.

The Semilunar Valves are pressed back by the Blood, and prevent its reflux during the contraction of the

Aorta.—They are returned towards the sides of the Aorta, in the same manner, and from the same cause, as in the Pulmonary Artery.

The *Aorta* passes upwards from the top of the Left ventricle, and is situated first behind, and then on the right side of the Pulmonary Artery, and between it and the Superior Cava.

It bears nearly the same proportion in thickness and strength to the Pulmonary Artery, which the sides of the Left ventricle do to those of the Right.

When the Aorta is about to send off the first of its large Branches at the top of the Thorax, it is of great size, and is sometimes called the *Large Sinus* of VALSALVA.

The Aorta receives the Blood from the left ventricle, and by its Muscular contraction re-acts upon it, and assists the ventricle in sending it by numberless Branches through the different parts of the Body, from whence it is returned by the veins to the Right Auricle.

Besides the Blood-vessels already taken notice of, and which are common to the Heart and the rest of the Body, the Heart is furnished with vessels peculiar to itself, termed *Coronary*, form a *Corona* which they form upon its surface.

The Coronary vessels consist of *two Arteries* and *one principal vein*.

The *Coronary Arteries* arise from the Sinuses, at the Mouth of the Aorta, opposite to two of the Semilunar valves.

One runs in a Groove between the Right Auricle and ventricles, and supplies chiefly the right side of the Heart.

The other passes partly between the Left Auricle and Ventricle, and partly in the Groove between the ventricles, on the fore-side of the Heart,—supplying the left side of the Heart, and communicating with the Branches of the other Artery on its upper and under surfaces.

The Coronary Arteries are entirely dispersed upon the substance of the Heart, and upon the roots of the great vessels, forming upon these some of the minute Branches, termed *vasa vasorum*.

The Coronary Arteries, from their situation opposite to the valves, have been supposed to be filled at a different time from that of the rest of the Arterious System;—but from experiment, it seems now sufficiently evident, that the Coronary vessels have their pulsation at the same instant with the other Arteries.

The *Coronary veins* return the Blood from their corresponding Arteries:—The greater part of them join into a Trunk, called the *Great Coronary vein*, which after making a turn from the left side, and running between the Left Auricle and Ventricle, terminates in the under part of the Right Auricle, where it is covered by its Semilunar Valve.

Other Coronary Veins, much smaller than the former, terminate in different parts of the right side of the Heart.

The *Absorbents* of the Heart go to the neighbouring Lymphatic Glands.

The *Nerves* are from the great Sympathetics and Eighth Pair.

With respect to the Circulation in general:—The Veins return the Blood from all the different parts of the Body by a slow and equal motion, and without pulsation, to the Auricles, which, on account of the quantity and stimulating quality of the Blood, contract suddenly and at the same time, and send it to the Ventricle.

The ventricles, from the same cause which stimulates the Auricles, and from the stroke they receive from them, contract convulsively, with a force proportioned to the thickness of their sides, and send the Blood to the Arteries; and, during their contraction, they are thrown by the dilatating Auricles against the Ribs, where the stroke occasioned by the Pulse of the Heart may be felt.

The Arteries, by their contractile power and elasticity, send the Blood suddenly to the veins, through which, by the united force of the ventricles and Arteries, and likewise, as is supposed by some, by a contractile power of the veins and pressure of the surrounding parts, it is driven again to the Auricles.

In its course the Blood performs a double Circulation,—one called the Lesser or that through the Lungs;—

the other called the Greater, or that through the Body.

In the former it passes from the Right ventricle to the Lungs, and returns to the Left Auricle.—In the latter, it goes from the left ventricle to the different parts of the Body, and returns to the Right Auricle.

During this Circulation, the Auricles and Arteries, and the Ventricles and Veins, act in concert, contracting and dilating at the same time.

Use of the Heart.—The Heart is the centre of the Vascular System, and principal agent in the Circulation of the Blood.

The right side of the Heart receives the Blood, which is contaminated in passing through the Body, and sends it to the Lungs, where it is purified through the medium of the Air.

From the Lungs, the Blood, now purified, is returned to the left side of the Heart to be circulated through all the other parts of the Body, thereby imparting Nourishment, Growth, and Strength to the general System ; being found also to be the source of Sensibility, Irritability, and Motion, and likewise of the Animal Heat.

OF THE LUNGS.

The *Lungs* are two soft spongy bodies, which occupy by much the greater part of the Cavity of the Thorax.

They completely fill the two bags of the Pleura, and are every where in contact with the parts adjacent ; no air intervening between them and the Thorax.

In *figure*, they have been compared to that of the Foot of an Ox, with the back-part turned forwards ; or, their shape corresponds exactly with the inside of the Thorax, being rounded next the Ribs, hollow towards the Diaphragm, and irregularly flattened and depressed next the Mediastinum and Heart.

They are of a reddish or pink colour in Children, of a light blue or greyish colour in Adults, and more of a purple and lived colour in old age, at which period they

are also observed to be tinged with black spots, proceeding from a matter secreted in their substance.

They are joined to the Neck, by the Trachea; to the Spine, by the two Layers of the Mediastinum, which serve them as Ligaments; and to the Heart by the Pulmonary vessels;—the rest of them being free and unconnected, unless an adhesion has taken place in consequence of inflammation.

They are divided into *Right* and *Left Portions*, or *Lungs*, which are separated from each other by the Heart and Mediastinum, and which have no communication, excepting through the Medium of the Trachea.

Each of the Lungs is again divided into large portions called *Lobes*, which facilitates their motion and the dilatations of their Cells.

Of these Lobes, *three* belong to the Right Lung, corresponding with the larger Bag of the Pleura, and *two* to the left, between which there is a Notch or Sinus occupied by the point of the Heart.

Each of the Lobes is subdivided into many smaller parts, termed *Lobules*, which are of different sizes, and of an irregular angular form.

The Lobules diminish in size, and degenerate at last into small *Vesicles* or *Cells*, which constitute a large share of the Lungs, and which are merely visible to the naked Eye.

The Cells of the Lungs are purely Membranous, of an irregular figure, compressed and closely connected, and have a free communication with each other.

Between the different Lobes, Lobules, and Cells, a large quantity of common Cellular Substance, destitute of Fat, is interposed, which unites and strengthens them, and allows the Blood-vessels to be minutely dispersed over them.

The Cells of the Lungs have no communication with this common Cellular Substance; for when Air is blown into it, the Lobules are compressed; but when the Air is blown in through a Branch of the Trachea, the Cells are again distended, and the Lobules recover their former dimensions.

In the Fœtus, the Cells are empty and in a collapsed state;—but as soon as Respiration begins, they become

distended, and continue so during life, and in every state of Respiration, and even in the recently dead body; but if an opening be made into the Cavity of the Thorax, whether in the living or dead body,—and the Air in this or in any other way admitted, they immediately collapse by their own weight and elasticity, the pressure of the air being then the same on the outer surface of the Lungs, and the inner Surface of the Trachea.

The Lungs are covered by *two coats*, an External or Common, and an Internal or Proper one.

The *External* or *Common coat* is a continuation or reflection of the Pleura, is extremely thin, but dense, and, like the other parts of the Pleura, is found to possess little Sensibility. It forms a general covering to the Lungs, but does not enter between the different Lobules.

The *Internal* or *Proper coat* adheres so firmly to the former, as to appear to constitute part of its Substance. It not only covers the Lungs, but insinuates itself between their Lobules, and is intimately connected with their Cellular Substance.

Besides the Cells, various kinds of Vessels, viz. the *Air-vessels* or *Branches of the Trachea*, *Blood-vessels* and *Absorbents*, together with small Branches of *Nerves*, enter into the composition of the Lungs.

Trachea.

The *Trachea*, or *Aspera Arteria*, so called from the inequality of its Surface, and from its conveying Air, begins at the under part of the Cricoid Cartilage, and descends in the fore-part of the Neck, between and behind the Sterno-hyoid and Sterno-thyroid Muscles.

From the Neck, it passes into the Thorax, where it is situated between the Layers of the upper part of the posterior Mediastinum.

Behind the Curvature of the Aorta, and opposite to the third Vertebra of the Thorax, the Trachea divides into two Lateral Branches, termed *Bronchi*, from the Greek, one of which goes to the Right, and the other, which is the longer of the two, to the Left Lung.

The Bronchi are divided into Branches, which by degrees become smaller, and at last terminate in the

Cells of the Lungs, which communicate so freely with each other, that, upon introducing Air into any of these Branches, a large portion of the Lungs may be inflated.

The Trachea consists of *Cartilaginous Rings*, about sixteen in number, which give strength and firmness to it, and preserves it constantly open for the transmission of Air. They are incomplete behind, where the Trachea is formed of a *soft Fleshy Substance*, which yields to the Esophagus in the time of Deglutition.

Each Cartilage forms a large segment of a circle, about a line, or one-twelfth of an inch in breadth, and one-fourth of a line in thickness.

The Cartilages are situated horizontally, with their edges opposed to each other, small spaces intervening between them.

They are united to each other, by a Ligamentous Substance, which is so elastic, that when the Lungs are taken out of the Body, it draws the Cartilages closely together.

At the upper end of the Trachea, two or three of the Cartilages are frequently joined by an union of Substance ; but below this, they are perfectly distinct from each other.

The beginnings of the Bronchi have the same kind of Cartilages with the Trachea ; but after they enter the Lungs, they are broken into two or three pieces, which go completely round the Bronchi, and are so connected to each other, as to keep the Passage open and free from Compression.

The Trachea has several *coats* entering into its composition, some for strengthening it, others for giving it a certain degree of motion, viz.

A *Cellular coat*, which in the Thorax, is covered by the Mediastium.

An *Elastic Ligamentous coat*, which passes along the Trachea and also upon the different Branches in the substance of the Lungs, adding much to the elasticity of these.

A *Muscular coat*, placed between the Cartilages, and in the back-part of the Trachea, and composed of circular Fibres without, and Longitudinal Fibres within ;

the former for straightening, the other for shortening the general Passage.

The Longitudinal Fibres are collected into bundles, which are distinctly seen through the inner coat, and may be traced considerably farther, in the substance of the Lungs, than the Cartilages.

The inner side of the Trachea is lined with a very *Vascular* and *Irritable Membrane*, continued from the Mouth, and forming at last the extreme Branches of the Trachea, which terminate in the Cells of the Lungs.

The inner Membrane of the Trachea is every where perforated by the *Ducts* of *Mucous Glands*, and by the *Mouths* of the *Exhalent Arteries*, the former pouring out Mucus to lubricate the Lungs, the other the Vapour which is thrown off in Perspiration.

Three different kind of Glands are connected with the Trachea,—the *Thyroid*, the *Tracheal*, and the *Branchial*.

The *Thyroid Gland* has its name from its connection with the Thyroid Cartilage, though more immediately connected with the Trachea.

It is a large reddish mass, situated at the under and fore-part of the Larynx, behind the Sterno-hyoid and Sterno-thyroid Muscles.

It has two Lobes placed at the under and lateral parts of the Layrnx, descending a certain way upon the Trachea and Esophagus.

The Lobes are joined by an intermediate portion, which lies across the upper and fore-part of the Trachea.

Sometimes a Process from the middle portion ascends between the Sterno-hyoid Muscles, and is lost behind the Base of the Os Hyoides.

This Gland has a Grandulous appearance within, and a viscid Liquor is sometimes observed in it, which has been supposed by SABATIER and others, to lubricate the parts in the neighbourhood.

It is supplied with large Blood-vessels, and with several Nerves, from those of the Larynx ; it is likewise furnished with numerous Lymphatics,—but no Excretory Duct has yet been observed to come from it ; nor is its office yet understood.

The *Tracheal Glands* are small, but numerous, and of different sizes, surrounding the Muscular coat of the Trachea, and its Branches in the Lungs; the largest of them are placed in the Fleshy Substance behind.

From each of these Glands a small duct issues, and throws out a Mucus, to defend the inner Surface of the Trachea from being injured by the Air, or by the extraneous particles which it carries along with it.

The *Bronchial Glands* are placed in the Cellular Substance round the under end of the Trachea and roots of the Bronchi, where these penetrate into the Substance of the Lungs.

They are of various sizes, from that of the point of the little Finger to that of the Millet-seed, and have a bluish or black colour, corresponding in a great measure with the colour of the darkest parts of the Lungs.

They were formerly considered by many Authors as sending Fluids to the Trachea, but are now sufficiently known to be entirely of the Lymphatic kind,—the Absorbents of the Lungs passing through them in their way to the Thoracic Duct.

The Trachea is furnished with *Blood-vessels* from the Inferior Laryngeals, and *Nerves* from the Recurrents and great Sympathetic Pair.

The Trachea serves to convey Air into, or out from the Cells of the Lungs, during Respiration, and to carry off the Perspirable Matter from their Arteries in time of Expiration.

The *Blood-vessls* of the Lungs consist of the *Pulmonary* and *Bronchial vessels;* the one for the general circulation, the other proper to the Lungs.

The Pulmonary Artery arises from the top of the Right Ventricle, divides, like the Trachea, into Right and Left Branches, which are dispersed through the substance of the Lungs.

The minute Branches running in the common Cellular Substance, form at last a *Plexus* upon the proper Cells, sometimes called *Rete Mirabile*, and *Rete Vasculosum* MALPIGHII, from which that Halitus is derived, which is expelled by the Lungs in Expiration.

The *Pulmonary veins* are commonly observed to be smaller in proportion to the corresponding Arteries, than Veins are to Arteries in other parts of the Body,

which has been supposed to be owing to the large quantity of Fluids expired.—They join into four principal Trunks, which terminate in the left Auricle.

The *Bronchial Arteries* arise by three or four small Branches, one of which is from the right Superior Intercostal, the rest from the Trunk of the Aorta.

They are dispersed upon the Branchi and Bronchial Glands, and substance of the Lungs in general, and are found to communicate with the Pulmonary Artery.

The Bronchial Arteries are supposed to serve for the nourishment of the Lungs and secretion of the Mucus.

The *veins* return the Blood to the Vena Azygos, and left superior Intercostal Vein.

The *Lymphatics* form a Plexus upon the Surface of the Lungs :—They communicate freely with the deep-seated Absorbents, and pass through the Bronchial Glands.

The Nerves of the Lungs are partly from the great Sympathetics, but chiefly from the Eighth Pair, and are rather small in proportion to the bulk of the organ on which they are dispersed.

The Lungs serve the general purpose of *Respiration*, which consists of *Inspiration* and *Expiration*, or the passage of the Air into or out from the Lungs by the alternate dilation and contraction of the Thorax.

Inspiration is performed in consequence of the Thorax being dilated by the action chiefly of the Diaphragm and Intercostal Muscles ; the Lungs, which are passive, and in contact with the Thorax, following it, and the Air rushing into the Trachea by its own gravity.

Expiration is performed in consequence of a relaxation of the Muscles which dilate the Thorax,—of the Abdominal and a few other Muscles,—of the elasticity of the Cartilages of the Ribs, likewise of the Lungs, by which the Cavity of the Thorax is diminished, and the Air is expelled from the Lungs.

Upon the alternate states of Inspiration and Expiration, depend the formation of the voice, the sensation of Smell, and all the other functions of the Body : but the great and principal office of the Lungs, which was formerly supposed to be that of cooling the Blood-overheated by friction, is, during Inspiration, to receive from the Atmosphere pure Air, upon which the princi-

ple of heat and life depends; and, during Expiration, to carry off an impure Air, which is noxious to Animal Life.

According to late experiments, it appears, that the Venous Blood passing to the Lungs, of a dark red or purple colour, is charged with Carbon or Charcoal, and Hydrogen, or Inflammable Air;—that while circulating upon the Bronchial Cells, one part of the Oxygen, or Vital Air, contained in the common Air, which has been inspired, unites with the Carbon and Hydrogen, and forms Fixed Air and a Watery Halitus, which are carried off by Expiration;—that another part of the Oxygen is imbibed by the Blood, which, in consequence of these changes, returns from the Lungs, of a florid red colour, and full of heat in a latent state, which becomes sensible in the course of the general Circulation, and is diffused over the different parts of the Body; and, —that the Blood thus changed also affords a stimulous to the Arteries, and promotes the different Secretions.

Esophagus.

The *Esophagus*, called also *Gula* or *Gullet*, derives its name from carrying what is eaten into the Stomach.

It is a Fleshy Canal, which begins from the inferior part of the Pharynx, descends along the Neck, and through the Thorax, following nearly the direction of the Spine.

It is situated between the Trachea and Vertebræ; and in the Thorax, it proceeds behind the Base of the Heart, and between the Layers of the Posterior Mediastinum, from which it receives a lateral covering.

Soon after entering the Thorax, it makes a slight turn to the right, and passes down upon the fore and right side of the Aorta, by which they are prevented from injuring each other.

In its progress, it inclines more forwards and to the left side; and about the Ninth Vertebra of the Thorax, it perforates the Muscular part of the Diaphragm, and terminates in the upper Orifice of the Stomach.

It has several *coats* proper to it, the first of which is *Cellular*, and connects it to the adjacent parts.

The second Coat is *Muscular*, and is sometimes ter-

med *vaginalis Gulæ*,—It consists of two Layers; the external of which has thick, strong, longitudinal Fibres; the internal is formed of circular and transverse Fibres, and is thinner than the former.—The outer Layer is fitted for shortening and relaxing, and the inner for contracting the Canal, during Deglutition.

The third Coat is termed *Nervous*, but is properly Cellular, being formed of loose Cellular Substance, which connects the Muscular to the Inner coat.

The *Inner coat* is continued from the Lining of the Mouth; It consists of many longitudinal *Plicæ* or Folds, which are scarcely visible when the Esophagus is dilated, and is furnished with numerous *Foramina*, which discharge a Mucus for lubricating the passage, and facilitating Deglutition.

The *Arteries* of the Esophagus are Branches of the Inferior Laryngeals, which supply the Curvical part of it, and Esophageals and Branches of the Bronchials, which are derived from the Aorta Descendens, and supply the Thoracic part of it.

The *Veins* go to the Inferior Laryngeals, to the Vena Azygos, and left Superior Intercostal Vein.

The Absorbents are numerous, and intermix with those of the Heart and Lungs.

The *Nerves* are chiefly from the Eighth Pair.

The *use* of the esophagus is, to receive the Aliments from the Pharynx, and convey them to the Stomach.

Thoracic Duct.

The *Thoracic Duct* is a small Membraneous-like Canal, situated in the back-part of the Thorax, and is the principal Trunk of the Absorbent System.

It begins upon the third Vertebra of the Loins, and passes behind the Aorta, crossing obliquely from left to right, till it gets to the right side of that Artery.

Upon the first Lumbar Vertebra, it forms an *Oval Sac*, termed *Receptaculum Chyli*, which is placed behind the Right Crus of the Diaphragm, and a little higher than the Right Renal Artery.

The Duct afterwards passes between the Crura of the Diaphragm, and ascends in the Thorax, on the anterior part of the spine, between the layers of the poste-

rior Mediastinum, on the right side of the Aorta, and between it and the Vena Azygos.

It crosses behind the upper part of the descending Aorta, and emerges from the Thorax, to reach the under part of the Neck.

In the Neck, it passes behind the Internal Jugular Vein, and a little higher than the Subclavian.

It then turns downwards, forming an Arch, which terminates in the upper part of the Angle, between the Internal Jugular and Subclavian of the Left Side.

The Thoracic Duct receives the Chyle from the Lacteals, and Lymph from the Lymphatics, and discharges these into the red Veins.

OF THE ABDOMEN.

The *Abdomen* or *Belly* extends from the Thorax to the under part of the Trunk.

It is bounded above, by the Diaphragm, and the Bones to which that Muscle is fixed; below, by the Pelvis; behind, by the Lumbar Vertebræ and Muscles of the Loins; anteriorly, by its proper Muscles; and laterally, by the False Ribs, Ossa Ilii, and Muscles connected with these;—all of which have been described in their places.

It is distinguished into *three Divisions* or *Regions*, termed *Upper*, *Middle*, and *Under* Region; each of which is subdivided into three others.

The *Upper Region* begins opposite to the Cartilago Ensiformis, at a small depression called *Scrobiculus Cordis*, or Pit of the Stomach, and extends to about a hand breadth from the Umbilicus or Naval.

The middle of this Region is termed *Epigastrium*, or under part of the Belly, and the two lateral parts *Hypochondria*, from their lying under the Cartilages of the False Ribs.

The *Middle Region* occupies an equal distance above and below the Umbilicus.—The middle part of it is called the *Umbilical*, and its lateral parts the *Lumbar Regions* or *Loins*.

The *Under Region* begins where the middle one terminates, or at a line drawn between the superior anterior Spinous Processes of the Ossa Ilii, and forms in the middle, the *Hypogastrium*, or bottom of the Belly; and at the sides, the *Iliac Regions*.

The Abdomen is covered on the outside by the *common Integuments*, and lined within by the *Peritoneum*, in the manner the Thorax is lined by the Pleura, but without being divided by the intervention of a Partition.

The Abdomen contains the *Chylopoetic* and *Assistant Chylopoetic viscera* or *Organ of Digestion*,—the *Organs of Urine*, and *part of those of Generation*, with the *vessels* and *Nerves* which belong, some of them to these Viscera, and others to the lower parts of the Body.

The *Chylopoetic Viscera* comprehend the Stomach, which is situated in the upper and left part of the Abdomen—the *Intestines*, which fill the greater part of it, —and the Membranes, termed *Omenta* and *Mesentery*, which are connected with these.

The *Assistant Chylopoetic Viscera* consists of the *Liver*, which is placed in the upper and right; of the *spleen*, which is situated in the upper and left side of the Abdomen;—and of the *Pancreas*, which lies under the Stomach.

Of the *Organs of Urine*, the *Kidneys* are placed in the back-part of the Abdomen, and the *Bladder*, with some of the *Organs of Generation* in the Pelvis.

Peritoneum.

The *Peritoneum*, named from its being stretched or spread around the bowels, is a firm but simple Membrane, by which the Abdominal Viscera are surrounded, and partly supported.

Its External Surface is rough and Cellular, and closely connected with the parts to which it belongs.

The Internal Surface is remarkably smooth, and lubricated by a Liquor which is exhaled from its own Vessels.

It is very elastic, and admits of great extension, as happens in Gestation, Corpulency, or Ascites; but, upon the causes of extension being removed, it returns to its former dimensions.

It lines the Diaphragm, passes downwards, adhering firmly to the Abdominal Muscles,—lines the containing, and covers the contained parts of the Pelvis, from which it is reflected in the back part of the Abdomen, lining its Muscles, and, by its reduplications, covering the Bowels and great Blood-vessels of that Cavity;—though strictly speaking, the Abdominal Viscera may be said to lie on the outside of it.

In its passage from one Bowel to another, it forms doublings which serve as Ligaments to fix them to each other, and likewise to the Body.

It gives a general covering to most of the Bowels, a partial one to a few, and to those which are deep-seated and project least, a still more partial covering.

It forms a large Sac, the posterior part of which adheres firmly to the different Viscera, and the anterior to the Abdominal Muscles;—the part lining the Abdomen being merely in contact with its contents, and allowing a small degree of motion.

The Cellular Substance, on the External Surface of this Membrane, is not every where of equal thickness, being in some parts, as upon the Bowels, remarkably thin; in others, as over the Kidneys, filled with a considerable quantity of Fat.

The Cellular Substance forms various Processes or productions, some of which, as those on the Spermatic cords, pass through Foramina, to be connected with the neighbouring parts; and the processes are sent off, without affecting the Internal Membrane, the one not accompanying the other.

The *Vessels* and *Nerves* of the Peritoneum are from those which supply the contiguous parts; its Vessels, however, are not very numerous; neither does it possess much sensibility when free from disease.

The *Arteries* come from the Internal Mammary, Epigastric, Inferior Intercostal, Lumbar, Sacral, and Ileo-Lumbar Arteries, and from those which supply the Abdominal Viscera.

The *Veins* have the same course, bear the same names, and in general pass to the Inferior Cava.

The *Absorbents* are numerous, and run chiefly to the Iliac and Lumbar Plexus.

The *Nerves*, which are few in number and small, are

from the Inferior Dorsal, the Lumbar, the Great Sympathetic and Sacral Nerves.

The *use* of the Peritoneum is to line and strengthen the Cavity of the Abdomen; to inclose and assist in supporting its different Viscera; to furnish most of them with an External coat; to connect them to the Body, and, by its smoothness and slipperyness, to prevent the effects of Friction.

Upon the outside of the Peritoneum are *Four White Lines*, or small Cords, three of which are Vessels in the Fœtus,—one of them a Vein, and two of them Arteries; the fourth is the Urachus.—In the Adult, they are shrivelled up, and serve as Ligaments, the Vein forming the Round Ligament of the Liver, the three other Cords, forming Ligaments of the Bladder.

STOMACH.

The *Stomach* is a large Bag or Reservoir, situated obliquely across the upper and left part of the Abdomen, in the left Hypochondriac and Epigastric Regions.

It is turned downwards and forwards, so as to form an angle with the Œsophagus, the angle becoming more conspicuous, according to the distension of the Stomach.

The right part of the Stomach is situated under the left part of the Liver, the rest of it is placed immediately under the Diaphragm, its extremity being in contact with the Spleen.

The Stomach is long, round, and tapering, and has been compared in shape to the Bag of a Bagpipe.

The size is in proportion to the quantity of Aliment it has been accustomed to receive, and therefore is commonly larger in men than in Women.

It has a *Large* and *Small Extremity*, an *Upper* and *Under Surface*, a *Great* and *Small Curvature*, a *Left* and *Right Orifice*, and consists of several *Layers* or *Coats*.

The *Large*, called also the *Left Extremity*, is situated in the left side of the Abdomen, and is considerably higher than the Right.

The *Upper Surface* is turned towards the Diaphragm, the *Under* towards the Intestines;—but when the Abdomen is laid open,—unless the Stomach be considerably distended,—the Superior Surface becomes anterior, and the Inferior Surface posterior.

The *Large Curvature* is turned obliquely forwards and downwards towards the Abdominal Muscles, and extends from one Orifice to the other.

The *Small Curvature* is opposed to the other, and turned backwards and upwards, towards the Spine, extending also between the two Orifices.

The *Orifices* are next the small Curvature. The left is termed *Cardia*, or *Os Ventriculi*, or *Upper Orifice* of the Stomach.—It is opposed to the Spine, at a little distance from it, and is formed by the termination of the Esophagus. It allows a free passage for the Food into the Stomach, the return of which is prevented by the Angle formed by this part of the Stomach, and by the Fleshy parts of the Cardia, and of the Diaphragm in which it is situated.

The *Right*, or *Inferior Orifice*, is commonly termed *Pylorus* from its Office as a *Porter*.

It is situated under the small Lobe of the Liver, a little to the right side of the Spine,—is turned more forwards than the Cardia, and is considerably lower, but rises in proportion to the distension of the Stomach.

The Stomach is connected by the Cardia to the Esophagus,—by the Pylorus to the beginning of the Intestines,—by the Peritoneum and Blood-vessels to the Spleen,—and by a reflection of the Peritoneum to the root of the Liver and to the Great Intestines.

The *Structure* of the Stomach is in general similar to that of the Esophagus, of which it is a kind of Expansion.

The *coats* of the Stomach are *four* in number.

The first or *External coat*, called also *Peritoneal*, is a Reflection of that part of the Peritoneum which comes from the root of the Liver.

It strengthens the Stomach; by its smoothness it diminishes the effect of Friction, and possessing few Nerves or Blood-vessels, it is not very susceptible of pain or inflammation.

The Cellular Substance under the Peritoneal Covering, is described by some authors as a distinct coat, called *Tunica Cellulosa Ruyschiana*;—but ought not to be numbered among the coats of the Stomach.

The Second or *Muscular coat* is composed chiefly of two planes of Fibres variously disposed.

The External Plane is longitudinal, extends from the longitudinal Fibres of the Esophagus, and follows the same general course with that of the Stomach from the great to the small Extremity.

Upon each side of the Small Curvature, the longitudinal Fibres form a thick, strong, Muscular Band.

The second Plane is chiefly transverse or circular, and considerably thicker and stronger than the other.

Its Fibres are intersected by many small, white, Tendinous-like Lines;—these, however, are in a great measure formed of that Cellular Substance by which the two coats are united.

The Muscular Coat assists in the digestion of the food, by giving a gentle motion to the Stomach, according to the direction of its Fibres, the one set shortening, the other rendering it narrower.

The Pylorus is formed by a doubling of the two inner coats, which project into the passage between the Stomach and Intestine, and contain a *Ring* of Muscular Fibres, which form a Spincter, called *Spincter Pylori*.

This substance, by contracting, prevents the grosser indigested parts of the Aliment from escaping, and, by dilating allows the Pulpy digested part to pass to the Intestines.

The *Third Coat*, commonly called *Nervous*, but properly *Cellular*, consists of a large quantity of fine Cellular Substance, without Fat, and is intermixed with, and supported by small Aponeurotic-like Filaments, which cross each other obliquely, but which are also of a Cellular nature.

This coat strengthens the Stomach, and allows the Vessels to be distributed to the Inner coat, with which it is intimately connected.

The *Fourth* or *Inner Coat*, called also *Villous*, from its resemblance to Velvet, is continued from the Inner Coat of the Esophagus, but is much more Villous.—It is formed of fine, short, prominent Villi, which are crowded

with Small Vessels, some for furnishing a Mucous Liquor to the Stomach, others for absorbing a portion of the thinner part of the Food.

The two last coats are more extensive than the rest, and form, upon the inner part of the Stomach, many doublings, termed *Rugæ*, the greater number of which run in a waving transverse direction, and are afterwards divided into a sort of *Net-work*. Near the Orifices, however especially towards the upper one, they run more in a longitudinal direction, and have a radiated appearance at the Cardia.

The Rugæ, like the Plicæ of the Esophagus, are most distinct when the Stomach is empty,—when full, they are much less evident.

They admit of distension without endangering the Vessels and Nerves dispersed in them, and assist a little in detaining the Aliment till properly digested.

From the inner surface of the Stomach a liquor issues, which is found to approach to the nature of Saliva, and is termed *Gastric Juice*.—This was formerly supposed to come from Glands seated in the Third Coat, but is now more frequently considered as a Secretion from the Arteries of the Stomach, no Glands being evident there, at least in the sound state of this Viscus.

The Arteries of the Stomach are derived from the Cœliac Artery. They consist of the Superior Gastric, which supplies the place next the small Curvature; the Right inferior Gastric, which is a branch of the Hepatic; the Pyloric Arteries, which are small branches from the Gastrics and from the Hepatic; and of the Left Gastric and Arteriæ breves, which are branches of the Splenic Artery.

The *Veins* have the same names, and nearly the same course with the Arteries. The whole of them terminate in the Vena Portæ.

The *absorbents* of the Stomach are numerous and large. They pass through small Glands situated upon the Curvatures, and go afterwards to the Thoracic Duct.

They appear to carry Lymph only, no Chyle having been detected in them, even in cases where the Lacteals were found full of it.

The *Nerves* are chiefly from the Eighth Pair, and

partly from the Great Sympathetics, and are most numerous upon the Cardia.

The Stomach receives the Food from the Esophagus, and afterwards prepares it, by digestion, for the Intestines.

The digestion of the Food in the Stomach is found to be effected,—by Triture, which is performed by the motions of the Stomach and surrounding Muscles,—by dilution,—by a partial fermentation,—but chiefly by the action of the Gastric Juice serving as a Menstruum.

INTESTINES.

The *Intestines* consist of a long Cylindrial Canal, which begins at the Inferior Orifice of the Stomach, and, after winding in various directions, terminates in the Anus.

In general they are about six times the length of the Body to which they belong; though, in a person of short stature, the proportional length of the Intestines is greater, and *vice versa*.

They occupy a large part of the abdomen, and are connected to the Body through their whole extent, by a doubling of the Peritoneum.

On account of the inequalities of their size, they are divided into *Small* and *Large* Intestines, and each of these is subdivided into others.

Small Intestines.

The *Small Intestines* are smooth on their outer Surface, and of a tapering form becoming gradually less in their diameter from their upper to their under extremity, and are divided into the *Duodenum*, *Jejunum*, and *Ilium*.

The *Duodenum*, so called from its being about twelve fingers-breadth in length, begins at the Pylorus, and makes a short turn upwards and backwards, by the Neck of the Gall-bladder, to which it is contiguous,

having the Anterior Layer of the Omentum fixed to its inferior part, and the Omentum Minus to its opposite side.

It then passes obliquely downwards and to the right side, before the great Vessels which go into the Liver, and likewise before the Renal Artery and Vein, included in the Cellular Substance of the Mesocolon.

Opposite to the under part of the Kidney, it makes a turn to the left side, where it is lodged in the common root of the Mesocolon and Mesentery, and receives into its back-part the ends of the Biliary and Pancreatic Ducts, and goes over the Aorta and Vena Cava, opposite the last Vertebra of the Back.

In passing across these Vessels, it is involved in the root of the Mesentery, and ascends a little till it gets to the left side of the Spine, where it perforates the common root of the Mesentery and Mesocolon, and makes a turn forwards, where it obtains the name of *Jejunum*.

The *Jejunum* so named from its being commonly more empty than the other Intestines, in consequence of the thinner parts of its Contents being sooner absorbed, begins at the last turn of the Duodenum, and forms numerous Convolutions, which run in all directions, and are situated in the upper part of the Umbilical Region.

The *Ilium*, named from its numerous Turns, begins where the Jejunum terminates, or where the Internal Plicæ become less conspicuous, and is distinguished externally from that Gut, by being smaller, thinner in its coats, and paler, and from its forming about three-fifths of the length of the two Intestines.

The Ilium, like the Jejunum, forms many convolutions, which are situated on the under part of the Umbilical Region, and extend as far as the Hypogastric and Iliac Regions, and not unfrequently, especially in Women, into the Cavity of the Pelvis.

It surrounds the lateral parts of the Jejunum, and is supported by the Ossa Ilia; and, the last turn of the Gut passing across towards the upper edge of the Right Os Ilium, it terminates by a Valve in the left side of the beginning of the Colon.

Through the whole of this course, the Jejunum and

Ilium are fixed to the Spine by a continuation of the Mesentery.

Great Intestines.

The *Great Intestines*, like the Small, form one continued Canal, which tapers from its upper to near its under extremity; but differ from them in being considerably larger, shorter, and straighter, and in being irregular in their Outer Surface, and tacked up into Cells, having besides many Processes depending from them, termed *Appendiculæ Pinguidenosæ*.

Like the Small Intestines, also, they are divided into three parts, termed *Cæcum*, *Colon*, and *Rectum*.

The *Intestinum Cæcum*, or *Blind Gut*, forms a round short Bag, only about three or four Fingers-breadth in length, and nearly the same in diameter. The Cæcum, properly so called, is that part of the Intestine which lies under the insertion of the Ilium, though frequently the dilated beginning of the Colon is distinguished by the same name.

It is situated in the Right Iliac Region, resting on the Cavity of the corresponding Os Ilium, at the under end of the Right Kidney, and is concealed by the last Convolutions of the Ilium.

The bottom of it is turned downwards and forms a shut Sac, the mouth of which is turned towards the Colon, and may be considered as forming the *Gæcum Caput Coli*.

At the posterior and left side of the Cæcum, there is a *small Process*, about the same length with the Cæcum itself, but the diameter not larger than that of a Goose-quill,—termed *Appendix Vemiformis*, from its resemblance to an Earth-worm, and *Appendix Cæci*, from its connection with the Cæcum.

It is convoluted, and fixed by its sides to the Cæcum.

It has two extremities, one of which is impervious, the other opens obliquely into the back-part of the Cæcum.

The *Colon*, so called from the Greek, is by much the longest of the large Intestines. It encircles the Small Guts, and is contiguous to most of the Abdominal Viscera.

It is a continuation of the Cæcum, beginning at the termination of the Ilium.

It ascends in the Right Lumbar Region, over the Kidney of that side to which it is connected.

From the Kidney, it passes forwards, and crosses the Abdomen in the Epigastric and Hypochondriac Regions connected to the Duodenum, under the name of *Great Arch of the Colon.*

The right portion of the Great Arch is situated under the Liver and Gall-bladder, which, after death, commonly tinges part of it and of the Duodenum with Bile.

The left portion is situated under the Stomach; and immediately below the Arch are the Convolutions of the Jejunum.

In the Left Hypochondrium, it turns backwards under the Spleen, and descends in the Left Lumbar Region, on the foreside of the Kidney, to which also it is closely connected.

In the Left Iliac Region, it forms two Convolutions, compared in shape to the Greek *Sigma*, and hence called *Sigmoid Flexure* of the Colon, which afterwards constitutes the Rectum.

The *Sigmoid Flexure* varies considerably in length in different persons, extending frequently into the Hypogastric Region, and in some instances, as far as the Intestinum Cæcum.

The Colon, through its whole extent is fixed to the Body by means of the Mesocolon.

The *Rectum* begins at the last Lumbar Vertebra, and has its name from appearing straight when viewed anteriorly.

It descends upon the fore-side of the Os Sacrum and Os Coccygis, and terminates in the Anus, a little beyond the extremity of the last named Bone.

In its course, it follows the direction of the Bones over which it passes, turning first downwards, then a little backwards, then forwards, and is fixed to them by the Mesorectum.

The Rectum differs from the other Intestines, in becoming wider in its progress downwards, and forming below a Reservoir for the Fæces.

At the Anus, it contracts into a narrow Orifice, the sides of which are disposed in close longitudinal folds.

Upon the Outer Surface of the Great Intestines, but more especially upon the Colon, are the *Appendiculæ Pinguedinosæ* situated at different distances from each other,—thin at their roots, becoming thicker in their bodies, and projecting from the Intestines like so many pendulous Papillæ.

They are covered by the Peritoneum, and are of the same structure and use with the Omentum.

Besides the Appendiculæ, there are on both sides of the adhesions of the Mesocolon, *Adipose Strata*, which are of the same nature with the others.

The Colon is divided longitudinally, into three parts, by as many *Ligamentous-like* Bands, which run upon its Surface.

One of them goes along each side of the Colon: and that most exposed to view when the Omentum is separated, is the largest: The third, which is the smallest, and which was discovered by MORGAGNI, is concealed by the attachment of the Meso-colon.

They begin at the root of the Appendix Vermiformis, and, after running along the Cæcum and Colon, unite into two, and then terminate on the Rectum.

Mesentery.

THE *Mesentery* is formed by a doubling of the Peritoneum, which is detached forwards, and includes the Intestines as in a sling.

It is named from its situation in the middle of the Intestines, and is divided into two parts one connecting the small Intestines, and retaining the name of *Mesentery*; the other, the Great Intestines, and termed *Mesocolon*.

The Mesentery begins at the last turn of the Duodenum, and runs obliquely downwards and towards the right side, along the Vertebræ of the Loins, to the first, second, and third of which it is chiefly connected.

Between the two Layers of the Mesentery, are inclosed a considerable quantity of Cellular Substance and Fat, the numerous Blood-vessels and Nerves, with the Lacteals and Glands of the Jejunum and Ilium.

Its anterior edge is much more extensive than the

posterior, being plaited and folded,—the Plaits corresponding with the Convolutions of the intestines to which it is fixed.

The *Meso-colon* is the continuation of the Mesentery, which, after reaching the lower extremity of the Ilium, contracts, and obtains this name.

It follows the course of the Great Intestines, and fixes them in their place.

Under the Right Kidney, it is narrow and firm, and forms the Right Ligament of the Colon.

Opposite the Kidney, it appears to be lost by the immediate adhesion of the Colon to the Kidney and Duodenum.

It then turns across, and forms a broad expansion, which incloses the Arch of the Colon at its anterior edge; and behind, it separates and incloses the anterior part of the Duodenum, and is fixed to the Spine.

It adheres a little to the under part of the left extremity of the Stomach, and afterwards descends over the left Kidney, at the under end of which it forms the Left Ligament of the Colon.

It afterwards expands, adheres to the large Psoas Muscle, and forms a loose fold, which retains the Sigmoid Flexure of the Colon.

At the last Vertebra of the Loins, it forms the *Meso-rectum*, which by degrees becomes narrower, and disappears towards the under part of the Pelvis, the Rectum being then immediately connected to the Os Sacrum.

Between the Layers of the Meso-colon are placed the Arteries, Veins, and Nerves, with the Absorbents and Glands of the Colon.

The *use* of the Mesentery, in general, is to suspend, connect, and retain the Intestines in their places,—to furnish them with an external Coat,—to receive their Glands, Vessels, and Nerves, and to allow the two last to be properly distributed.

Omentum.

THE *Omentum* or *Cawl*, formerly called *Epiploon*, from its seeming to float upon the Intestines, is a fine Membranous Bag, intermixed with much Fat, and covering a large portion of the Anterior Surface of the Abdominal Viscera.

It is divided into *Omentum Gastro-Colicum*, and *Omentum-Colicum*, the former common to the Stomach and Colon, the latter proper to the Colon: They are, however, a continuation of one and the same substance.

The *Omentum Gastro-Colicum* consists of an anterior and posterior part, each of which is formed of two Membranes intimately united.

In young subjects, the Omentum forms a distinct Bag, but in old people, the Layers of which it is composed become more or less incorporated, and Cribriform or Reticular.

The Anterior Layer is a continuation of the Peritoneal Coats, produced from the upper and under Surfaces of the Stomach.

This Production arises from the whole length of the large Arch of the Stomach, and beginning of the Duodenum;—its origin extending as far as the Spleen, and descending to a little below the Umbilicus, especially in fat people,—but without adhering to the Abdominal Muscles behind which it is situated.

Its under edge is reflected to form the Posterior Layer, which ascends without adhering to the Small Intestines over which it is spread, until it reaches the Arch of the Colon, to the greater part of which Arch, and the Vessels of the Spleen, it is connected.

The *Omentum Colicum* arises from the right part of the Arch of the Colon, in the manner the other part of the Omentum arises from the Stomach, and sends downwards and to the right side a Cuneiform Process, to be connected to the Cæcum.

Besides the Omentum, there is a Membrane much smaller than the former, situated between the Liver and Stomach, termed *Omentum Hepato-gastricum*, or *Omentum Minus*, of WINSLOW, or *Membrana Mucilentior* of HALLER from its having little Fat in it.

It passes from the fore-part of the Sinus of the Porta, to the under and back part of the Liver, to be connected to the whole edge of the small Curvature of the Stomach, and to the beginning of the Duodenum.

Like the other Omentum, it is composed of two Layers, but is thinner, less Fat, and more uniform in its structure, and also differs from it in having no reflection upwards.

After the Omentum Minus reaches the Stomach, its two Layers separate from each other, inclose that Viscus and form its external Coat

At the Great Curvature of the Stomach they rejoin, and form the Anterior, then the reflected or posterior part of the Omentum Majus.

The posterior part separates again into two Layers, which inclose the Colon, and form its external Coat.

At the opposite side of the Colon, the Layers re-unite, and form the Meso-colon.

By the Membrane thus continued, a large irregular Bag is formed, of which the Omentum Minus, Stomach, and anterior portion of the Omentum Majus, constitute the anterior, and the reflection of the Large Omentum, the Colon, and Meso-colon, the posterior part.

At the upper and right side of the Sac, there is a passage large enough to admit a Finger, termed *Foramen* WINSLOWI.

It is situated immediately behind the Cord of the great Vessels which lead to the Liver and is of a Semicircular form.

It is composed of the Peritoneum, under the appearance of two Ligaments which connect the surrounding parts to each other.

The Foramen of WINSLOW maintains a communication between the Large Sac of the Omentum and common Cavity of the Abdomen, from which circumstance, Fluids generated by disease may readily pass from one of these Cavities to the other.

The Omentum, by its Fatty nature, serves to lubricate the Viscera, and prevent them from being injured by friction.

Structure of the Small Intestines in General.

The *Structure* of the Small Intestines is nearly similar to that of the Stomach, and the number of their *Coats* the same.

The *External Coat*, excepting in a proportion of the Duodenum, is a continuation of that part of the Peritoneum which forms the Mesentery. It closely surrounds the Intestines, adhering to them by fine Cellular Substance.

The *Second* or *Muscular Coat*, as in the Stomach, is composed of two Planes or Fibres, the External or Longitudinal of which are more minute than the Internal.

The *Circular Fibres* are distinct and numerous: They consist of Segments of Circles, which unite at different distances, so as to surround the Canal.

The *Longitudinal Fibres* shorten, and the *Circular* contract the Intestines; and upon the alternate relaxation and contraction of these Fibres, depends that Vermicular motion, called *Peristaltic*, by which the contents are pushed through the Canal.

The *Third* commonly called *Nervous coat*, like that in the Stomach, is white and firm and composed of Cellular Substance, without Fat;—its firmness giving strength to the Intestines.

The *Fourth*, or *Villous coat*, differs from that of the Stomach, in forming with the Cellular coat, numerous transverse Folds, termed *Valvulæ conniventes*, from their serving, as a kind of Valves to retard the motion of the Food.

One edge of these Valves is fixed to the Intestine, the other is loose. They are much deeper than the Rugæ of the Stomach, and placed opposite to the Interstices of each other, and are of different lengths, not forming entire Circles.

The *Villi* of the Inner coat are much more conspicuous than in the Stomach, being composed not only of the extremities of Arteries, Veins, and Nerves, but particularly of the Mouths of Lacteal Vessels, the Origins of which are extremely small, and have a fungous appearance.

Numerous *Ducts* of *Simple* and *compound Glands* terminate on this coat, for the secretion of Mucus.

The former are called *Solitary*, and the latter *congregate;* and form their describers, *Glandulæ* PEYERI, and *Glandulæ* BRUNNERI.

They are in the form of Papillæ, but so minute as seldom to be seen, excepting in the diseased state, though they are supposed to be dispersed over the whole of the Canal.

Structure of the small intestines in particular.

The *Duodenum* is the laxest and straightest of the Small Intestines, and so large as to have been considered as a *Ventriculus Succenturiatus*, or *Secondary Stomach.*

It is of a redder colour, than the rest, has a thicker Muscular coat, receives only a partial covering from the Peritoneum, and is fixed more closely to the Body, without floating like the other Intestines.

It is perforated at the distance of three or four fingers-breadth from the Pylorus, by the ends of the Biliary and Pancreatic Ducts, for the reception of Bile and pancreatic Juice.

In the Duodenum, the Lacteal Vessels begin to make their appearance, and numerous Mucous Glands are found in it especially near the Pylorus.

The *use* of the Duodenum is to receive the food from the Stomach, and detain it till mixed with the Bile and Pancreatic Duct.

The *Jejunum* differs from the Duodenum, in deriving its common coat wholly from the Peritonium, in being smaller, in having a weaker Muscular coat, in the external Fibres of which are extremely minute, in the Valvulæ Conniventes being larger and more numerous,—and in the Villi and Lacteals which proceed from them being much more conspicuous.

The *Ilium* differs from the former in being less in diameter, and its coats thinner and of a paler colour, and in having fewer and Smaller Lacteal Vessels. In this Intestine the Valvulæ Conniventes gradually decrease in size and number, and at length entirely disappear. At its under end, the Mucous Glands are distinct and numerous.

The *use* of the Small Intestines in general is, to promote the formation of the Chyle, to allow it to be absorbed, and, to propel the remains of the Food into the Large Intestines.

Structure of the Great Intestines in General.

The Great have the same number of coats with the Small Intestines, but differ from them in being thicker, and stronger. The Valvulæ Conniventes are deep, and placed opposite to each other, and as in the Small Intestines, diminish in number and in size towards the under extremity. The Villous appearance is much less distinct. The Mucous Glands are larger, but simpler than those of the Small Intestines.

Structure of the Great Intestines in particular.

The *Intestinum cæcum* is of the same general structure with the rest of the Great Intestines. Its Villi are very short; and it has a number of solitary Mucous Glands, broader than those of the Small Intestines, which, when diseased sometimes appear like Small-pox, with a perforation in each.

The *Appendix Vermiformis* is of the same structure with the other Intestines, contains no Fæces, but is furnished with numerous Glands similar to those of the Duodenum, the contents of which pass into the Cæcum, a little below the Valve of the Colon, and assist in lubricating that Intestine, in facilitating the expulsion of the Fæculent Matter.

In the Cæcum, and beginning of the Colon, the Food coming from the Ilium is retained for some time, and, in consequence of absorption, acquires a greater degree of consistency, and receives a fœtid smell.

The *Valvula Coli*, sometimes called *Valvula Ilei*, or *Valvula* BAUHINI, from its supposed discoverer, and *Valvula* FULPII from the Author who gives a particular description of it, is situated at the beginning of the Colon, and is placed transversely in the posterior and left part of that Intestine.

It is formed of a projection of the Villous and Nervous coats, and Circular Muscular Fibres of the Ilium, Cæcum and Colon, and has two Folds or Lips, with an aperture in form of a Mouth or Chick between them.

At the ends of the Valves are two cords, termed *Retinacula* or *Frenæ* MORGANII, which retain the Valve in its proper situation.

The Valve of the Colon allows a free passage for the Contents of the Small into the Large Intestines, but completely prevents their return.

The Colon is a similar structure with the Cæcum.—The Longitudinal Muscular Fibres are collected upon it into three Fasciculi or Bands, which arise at the root of the Vermiform Process, and are continued along the Colon to the Rectum.

The Longitudinal Bands are shorter than the inner parts of the Colon, and of consequence assist in contracting it, and forming it into Plicæ, which lie across the Gut, answering to the Valvulæ Conniventes; only they are

at a greater distance from each other, and much larger, dividing the Colon into little apartments, called *Cells*.

The *Cells* of the Colon, with their Partitions, have a threefold order, the Intestine being almost quite smooth or plain, opposite to the Longitudinal Bands.

The Cells assist in preventing the too quick descent of the Fæces.

The *use* of the Colon is,—to receive the Excrementitious parts of the Aliment,—to retain them,—to change them into Fæces, and then, by the peristaltic motion of the Intestines and power of Respiration, to push them, by slow degrees to the Rectum.

The *Rectum* differs from the Colon in being covered only anteriorly and laterally by the Peritoneum:—Its Muscular Fibres are stronger and thicker, and spread uniformly over the Intestine.—The Circular Fibres are so thick at the end of the Rectum, as to have been named *Internal Sphincter*.

It has no Cells like the Colon; but the Cellular and Inner coat are so much larger here than they are higher up, as to fall into transverse folds, which, however, disappear in proportion to the distension of the Intestine.

The middle and under end of the Rectum has numerous large Mucous Glands or Follicles.

The extremity of the rectum forms a firm Circle, which acts as a Valve, and assists the proper Sphincter in preventing the involuntary discharge of the Fæces.

The Verge of the Anus is surrounded with deep Follicles, the contents of which prevent the tender Skin of the Anus from being excoriated by hard or acrid Fæces.

The Anus is also surrounded with a great deal of Fat, which admits of the dilatation of the Rectum, and facilitates the discharge of the Fæces.

The Rectum receives the Fæces from the Colon, retains them for a certain time, till, by their weight and acrid nature, it is stimulated to discharge them: which it does by the power of its Muscular coat, and of the Levator Ani, assisted by the action, of the Diaphragmatic and Abdominal Muscles.

The *Blood-vessels* of the Intestines are large and numerous, and are derived from different sources.

The Duodenum receives branches from the Splenic and Hepatic Arteries.

The Jejunum, Ilium, and right half of the Colon, are supplied by the Superior Mesentric Artery; and the left half of the Colon with the Rectum, by the Inferior Mesentric Artery.

The Veins of all the Intestines send their Blood to the Vena Portæ.

The *Absorbents* of the Intestines are large and numerous.—They arise from the Inner Surface of the Intestines, run in the Mesentery and Meso-colon, passing through their numerous Glands.—The Absorbents of the Small Intestines terminate in the receptacle of the Chyle; those of the Large Intestines, which are smaller than the former, go partly to the Thoracic Duct, and partly to the Lymphatics of the Loins.

The Nerves of the Intestines are small, but numerous, and are derived partly from the Eighth Pair, but chiefly from the Great Sympathetics.

The Vessels and Nerves of the Omenta are Branches of those which supply the Stomach, and have the name of *Gastro-Epiploic*.

LIVER.

The *Liver* is a large solid Mass, of a dusky red colour, situated immediately under the Diaphragm, extending downwards to the margin of the Thorax, but not going beyond it.

It is placed partly in the Right Hypochondrium, which it in a great measure fills, and partly in the Epigastrium, reaching over a little way into the Left Hypochondrium.

It is *convex* and very *smooth* on the upper Surface, where it is opposed to the Diaphragm, though a little flattened on the upper part of its left side, where it is placed opposite to the Heart.

It is *irregularly concave* on the under side, where it

rests upon the Stomach and Intestines, and is perforated by several large Blood-vessels.

It is *thick* on its right and posterior part, and becomes gradually *thinner* towards the left side; it is *obtuse* or *blunt* on its posterior, and *acute* or *sharp* on its anterior edge,—and considerably *broader* from one side to the other than from before backwards.

It is divided into *Prominences* or *Lobes*, two of which, called *Great* and *Small*, or *Right* and *Left Lobes*, are so considerable as to form the Body and whole upper part of the Liver.—The others are small, and are placed upon the under side of the former.

The *Great Lobe* is placed obliquely in the Right Hypochondriac Region, following the Curve of the Diaphragm, and rests upon the Pylorus, Colon, and top of the Right Kidney.

The *Small Lobe*, distinguished from the Great one by a broad Ligament, is placed almost horizontally, chiefly in the Hepeastic, and reaching only a little way into the Hypochondriac Region.

—The other Lobes are,—

The *Lobules Spigelii*, which is small when compared with the two former Lobes, but is the principal one below.

It is situated near the Spine, upon the left side of the Great Lobe, and is of a Pyramidal form, projecting like a Nipple, as the small Curvature of the Stomach.

The *Lobulus Caudatus*, which is merely the root, or one of the angles of the Lobulus Spigelii, advancing towards the middle of the lower side of the Great Lobe.

The *Lobulus Anonymus*, or *Quadratus*, which is placed between the passage of the round Ligament and the Gall-bladder, and is less prominent, but broader than the former Lobule.

From the Lobulus Anonymus a bridge called *Pons*, or *Isthumus Hepatis*, runs across the Passage for the round Ligament, to be joined to the Left Lobe;—It is sometimes a wanting.

Upon the under side of the Liver, there are several *Fissures*, of which the following are the principal.

The *Great Fissure*, called *Fossa Umbilicalis*, between

the right and Left Lobes, at the under and fore-part of the Liver.

This is terminated by a *Notch* at the fore-part of the Liver,—of different depths in different bodies,—and behind, it is commonly covered with the Bridge above-mentioned.

The *Principal Fissure*, termed *Sulcus Transversus* or *Sinus Portarum*, extending from the right to the left, between the Great and small Lobes, and bounded by these Lobes at its extremities, and by the Lobulus Anonymus before, and by the Lobulus Spigelii behind, the two latter forming parts compared by the Ancients to a Gate, and therefore called *Porta*.

The *Depression* between the Great Lobe and Lobulus Spigelii, for the passage of the Inferior Vena Cava, which has frequently a bridge over it, forming it into a Canal.

A *Small Depression* called *Fossa Ductus Venosi*, between the Left Lobe and Lobulus Spigelii, running a little obliquely from right to left side, and receiving a Ligament,—which is a Branch of the Umbilical Vein in the Fœtus.

The Liver is connected to the Body by different *Processes*, termed its *Ligaments*, all of which, excepting one are formed by doublings of the Peritoneum, viz.

The *Ligamentum Latum*, or *Suspensorium Hepatis*, placed between the right and left Lobes above, and extending below into the Fossa Umbilicalis.

It is fixed obliquely to the Diaphragm and tip of the Enisform Cartilage, and then descends in the same oblique direction, adhering to the inner part of the Vagina of the Right Rectus Abdominis Muscle, as far as the Umbilicus.

The *Ligamentum Rotundum*,—which is the Umbilical Vein in the Fœtus placed in a doubling at the under part of the Ligamentum Latum, and fixed to the Umbilicus.

These two Ligaments have been supposed to resemble a *Falx*, with the edge turned uppermost, from which circumstance the Ligamentum Latum is sometimes also called *Falciforme*.

The *Ligamentum Dextrum*, or *Right Lateral Liga-*

ment, which is short, and connects the back-part of the right extremity of the Great Lobe to the Diaphragm.

The *Ligamentum Sinistrum*, or *Left Lateral Ligament*, which is longer than the former, and connects the left extremity of the Small Lobe to the Diaphragm.

The *Ligamentum Coronarium*, considered by some as merely Cellular Substance, by others as a reflection of the Peritoneum, or both.—It unites the root of the Liver to the Tendinous Portion of the Diaphragm.

Besides the Ligaments already mentioned, two others are described by HALLER; one called *Hepatico colicum*, which passes from the Gall-bladder and contiguous Sinus Portarum, across the Duodenum, to the Colon: another called *Hepatico-renale*, which descends from the root of the Liver to the Kidney.—These as well as the other Ligaments of the Liver in general, are productions of the Peritoneum.

The Ligaments of the Liver preserve it in its proper situation and of course prevent it from inclining too much in any direction. The Stomach and Intestines support it when the Body is upright, and the Diaphragm when the Body is inverted.

The Liver has a simple coat adhering closely to it which it derives from the Peritoneum, and is everywhere covered by this Membrane, excepting behind, where it adheres to the Diaphragm by Cellular Substance.

The Substance of the Liver is composed of several kinds of Vessels, the extreme Branches of which are intermixed in such a manner, as to form numberless Pulpy Corpuscles, named *Acini*, from a resemblance to small Stones or Kernels of Fruit, which when minutely examined, are observed to be composed of Vessels in the form of radiated *Villi* or *Penicilli*.

The *Vessels* of the Liver are, the *Hepatic Artery*, *Vena Portarum*, *Venæ Hepaticæ*, *Absorbents*, *and Biliary Ducts*.—It has likewise numerous *Nerves*.

The trunks of the Hepatic Artery, Vena Portæ, Biliary Ducts and Nerves, with the Absorbents and Lyphatic Glands of the Liver, form a large *Cord* at its under part.

The Artery is situated in the left part of the Cord, the Vein in the right, with the trunk of the Biliary Ducts

before it;—the Nerves and Lymphatics surrounding the great Vessels.

The Cord of Vessels and Nerves is intermixed with much Cellular Substance and covered externally by a reflection of the Peritoneum, which has obtained the name of *Capsule of* GLISSON.

The Branches of Vessels and Nerves accompany each other through the substance of the Liver, forming small Fasciculi, in a manner somewhat similar to that by which the Cord is formed by their Trunks.

In their course through the Liver, the Branches of the different Vessels and Nerves, but particularly those of the Vena Portæ, are inclosed in a large portion of Cellular Substance, which is also frequently called *Capsule of* GLISSON, from that Author supposing it to be a continuation of the Capsule which covers the Vessels before they enter the Liver.

The *Hepatic Artery* is derived from the Cæliac, and is dispersed throughout the whole substance of the Liver, and also upon the Coat which covers it, and is so small when compared with the bulk of the Liver, as to have been generally supposed to be destined for the nourishment merely of that Viscus; but from injections passing from the Artery to the Biliary Ducts, and from other causes, it has been supposed by some Anatomists, that the Hepatic Artery is not only intended to nourish the Liver, but is capable of secreting part of the Bile;—and this supposition is further confirmed from the Vena Portæ having, in a recent case been found wanting, while at the same time the Hepatic Artery was larger than usual, and the Veins which commonly form the Vena Portæ, terminated in the Vena Cava.

The *Vena Portæ* is named from its situation with respect to the Porta of the Liver.

It partakes of the nature of an Artery and a Vein:—Like the former it carries the Blood from the Trunk to the Branches, and, like the latter, it carries it to the Heart; or it is peculiar in the Blood, in one part flowing from the Branches to the Trunk, and in another from the Trunk to the Branches.

It is formed by the Veins of the Stomach and Intestines, joined to those of the Spleen, Omentum, and Pan-

creas, and approaches to the nature of an Artery in the thickness of its coats, though it has no pulsation.

It passes to the Porta, where from its great size, it is named *Sinus* of the Vena Portæ, and divides into Branches which accompany those of the Artery in their course through the substance of the Liver, terminating at the last in the Pulpy Corpuscles.

The *Vena Portæ* serves to carry Venous Blood to the Liver, for the secretion of the Bile.

The *Venæ Hepaticæ* are numerous. They are reflected partly from the extremities of the Artery, and partly from those of the Vena Portæ. They unite by degrees, and accompany the other two sets of Vessels; but at the root of the Liver they form two or three large Trunks which terminate in the Vena Cava, where it is about to perforate the Diaphragm.—They likewise send off some small Branches which terminate in the Cava, where that Vein lies behind the Liver.

The Venæ Hepaticæ receive the Blood from the Hepatic Artery and Vena Portæ after the Bile has been secreted, and return it to the Vena Cava, to be conveyed by it to the Heart.

The *Lymphatics* of the Liver are so numerous as to cover almost the whole of its outer Surface. They discharge their contents, partly into the beginning of the Thoracic Duct, and partly to a Plexus situated in the fore-part of the Thorax.

The *Nerves* of the Liver are also numerous. They arise from the Great Sympathetics and Eighth Pair, and accompany the Blood-vessels.

The *Biliary Ducts* arise by extremely minute Branches, termed *Pori Bilarii* or *Tubuli Biliferi*, chiefly from the extremities of the Vena Portæ, in the Substance of the Corpuscles, through the whole of the Liver.

The Pori Bilarii run in company with the Branches of the Artery and Veins, and unite into larger and larger Branches, which afterwards go into two, and these again into a single Trunk in the Sinus Portarum, called *Ductus Hepaticus*.

The *Ductus Hepaticus* serves to carry the Gall or Bile which is of a yellow green colour, from the Liver,—and to convey it by the power of the Heart, Hepatic Artery, and Vena Portæ, assisted by the pressure of the sur-

rounding Muscles, to the Duodenum, and partly to the Vesicula Fellis.

The *Vesicula*, or *Cystis Fellis*, or *Gall-bladder*, is a small oblong Pyriform Bag, consisting of a Bottom, Body and Neck, situated upon the concave side of the Great Lobe of the Liver, and placed in a transverse direction from behind forwards.

It extends from the Sinus Portarum; where the Neck is situated, to the anterior edge of the Liver, and when full advances beyond the edge of the Liver, so as sometimes to have its Fundus opposed to the soft parts of the Abdomen under the edge of the False Ribs.

The bottom is a little lower than the Neck, when the Body is in the erect posture. It inclines also a little to the right side, and rests upon the Colon at the beginning of the Duodenum.

It is composed of several *coats*, the *external* of which is a continuation of the Membrane of the Liver: This however, is only a partial coat covering that part of the Gall-bladder, which projects beyond the Surface of the Liver.—It serves to give strength to the Gall-bladder, and to fix it to the Liver

Under the former Coat, a few pale scattered Fibres, running in various directions, are sometimes observed, which have been considered as a *Muscular Coat*; under this is a small quantity of Cellular Substance, which has obtained the name of *Nervous Coat*.

The *Inner Coat*, sometimes called *Villous*, is full of small Reticular Rugæ or folds, which become extremely minute towards the Cervex, where they run in a longitudinal direction.

The Surface of this coat is every where perforated by the ducts of small Follicles, which discharge a viscid Mucus to defend the Surface of the Inner coat from the Stimulant nature of the Bile.

The Gall-bladder is connected through its whole length to the Liver by Cellular Substance, Blood-vessels, and Absorbents, among which the *Hepato-cystic Duct*, similar to those found in many Animals, were in former times described, and supposed to carry the Bile found in the Gall-bladder immediately from the Liver. It is now sufficiently ascertained,—that no such Ducts exist in the human body.

The Gall-bladder has Blood vessels, Absorbents, and Nerves, common with those of the Liver.—Its Veins pass into the Vena Portæ.

The Neck of the Gall-bladder is twisted and folded against itself, and afterwards contracts and sends out a Duct called *Cysticus*, which runs near the *Ductus Hepaticus*, and then joins it, to form the *Ductus Communis Choledochus*.

The *Ductus Cisticus* is smaller than the *Ductus Hepaticus*, and differs from it also in having a number of imperfect Partitions or *Plicæ*, running in a somewhat spiral direction, and forming it into Cells which retard the flow of the Bile.

The Gall-bladder serves as a receptacle for the Bile, when the Stomach and Intestines are empty and have no need of it, and retains it till wanted for the purpose of digestion. It is afterwards discharged from the Gall-bladder, when the Stomach is full into the Ductus Communis, and from that to the Duodenum, chiefly by the pressure of the surrounding Viscera, and partly as some Anatomists suppose, by a contractile power in the Gall-bladder itself. The whole of the Bile contained in the Gall-bladder is found by experiment to pass, from the Liver through the Hepatic Duct to the Ductus Communis, and from that by the Cystic Duct into the Gall-bladder.

The Bile returning from the Gall-bladder is observed from the thinner parts being absorbed, to be thicker, more acrid and bitter, and of a deeper colour, than that which flows from the Liver

The *Ductus communis Choledochus*, called *Choledochus* from its conveying Bile, is about the size of a Goose-quill, and is considerably larger than either of the Ducts which open into it

It descends at the posterior and left part of the Duodenum, and passes for some way obliquely between the Muscular and inner coats of that Gut,—the obliquity answering the purpose of a Valve.

It terminates in the left, posterior, and near to the under part of the second Turn of the Intestine, by a projecting Orifice, which is rounded above, and pointed below.

The Structure of the Ductus Choledochus, and of the Biliary Ducts in general, is of the same nature, being

entirely Membraneous: The Inner Surface of the Ducts also agree in being perforated by numberless pores, which are the Mouths of Mucous Follicles, similar to those upon the inside of the Gall-bladder.

The Bile serves to mix the different parts of the Food properly together, for the formation of the Chyle,—to correct too great a disposition to acidity,—and to excite the Peristaltic motion of the Intestines.

SPLEEN.

The *Spleen* is a soft and very Vascular Substance, and of a purple colour.

It is somewhat depressed, is of a long oval form, and of considerable size, but varying in this respect in different subjects.

It is situated in the Left Hypochondriac Region, between the large extremity of the Stomach and corresponding False Ribs;—Its under end lying behind the Colon, and over the top of the Left Kidney.

The situation of the Spleen varies a little, according to the state of Respiration, and to the fullness or emptiness of the Stomach;—rising or falling as the Lungs are less or more dilated, and becoming more oblique in its situation,—with its inferior extremity turned more forwards, in proportion as the Stomach becomes more distended.

Its *External Surface* is convex and uniform, like that of the Ribs, &c. to which it is opposed.

Its *Internal Surface*, or that next the Spine, is irregularly concave; and is divided into an Anterior and Posterior Plane, by a longitudinal Groove or Fissure, where the Vessels and Nerves enter.

The Anterior Plane is more concave than the Posterior, corresponding to the contiguous convexity of the Stomach.

The Spleen has frequently deep *Fissures* upon its edges;—sometimes it has small *Appendages* attached to it, and not unfrequently there is one or more *Small Spleens* connected with it.

At the under side, it is fixed to the Omentum, and, by means of that and Blood-vessels, to the Stomach and Pancreas.—Behind, it is connected to the Diaphragm;

and below, to the Left Kidney and Colon, by reflections of the Peritoneum, and by Cellular Substance.

It is covered by a *double Membrane*, one Layer of which is a production of the Peritoneum, the other proper to the Spleen itself; but so closely connected to the common coat, that they appear to be one and the same Membrane.

The substance of the Spleen is remarkably soft, and is by much the most tender of the Abdominal Viscera.

It consists of a Congeries of Blood-vessels, Lymphatics, and Nerves, joined together and supported by a large quantity of Cellular Substance.

The extreme Branches of the Blood-vessels put on the appearance of *Penicili*, or small *Brushes*, which have been mistaken for Glands.

These vessels are so tender, that when an injection is forcibly thrown into either Artery or Vein, it bursts into the common Cellular Substance, and gives the appearance of Follicles or Cells.

The *Blood-vessels*, of the Spleen are among the largest of the Body, in proportion to the Viscus on which they are dispersed.

The *Artery* is a principal Branch of the Cæliac.—It runs in a serpentine direction, and, after sending Branches to the Pancreas, &c. and the *Arteriæ Breves* to the left end of the Stomach, it goes into the substance of the Spleen, where it is subdivided into Branches, which are crowded together, and run in every direction, forming at length Plexus and Penicilli, which terminate in the Branches of the corresponding Vein.

The Vein, like that in most other Viscera, is larger than the Artery: It receives the Blood immediately from the terminations of the Artery, without the intervention of Cells.

The Splenic Vein receives the *Venæ Breves* of the Stomach, the Pancreatic Veins, &c. and forms one of the principal Branches of the Vena Portæ.

The *Lymphatics* from the superficial parts of the Spleen join the deep seated Absorbents at the Fissure where the Blood-vessels enter, and afterwards pass through several Conglobate Glands lying over the Splenic Artery.

They intermix with Lymphatics belonging to several other Viscera, and terminate in the Thoracic Duct

The *Nerves* of the Spleen, which are small, but considerable in number, are Branches of the Great Sympathetic and Eighth Pair, and form an irregular Plexus which surrounds the Vessels.

No Excretory Duct has been found to proceed from the Spleen, in consequence of which very various opinions have been entertained with respect to the use of that Organ.

Many of the Ancients were of opinion,—that besides the Bile of the Liver there was an *Atra Bilis*, or *Black Bile* and that the Spleen was the receptacle of the latter.

Others have thought a particular *Menstruum* was secreted in it, and conveyed to the Stomach for the purpose of digestion.

Others again,—that the Blood of the Spleen promotes the sluggish circulation of Blood of the Vena Portæ.

The late Mr. HEWSON, who has written particularly on the Spleen, was of opinion it concurred with the Thymus and Lymphatic Glands, in forming the red Globules of the blood, and that these globules were rendered complete in the Spleen.

It has been also supposed,—that as the Stomach becomes full, the Spleen is compressed by it, in consequence of which a greater quantity of Blood is sent to the Pancreas, for the Secretion of the Pancreatic Juice.

But the present most prevalent opinion is,—that the Blood undergoes some change in it, which renders it useful in the secretion of the Bile; and the opinion is supported from the great quantity of Blood with which this Organ is known to be supplied, and from its Vein, not only in Man, but in other animals, passing to the Vena Portæ.

PANCREAS.

The *Pancreas*, i. e. *All Flesh*, or the *Sweat Bread*, is a long flat Gland of the Conglomorate kind, and of the same nature with the Salivary Glands, of which it may be reckoned the largest.

It is situated in the Epigastric Region, and placed transversely in the back-part of the Abdomen, between the Stomach and Spine.

It has a large or Right Extremity, and a small or Left one, an Anterior and posterior Surface, and an Upper and Under Edge.

The Right extremity, is attached to the left side of the second Turn of the Duodenum, or to that part where the Intestine is about to go across the spine.

From the under part of the Right Extremity, the Pancreas sends down an Elongation or Process, which adheres closely to the Duodenum.

This process was discovered by WINSLOW, and termed by him *Pancreas Minus.*—It is also called *Head of the Pancreas.*

The body of the Pancreas passes before the upper part of the transverse portion of the Duodenum, and over the Aorta, Vena Cava, and part of the Splenic Vessels, to all of which it is attached.

The small extremity, which is rounded, fixed to the Spleen, through the medium of the large Omentum.

The Pancreas is covered anteriorly by the two Layers of the root of the Meso-colon;—posteriorly, it is only covered with Cellular Substance, which connects it to the Vertebræ.

It is composed of Acini, which form small Glands or Lobes; and these are connected loosely by Cellular Substance, in such a manner as to give an appearance of uniformity and smoothness to the External Surface.

The *Arteries* of the Pancreas are derived, partly from the Hepatic, but chiefly from the Splenic, by several small Branches, which pass at various places into its Substance, in a transverse direction.

The *Veins* correspond in name and course with the Arteries, and assist in forming the Vena Portæ.

The *Lymphatics* run to the Splenic Plexus, and terminate in the Thoracic Duct.

The *Nerves* of the Pancreas are small: Like those of the other Viscera of the Abdomen, they are derived from the great Sympathetic and Eighth Pair.

From the different Acini of the Pancreas small Ducts arise, which join into larger ones running transversely in the Substance of the Pancreas, and forming a common Duct, called *Ductus Pancreaticus.*

The *Pancreatic Duct,* termed also *Ductus* WIRTSUNGI

after the discoverer of it in the Human Body, is remarkably thin, of a white colour, and semi-transparent.

It begins at the left Extremity of the Pancreas, runs in the substance of the Gland, a little below its middle heighth, and becomes gradually larger in consequence of receiving the different Branches which compose it,—and is at last about the size of a Raven's-quill.

At the Right Extremity of the Pancreas, it receives the Principal Duct of the Pancreas Minus, and terminates obliquely in the Duodenum along with the Ductus Communis Choledochus.—In some rare cases, however, it terminates at a little distance from the Biliary Duct; and sometimes also, the Duct of the Pancreas Minus ends separately in the Duodenum.

The Pancreas secrets a *Liquid* or *Juice*, resembling Saliva in quality and appearance, and discharges it by its Excretory Duct into the Duodenum.

The *Pancreatic Juice* incorporates the Bile with the Alimentary Mass, and may be said also to answer the same purpose to the contents of the Intestines, which the Gastric Juice does to those of the Stomach;—or, it finishes that digestive Process in the Intestines which was begun in the Stomach.

OF THE

ORGANS OF URINE AND GENERATION.

IN THE MALE.

KIDNEYS.

THE *Kidneys* are two Glandular bodies, of a pale red colour, situated in the upper and back part of the Abdomen, in the Lumbar Region.

They are placed one on each side of the Spine extending from the Eleventh Pair of Ribs to near the Ossa *Ilia*; and rest upon the Diaphragm, large Psoæ, Quadrati Lumborum, and Transversales Abdominis Muscles.

The Right Kidney is situated at the under and back-part of the large Lobe of the Liver, behind the Colon, and is commonly very little lower than the left.

The Left Kidney is situated at the under and back-part of the Spleen, and behind the left parts of the Stomach, Pancreas, and Colon.

The Kidney is abour five or six-fingers-breadth in length, but considerably less from the outer to the inner side, and less than that still from before backwards; or, it is compared in shape to a *French* or *Kidney Bean*.

It is rounded anteriorly, flattened posteriorly, convex and uniform at its outer margin, and has a deep depression or Sinus towards the Vertebræ, surrounded with unequal edges, where the Renal Vessels and Nerves enter.

It is a little broader behind than before, and a little broader and more curved above than below, from which circumstance, but more particularly from the disposition of the Vessels to be afterwards mentioned, it is easy to distinguish the Right from the Left Kidney when taken out of the Body.

The Right Kidney is connected to the Liver and Duodenum, the Left to the Spleen, and both to the Muscles on which they are placed and to the Renal Glands and Colon, by Cellular Substance and by the Peritoneum.

They are also connected to the Aorta and Vena Cava by the Blood-vessels, and to the Bladder of Urine by the Ureters.—They accompany the motions of the Liver and Spleen, in the different states of Respiration.

Each kidney is surrounded by loose Cellular Substance, which commonly contains a considerable quantity of Fat, from which it is termed *Tunica Adiposa.*

The *Tunica Adiposa* covers not only the Kidney, but large Vessels, and defends them from the pressure of the surrounding Viscera.

Under the Tunica Adiposa, there is a *Membrane* composed of the original proper Coat and Cellular Substance incorporated, which adheres close to the Kidney, and is reflected over the edges of the Sinus, to be joined to the Pelvis and large Vessels.

The substance of the Kidney is commonly smooth and uniform, though sometimes it is irregular, in consequence of the Lobes which originately from it not being completely incorporated.—It consists of an outer part called *Cortical*, and an inner termed *Medulary.*

The *Cortical Substance*, termed also *Secerning*, surrounds the Kidney, and forms about a third of its breadth;—it likewise sends in Processes or Partitions, which separate the Medulary parts from each other.

The *Medulary* termed also *Uriniferous Substance*, is of a redder colour than the former, and is divided into a number of distinct Columns each of which terminates in a projection called *Papilla*, or *Processus Mammillaris.*

The *Papillæ* merely the continuation of the Uriniferous part; though frequently considered as a third division of the substance of the Kidney.

Each Kidney has one, and sometimes more *Arteries*, which run transversely from the Aorta, and a Vein still larger, which terminates in the Cava.—They enter at the Sinus of the Kidney, and are included in Cellular Substance, which accompanies them throughout their course.

The Right Renal Artery is longer than the Left in con-

sequence of the Vena Cava, behind which it passes, being placed upon the Right Side of the Aorta.

The Artery as it approaches the Kidney, is divided into Branches, which are afterwards minutely distributed through the Cortical Substance, forming Arches and Anastomoses;—but these are found to be much less frequent than are commonly described.

The small Branches, after turning and winding in various directions, pass partly towards the Surface of the Kidney, where they form irregular *Stars*, some of which supply the proper membrane.

Others turn inwards in a waving direction, and form *Corpuscles*, which are disposed somewhat after the manner of *Clusters of small Berries*, which can only be seen distinctly by the assistance of Glasses, after a minute injection.

The *Corpuscles* were considered by Dr. NICHOLAS as the Globular termination of Blood-vessels, and termed by him *Globuli Arteriarum Termini*;—but these Globuli were afterwards observed by Mr. HEWSON to consist of small vessels intimately intermixed.

The *Veins* returning from the extremities of the Arteries unite in the Cortical Substance of the Kidney.

The Branches of the Renal Vein are much larger than those of the Artery, but correspond with them in their course.—They form a large Trunk on each side, which lies anterior to the corresponding Artery, and runs transversely to the Cava;—the left, which is the larger of the two, passing across the fore-part of the Aorta.

The *Lymphatics* of the Kidney run from without inwards, and terminate in the Lumbar Glands, and afterwards in the Thoracic Duct.—The Superficial Lymphatics are so small, as seldom to be seen, excepting in the diseased state of the Kidney.

The *Nerves* are from the Semilunar Ganglion formed by the great Sympathetic and Eighth Pair. They form a Plexus which surrounds the Blood-vessels, and accompanies them in the Kidney.

From the minute Extremities of the Renal Artery, in the Corpuscles seated in the Cortical Substance, the *Uriniferous Tubes* arise. They are mixed with some extremely small Blood-vessels, and constitute the Medullary Substance of the Kidney.

By degrees they unite into larger Tubes, which run in a radiated manner, the direction being from the outer edge or circumference, towards the inner part or Cavity of the Kidney.

The radiated Tubes, becoming still larger in their passage terminate in the *Papillæ*, which are of a compressed conical form, and are at a little distance from each other.

The *Papillæ* are twelve or more in each Kidney, the number varying according to that of the original Lobes of which the Kidney is composed, and likewise from some of the Papillæ being incorporated with each other.

Upon the points of the Papillæ are the termination of the Uriniferous Tube,—large enough to be distinguished by the naked Eye,—through which the Urine distils from the Substance of the Kidney.

Round the root of each Papillæ, a Membrane Tube arises, termed *Infundibulum* or *Calix*, which receives the Urine from the Papillæ.

The *Infundibula* are commonly the same in number with the Papillæ; the number, however, varying in different subjects, two or more of the Papillæ sometimes opening into the same Infundibulum.

The Infundibula joins into two or three larger Trunks which afterwards form a Dilatation of considerable size, of the shape of an inward Cone, and termed *pelvis* of the Kidney.

The *Pelvis* is placed partly within, but the greatest part of it without the body of the Kidney, and contracts into a long Tube, about the size of a writing-pen, called *Ureter*.

The *Ureters* are commonly one to each Kidney, though in some rare instances they are double on one or both sides.

The Artery of the Kidney is placed uppermost,—the Vein in the middle and fore-part,—and the Pelvis and beginning of the Ureters at the under and back-part of the Blood-vessels.

The Ureters descend obliquely inwards behind the Peritoneum, and go over the great Psoæ Muscles and Iliac Vessels, opposite to the anterior and lateral parts of the Os Sacrum.

They pass afterwards into the Pelvis, and terminate in the under, outer, and back-part of the Bladder

In their descent, they are not straight, but form turns, which are commonly compared to the Italic *f*; neither are they cylindrical, as they form slight dilatations and contractions in their course, two of which contractions are more observable in their passage over the Psoæ Muscles, and at their insertion into the Bladder.

The Ureters are covered anteriorly by the Peritoneum, and composed of an *External Membranous coat*, a *middle Muscular* one, formed chiefly of circular Fibres, and an *Internal coat*, sometimes called *Villous*.

The Inner coat is very Vascular, and is perforated by the Mouths of the small Ducts, which line it with a Mucus to defend it from the Urine.

The Vessels and Nerves of the Ureters are from those of the contiguous parts.

The *use* of the Kidneys is to secrete the Urine from the Blood, and convey it by means of the Ureters to the Bladder.

RENAL GLANDS.

The *Renal Glands*, termed also *Capsulæ Atrabilariæ*, *Capsulæ Renales*, *Renes Succenturiati*, and *Glandulæ Suprarenales*, are two small, flat, Glandular-like bodies of a dark-yellow colour, lying in the upper and back-part of the Abdomen.

They are situated at the upper, inner, and fore-part of the Kidneys, over the large Psoæ Muscles and Diaphragm and brighter than the Renal Vessels.

They are of an irregular figure, and are about a couple of fingers-breadth in length, but much larger, proportionally, in the Fœtus than in the Adult.

The Right one is connected to the Liver, the Left to the Spleen and Pancreas, and both to the small Muscle of the Diaphragm, and to the Psoæ Muscles and Kidneys, by the Cellular Substance. They are likewise retained by numerous Vessels and Nerves which are spread over them.

They are surrounded by Cellular Substance, which is part of the Tunica Adiposa of the Kidneys, and have a thin proper coat which adheres firmly to them.

They are frequently observed to be hollow, and to contain a dark-coloured bilious-like matter, which is consi-

dered by many Anatomists as the Internal, very Vascular and tender parts melted down by putrefaction.

Their *Arteries* come from those of the adjacent parts, particularly from the Renal, and also from the Aorta, and Diaphragmatic Arteries.

Of the principal *Veins*, the Right to the Vena Cava, and the Left to the Renal Vein.

The *Lymphatics* go chiefly to those of the Kidneys.

The Nerves come principally from the Renal Plexus.

They have no Excretory Ducts.

The Renal Glands have been supposed to furnish Lymph for the dilution of the Blood returning in the Renal Veins, after the secretion of the Urine;

Or,—to restore to the Blood of the Vena Cava the irritable parts which it loses in the secretion of the Urine and Bile;

Or,—to convey something useful to the Thoracic Duct;

Or, in the Fœtus,—to divert the Blood from the Kidneys, and thereby lessen the quantity of Urine.

But their *use* is still undiscovered; though it is supposed from their vicinity to the Kidneys, not only in Man, but in many other animals, that they are subservient to these Organs, and particularly to those of the Fœtus.

VESICA URINARIA.

THE *Vesica Urinaria*, or *Bladder* of *Urine*, is a large Sac situated in the Pelvis of the Abdomen, in the bottom of the Hypogastric Region.

It is placed in the fore-part of the Pelvis, behind the Ossa Pubis, and before the upper, and above the under portion of the Intestinum Rectum.

When empty, it is contracted into a small size, which occupies the under and fore-part of the Pelvis; but, when fully distended, it rises above the brim of that Cavity, and sometimes ascends to within a little distance of the Umbilicus.

When moderately dilated, it is of a roundish, irregular oblong form, but a little flattened before, more convex behind, and broader at its anterior and posterior, than towards its lateral parts,—a little more capacious, also, below than above, especially at its posterior part.

It is distinguished into *Fundus*, *Body*, and *Cervix*, the first of which is placed upwards and a little forwards; the last at the under and fore-part.

It is connected below to the Rectum, and at the sides to the Pelvis by the reflected Peritoneum and Cellular Substance, the former of which, when the Bladder is empty, has the appearance of lateral Ligaments.

It is attached, at the fore-part of its Body, by Cellular Substance, to the Ossa Pubis, without the intervention of the Peritoneum.

It is also fixed to the Umbilicus by three Ligaments situated between the Peritoneum and Abdominal Muscles.—They are formed of the Urachus running upwards from the Fundus, and the shrivelled Umbilical Arteries passing obliquely from the sides of the Bladder.

The firmest connection is by means of a Ligamentous expansion, which runs from each side of the Neck of the Bladder and Prostate Gland, to be fixed to the inside of the Arch of the Ossa Pubis. It is connected, also, at this place, to the Penis, by the Urethra.

It is composed of different coats joined together by Cellular Substance, the first of which is only a partial one continued from the Peritoneum.

The *Peritoneal* or *common coat*, recedes from the Abdominal Muscles at the top of the Pubes, and passes over the superior, and down upon the posterior, and lateral parts of the Bladder, to near the termination of the Ureters, where it is about a fingers length from the Anus,—and is there reflected upon the Rectum and back part of the Pelvis.

When the Bladder is much distended, it carries the Peritoneum with it, and leaves a space between that Membrane and the Pubes, of such length, that an incision has frequently been made here, and large Calculi extracted from the Bladder, without penetrating into the Abdomen, or wounding the Peritoneum.

The *second coat* is termed *Muscular*.—It is composed of distinct Fleshy Fibres, interwoven with each other, and forming Fasciculi.

The External Fibres run chiefly in a longitudinal direction, and are connected at the under and fore-part of the Bladder, with the Ossa Pubis.

More internally, are Fibres which run in all directions, and are intermixed with each other in the form of Network.

The Muscular Fibres are contracted about the Neck of the Bladder, and form what has been termed *Sphincter Vesicæ*;—these, however, are merely the continuation of the other Fibres.

The Muscular coat, by its contraction, occasions the complete evacuation of the Bladder.—The Fibres about the Neck of the Bladder, by acting separately from the rest of the Muscular coat, prevent the involuntary discharge of the Urine.

The Cellular Substance, under the Muscular Fibres, is frequently termed *Nervous coat*.

The *inner coat*, though often called *Villous*, is smooth like the inside of the Peritoneum, and, though thin, is so dense as to prevent the exudation of the Urine.

This coat is rendered somewhat unequal by the projecting of the Fasciculi of the Muscular Fibres; and when the Bladder is empty, it forms large wrinkles or Rugæ.

The inside of the Bladder is very irritable, in consequence of which a desire to expel the Urine is occasionally excited. It is lined, however, by a Mucus, discharged from its Arteries, which prevents it from being constantly irritated by that Fluid.

The under part of the Bladder is perforated by *three Openings*, of which one is placed anteriorly, and two posteriorly.

The Anterior Opening is the beginning of the passage called *Urethra*, and is surrounded by the Neck of the Bladder.

It comes off almost at a right angle from the lower part of the Bladder, without any tapering of that Viscus.

The other two openings are formed by the termination of the Ureters, which run obliquely forwards and inwards, between the Muscular and Inner coat of the Bladder.

They terminate in the Bladder at a little distance from each other, and at the same distance behind the beginning of the Urethra, each by a somewhat oval Opening, which is more contracted than the Ureter is immediately above it.

The *Arteries* of the Bladder come from various sources,

but chiefly from the Umbilical and Pudenda Communis.

The *Veins* return to the Internal Iliacs;—They form a Plexus of considerable size upon each side of the Bladder.

The *Lymphatics* accompany the principal Veins on the Bladder, and, at the under part and sides, pass into the Iliac Glands.

The *Nerves* are Branches of the Great Sympathetic and Sacral Nerves.

The Bladder receives the Urine from the Ureters by drops, and sometimes by small thread-like streams or squirts, till by its accumulated quantity and acrimony, it forces that Viscus to contract and expel it.

The Urine is expelled, partly by the contraction of the Bladder itself, and partly by the action of the Abdominal Muscles and Diaphragm pressing the Intestines against the Bladder.

The frequency of the evacuation depends upon the size and sensibility of the Bladder, upon the quantity of Urine secreted, and the degree of acrimony it possesses.

TESTES.

The *Testes*, formerly termed *Didymi* or *Gemini*, are two Glandular Bodies situated in the Cavity of the Scrotum.

The *Scrotum*, which furnishes an external covering to the Testes, is a continuation of the common Integuments, has the same Structure with the Skin in general, but is more plentifully supplied with Sebaceous Follicles, has no fat in its Cellular Substance, and is occasionally relaxed and corrugated in a greater degree than the Skin in the other parts of the Body.

Upon the Surface of the Scrotum, there is a superficial, longitudinal projecting *Line*, which divides it into two equal parts, and has the name of *Raphe*.

The inner Surface of the Scrotum is lined with Cellular Substance, which is firmer and more Vascular than in other places.

The Cellular Substance of the Scrotum, in consequence of its redness, Fibrous appearance, and supposed

power of contraction, has, by many Anatomists, been considered as a Muscle, and called *Dartos*.—This opinion, however, has of late years been rejected.

The Cellular Substance of the Scrotum involves each Testicle singly, and forms a Septum or Partition between the two, which prevents Air or Water from passing readily from one side of the Scrotum to the other.

The *Vessels* and *Nerves* of the Scrotum are chiefly from those of the neighbouring parts.

The Blood-vessels are Branches of the Pudenal and Femoral.

The *Lymphatics* go mostly to the Inguinal,—but some of them accompany those of the Testes to the Lumbar Glands.

The anterior part of the Scrotum derives Nerves from the Lumbar, and the posterior from the Pudenal Nerves.

The Scrotum assists in supporting and protecting the Testes.

Under the Scrotum are two *Membranes* or *coats*, proper to each of the Testes, the one termed *Vaginalis*, the other *Albuginea*.

The *Tunica Vaginalis*, named from its forming a sheath, is of the same nature with the Peritoneum, being originally a Process of that Membrane, which in the Fœtus descends with the Testicle from the Abdomen.

It forms a shut Sac, which has no communication with any other part.

It incloses the Testicle, as the Pericardium does the Heart, and lies loose every where, excepting behind, where it is *continuous* with the Albuginea.

It is considerably larger than the Testis which it incloses, reaching as far above and below it as to allow it a certain degree of motion.

It is connected by its external Surface to the Cremaster Muscle, and partly, by means of that, to the inner Surface of the Scrotum.

It assists the Cremaster in supporting the Testis, and, by being constantly moistened within by a fluid exhaled from its Surface, and from that of the Tunica Albuginea, it allows the Testicle to move easily.

The *Tunica Albuginea*, so called from its white colour, is, like the former Coat, a continuation of the Peritoneum, and invests the Body of the Testicle closely.

It is a thick, strong, dense, and inelastic Membrane, of a glistening appearance.

It is remarkably smooth on the outside, but internally it is rough and unequal, adhering every where firmly to the Body of the Testis.

It covers both the Testis and Epididymis, connects them to each other, gives strength to them, and conducts their Vessels in the manner the Mesentery does those of the Intestines.

The Body of the Testis is of a yellowish colour, and has a Pulpy appearance,—is of an oval form, a little flattened at its outer and inner Surface;—and frequently one Testicle is a little larger than the other.

The Testes are placed obliquely, with one end upwards, and the other end backwards and downwards.

At the outer and back-part of the Testis, there is an Appendix named *Epididymis*, from its situation upon the Testis or Didymis, which is enclosed in the same covering with the Testis itself.

The Epididymis begins at the upper part of the Testicle immediately above the entry of the Blood-vessels; and this part of it being large and of a round form, is termed *Globus Major*, or *Head* of the Epididymus.

In its descent, it becomes somewhat smaller and flatter, and is attached behind to the Body of the Testicle, where the Blood-vessels go in; but forwards it is loose, the Tunica Albuginea dipping in this place, and forming a Cavity or Pouch.

The under part of it becomes more firmly attached to the Body of the Testicle, and forms the *Canda*, or *Globus Minor*; it is then turned backwards upon itself, after which it sends out the Excretory Duct of the Testicle.

The body of the Testis has numerous Arteries, Veins, Absorbents, and Nerves; but is principally composed of a collection of minute, tender, elastic Filaments, intricately convoluted, termed *Tubuli Seminiferi*, or *Vasa Seminalia*.

The *Tubuli Seminiferi* are disposed in Fasciculi or Bundles, between Partitions, which are formed of Blood-vessels and Cellular Substance.

These Septulæ begin at the root or *Nucleus*, situated at the back-part of the Testicle, sometimes termed *Cor-*

pus Highmorianum, and extend in a radiated manner to Tunica Albuginea.

The Testis is fixed behind by its Vessels, which are collected into a *Cord* termed *Spermatic*, but is loose and free before, to prevent it from being pinched.

The *Spermatic cord*, properly so called, extends from the Ring of the External Oblique Muscle to the Body of the Testis, and is composed of the Trunks of the different Vessels belonging to the Testicle, and of a quantity of Cellular Substance.—The Cord is covered by the Cremaster Muscle; and within this, by the same Process of the Peritoneum which forms the Tunic Vaginalis Testis. This part of the Process, however, is so incorporated with the common Cellular Substance of the Cord, as to appear to form part of it.

The under part of the Vagina of the Cord is separated by a Partition formed by the upper end of the Vaginal Coat of the Testicle, and by condensed Cellular Substance, so that no liquor can pass easily from the Cord to the Testicle, and *vice versa*.

The *Arteries* of the Testes, termed *Arteriæ Spermaticæ*, and *Arteriæ Preparantes*, arise one on each side, from the fore-part of the Aorta, a little below the Renal Arteries.

The *Spermatic Artery* crosses over the Psoas Muscle and Ureter, and descends, behind the Peritoneum, to the under part of the Abdomen.

At the lower part of the Abdomen, it perforates the Ring of the External Oblique Muscle, and passes in the Spermatic Cord to the Testicle.

In its descent, it gives branches to the adjacent parts, and is so interlaced with those of the corresponding Vein, as to have been supposed by the Ancients to have large lateral communications with them.

After passing the Ring, it divides into Branches which go to the Testis at its posterior edge. They are partly dispersed upon the Epydidymis, but the larger Branches run in a serpentine direction into the Substance of the Testis, where they are minutely distributed upon the Surface of the Seminal Tubes.

Besides the Spermatic Artery, there is a smaller one from the Hypograstic, which accompanies the Vas Deferens, and is dispersed along with the other Artery.

The *Veins* are much larger than the corresponding Arteries, and have several Valves in them, especially without the Abdomen.

They form a *Plexus*, which accompanies the Artery on each side, and is sometimes called *Corpus Pampyniforme*, being compared to the shoots of the Vine, or *Corpus Pyrimidale*, from giving a Pyramidal form to the Cord.

The Plexus ascends in the Abdomen, and upon the Surface of the psoas Muscle; and about the part where it recedes from the Artery, it forms a single Trunk, which, in the right side terminates in the Vena Cava, nearly opposite to the Artery, and in the left side, goes into the Renal Vein.

There is also a small inferior Spermatic Vein, which accompanies its Artery, and ends in the Hypograstic Vein.

The *Tubuli Seminiferi* in the Body of the Testicle consist of numberless extremely minute Ducts, which are of a Cylindrical form, have no division into Branches, and when drawn out, are found to be several feet in length.

They are first collected into Bundles, between the Septulæ of the Testicle, and these again into others still smaller, each of the smaller being formed of a simple Tube, coiled up into a Conical form with its Base forwards, and its apex towards the posterior edge of the Testicle.

From the convoluted Seminal Tubes, an equal number of straight Vessels are sent out at the back-part of the Testicle, under the name of *Vasa Recta*.

At the upper and back-part of the Testicle, the Vasa Recta communicate, and form an irregular Plexus or Net-work, called *Rete Vasculosum Testis*.

The *Lete Testis* sends out from twelve to eighteen Tubes termed *Vassa Efferentia*, which carry the Semen from the Testicle to the Epididymis.

The *Vassa Efferentia* soon become convoluted, and form Conical Bundles, termed *Coni Vasculosi*.

The *Coni Vasculosi* are firmly connected by Cellular Substance, and are observed by Dr. MONRO, in his Treatise *De Testibus*, to compose somewhat more than a third part of the Epididymis.

The Vascular Cones gradually unite into a single Tube, which constitutes the rest of the Epididymis, and though only about the size of a Hog's Bristle, transmits the whole of the Semen.

The single Tube becomes larger in its course and less convoluted, and at last, expanding its convolutions, it comes out greatly increased in size, and almost in a straight direction, under the name of *Vas Deferenes*.

Besides the Ducts already described, a *Vas Aberrans* is sometimes observed, which is one of the Vascular Cones, wandering off, and terminating in the Epididymis lower than usual.

At other times, the same kind of Vessel forms a *Processus Cæcus*, or blind Duct, with a dilated extremity which does not communicate with any other part.

VESICULÆ SEMINALES AND PROSTATE GLAND.

The *vesiculæ Seminales* are two small Pyriform Receptacles, situated between the under and lateral parts of the Bladder and the Intestinum Rectum,—about three fingers-breadth in length, and the third part of that in breadth, and a little flattened.

They are at a considerable distance from each other behind, but anteriorly they converge, and become contiguous, forming a sharp angle.

Each of them is composed of a *convoluted Tube*, with *irregular Processes*, and surrounded by a quantity of tough Cellular Substance, and by many Vessels and Nerves.

Internally, they have a *Villous appearance* and are formed of irregular *Cells* which correspond with the irregularities on their External Surface, and communicate freely with each other.—Their shape, size, and general appearance, however, vary in different subjects, and not unfrequently in the same person.

Between the Vesiculæ Seminales, the ends of the Vasa Deferentia, now become larger and Cellular, pass forwards till they arrive at the Prostate Gland, where each Vas Deferens joins the Vesicula of that side, and communicate so freely with it, that injected Fluids readily pass from the one to the other.

From each Vesicula Seminalis and Vas Deferens of the same side, a *small Canal*, about a finger breadth in length, passes out which is firmly connected to its fellow, without communicating with it, and becomes gradually smaller, piercing, obliquely, the Prostate Gland, and terminating in the under part of the Neck of the Bladder.

The *Orifices* of these Canals are separated from each other by a *Caruncula*, or round Projection of the Membrane of the Urethra, termed *veru Montanum*:—or, from being broad behind and rostriform before, it is compared to the head and beak of the *Wood-cock*, and called *Caput Gallinaginis*.

The Vesiculæ Seminales are commonly considered as Reservoirs of the Semen, receiving it from the Vasa Deferentia, and afterwards,—by a power inherent in themselves, assisted by the action of the neighbouring Muscles, particularly of the Levatores Ani,—propelling it to the Urethra.

The Semen is prevented from passing into the Bladder, the opening from it being shut while that Fluid is expelled.

Various experiments have been made on the Vesiculæ Seminales by the late Mr. HUNTER, from which he was of opinion, that they are not Reservoirs of Semen, but Glands, secreting a particular Mucus;—that, with other parts, they are subservient to the purposes of Generation;—and that the Bulb of the Urethra is the receptacle of the Semen in which it is accumulated previous to its ejection.

The *Prostate Gland*, named from its situation before the Vesiculæa Seminales, lies immediately behind the under end of the Symphysis of the Pubis, and rests upon the Intestinum Rectum.

It surrounds and closely embraces the Neck of the Bladder, or beginning of the Urethra; but the greater

part of it is placed posteriorly and laterally, having a Lobe projecting on each side.

It is about the size of a walnut, and of the figure of a Spanish chesnut,—or it resembles a heart as commonly painted on Playing-cards, with the Base towards the Bladder, and the Point towards the Penis.

It has a Spongy Substance, but is one of the firmest Glands of the Body, and generally sends out *ten* or *twelve Ducts*, which open obliquely at the beginning of the Urethra, at the sides of the Caput Gallinaginis and near the termination of the Seminal Ducts.

From the Ducts of the Prostate Gland, a thin white Liquor is discharged,—from the same causes, and at the same time with the Semen,—into the Urethra, and is supposed to be useful in the process of Generation; —or, according to some Authors, this Fluid facilitates the passage of the Semen through the Urethra.

The Blood-vessels, Absorbents, and Nerves of the Vesiculæ Seminales, and Prostate Gland, are in common with those of the parts which surround them.

PENIS.

The *Penis*, which has obtained a variety of other names, and as *Membrum Virile*, *Mentula*, &c. consists of three Spongy Substances, two of which form the upper part and sides, or Body of the Penis, and are termed *Corpora Cavernosa Penis*, the third surrounds the Urethra, and has the name of *Corpus Spongiosum Urethræ*.

The Penis is covered with a continuation of the common Integuments, which are thinner than elsewhere, and, instead of Fat, there is as in the Scrotum, a Reticular Substance only under the Skin.

At the anterior extremity of the Penis, the Integuments form a loose fold, termed *Prepuce*, which is connected to the anterior and under part, or *Glans* of the Penis, by a triangular fold, called *Frænum Preputii*.

The *Corpora Cavernosa Penis* resemble two equal but irregular Cylinders, closely applied to the sides of each other, and each covered by a strong, elastic, Ligamentous Sheath, the Fibres of which run in a transverse, and partly in an oblique direction.

They arise one on each side, by two blind Conical extremities, called their Crura, from the inner part of the Crura of the Ossa Ischia and Ossa Pubis, to both of which they are very firmly connected by Ligamentous Substances.

At the under part of the Symphysis of the Pubis, they are united to each other, and continue so till they reach the Glands, where they terminate in a rounded extremity.

At the upper part of the root of the Penis, the Ligamentous Sheath of the Corpora Cavernosa sends up a process of a triangular form, to be connected to the Symphysis of the Ossa Pubis, under the name of *Ligamentum Suspensorium*, by which the Body of the Penis is supported, and prevented from passing too much upon the Scrotum.

The Corpora Cavernosa leave a *Groove* above, for the principal Vein of the Penis, and a *Channel* below for the Cavernous Substance of the Urethra.

The internal substance of the Corpora Cavernosa consists of *loose reticular Plates*, somewhat similar to the Cancelli in the ends of long Bones, and, like them, readily communicating with each other.

Upon the Cells of the Corpora Cavernosa, the Arteries are plentifully dispersed, and open freely into them, the Blood of the Arteries tinging the Cells in the relaxed state of the Penis, and filling them completely when it is distended.

The Corpora Cavernosa are united to each other by a *Septum* or *Partition*, formed by a continuation of the elastic Ligament which covers these Bodies.

The *Septum penis* is composed of Cords, extending, nearly in a parallel direction, from the Dorsum, or upper part of the Penis, to the Corpus Spongiosum Urethræ.

Between the different Cords, *Fissures* are left, through which the Blood, or an injected Fluid, passes without obstruction from one of the Corpora Cavernosa to the other.

The *Corpus Spongiosum Urethræ* is situated under and between the Corpora Cavernosa Penis, but projects considerably beyond them.

It begins a little behind the part where the Corpora

Cavernosa are united, adheres to them by condensed Cellular Substance, and terminates at the anterior extremity of the Penis.

It has an external covering similar to that of the Corpora Cavernosa Penis, but more delicate and more of a Membranous appearance.

The posterior part of the Corpus Spongiosum is dilated into a *longitudinal prominence*, of a *conical* form, situated within the Skin of the Perineum, and termed *Bulb* of the Urethra. It extends from the root of the Penis to near the Anus, projects most towards the under and back part, and is divided anteriorly by a Septum.

The Corpus Spongiosum is continued along the under part of the Corpus Cavernosa, and at the end of these expands into the Substance called *Glans penis*, which covers and incloses the ends of the Corpora Cavernosa.

The *Glans*, or *Nut*, named from its resemblance to an Acorn, is separated from the Corpora Cavernosa by a continuation of the Ligamentous Sheath which covers them, and is encircled at its posterior part by a prominent margin, called *corona Glandis*, behind which is a Cervix or Neck.

The Surface of the Glans is covered with a *plexus*, chiefly of Venous Vessels, and with *Nervous papillæ*, which give it its sensibility; and these are inclosed in a fine Membrane continued from the inside of the Prepuce.

About the Cervix and Corona of the Glans, are many *Follicles*, termed *Glandulæ Odoriferæ*, which discharge a Sebaceous Matter, to preserve the sensibility of the Glans, and allow the Prepuce to move backwards and forwards upon it with facility.

The Internal Structure of the Bulb of the Urethra and Glans of the Penis, is of the same nature with that of the Corpora Cavernosa; and the Internal Structure of the rest of the Corpus Spongiosum differs from that of the Corpora Cavernosa only in this, that the Cells are smaller and of a more delicate texture.—Some Anatomists consider the greater part of the Corpus Spongiosum as merely a Plexus of convoluted Veins.

The *Urethra*, named from the Urine passing through it, is a long Canal, the Diameter of which is nearly equal to that of a writing-pen. It begins at the under

and fore-part of the Bladder, runs through the Corpus Spongiosum, and terminates in the point of the Penis by a longitudinal Orifice.

At its Origin, it descends a little, and then passes forwards, under the Symphysis of the Ossa Pubis, to which it is closely connected by Cellular Substance: It then ascends at the under and fore-part of the Ossa Pubis, varying in the remainder of its course according to the different degrees of relaxation or distension of the Cells of the Penis.

There are commonly *three Dilatations* in the Urethra; one of which is at the Prostate Gland, the second in the Bulb of the Urethra, and the third about the beginning of the Glans.

In general, it has also the same number of *slight contractions;* the first at its origin from the Bladder, the second between the point of the Prostate Gland and Bulb of the Urethra, and the third at the point of the Glans.

Between the point of the Prostate Gland and part where the Urethra penetrates the Corpus Spongiosum, —including nearly the space of a fingers-breadth,—the Urinary passage is entirely *Membranous*, and covered only with the common Cellular Substance.

At the upper side of the Bulb, the Urethra enters the Corpus Spongiosum, in which it is inclosed to its termination in the point of the Penis.

The inside of the Urethra is lined by a very *Vascular* and *sensible Membrane*, which is observed to possess a certain degree of contractility, and is therefore presumed by several Anatomists to be endowed with Muscular Fibres.

Between the Corpus Spongiosum and the Membrane which lines the Urethra, especially towards the Septum of the Penis, numerous *Lacunæ* of different sizes are situated, one or two of which in particular, next the Glands, are often considerably larger than the rest.

They run in a longitudinal direction from behind forward, and perforate the Urethra by Orifices large enough to admit a Bristle.—The discharge a bland Mucus for the defence of the Urethra.

Besides the Lacunæ, two small bodies, each about the

size of a Garden-pea, are frequently met with, and are termed, from their discoverer, COWPER'S *Glands*.

They are situated at the sides of the Membranous part of the Urethra,—between its Bulb and the point of the Prostate Gland,—and covered by the Accelerator Muscles.

When present they are observed to discharge from their Ducts into the Urethra, a Fluid which is supposed to serve the same purpose with that of the Lacunæ.

The *Arteries* of the Penis are chiefly from the Pudicæ Communes, which are Branches of the Internal Iliacs, and partly from the Femoral Arteries.

Each of the Pudic Arteries having passed out of the Pelvis, through the great Notch of the Os Ilium, runs between the Sacro Sciatic Ligaments to the inner side of the Tuber Ischii, from which it passes along the Crus of that Bone, and of the Os Pubis to the root of the Penis.

In its course, it furnishes Branches to the adjacent parts, and afterwards gives off three principal Branches which belong to the Penis:—One of these goes to the Bulb of the Urethra, to be dispersed in the Corpus Spongiosum;—the other two, which are larger than the former, go to the Body of the Penis, one of them penetrating its Crus, and running in the centre of the Corpus Cavernosum; the other passing between the Symphysis Pubis and joining of the Crura Penis, and extending along the Dorsum as far as the Corona Glandis.

The Branches of the Femoral Artery to the Penis communicate with those of the former, and are chiefly dispersed upon the Integuments.

The Arteries of the penis are divided into minute Ramifications, which communicate with each other, and with their fellows on the opposite side, and terminate partly in the corresponding Veins, and partly in the Cells of the penis.

The *Veins* arise, some from the extremities of the Arteries, and others by large open Mouths from the Cells of the penis.

The greater number of the Veins unite into a Trunk, called *vena Magna Penis*, which runs in the superior Groove formed by the union of the Corpora Cavernosa

and is furnished with Valves, and with thick strong coats.

The Vena Magna, at the under end of the Symphysis Pubis, separates into the Right and Left Plexus, which pass to the corresponding Iliac Veins.

To an obstruction of the course of Blood through the Veins, by the pressure of the Muscles at the root of the penis, together with an increased influx through the Arteries, is owing that accumulation of Blood in the Corpora Cavernosa, which occasions a distension of the penis.

The relaxation of the penis happens from the causes which produced the distension, being removed;—The Elastic Ligamentous Membrane which covers the penis again forcing the Blood from the Cells in the Veins.

Upon the Surface of the penis, there are small superficial Veins, which communicate with those deeper seated, and commonly terminate by one or more Branches in the Veins at the top of the Thighs.

These Branches assist in carrying on the circulation, and return part of the Blood during the distension of the penis.

Of the *Lymphatics* of the penis, from those of the prepuce and Skin, in general, go to the right and left Inguinal Glands, while the Lymphatics from the Glans and Body of the penis accompany the Arteries into the under part of the pelvis.

The *Nerves* of the penis are large in proportion to the size of that Organ. They come from the Hypograstic plexus, and principally from the last Sacral Nerves, and are distributed chiefly upon the Ligamentous Sheath which incloses the Corpora Cavernosa.

They are situated upon the Dorsum of the penis, more laterally than the Arteries which lie between them and the principal Vein.

For the *Muscles* of the penis, see part II.

The penis ejects the semen into the Vagina, and serves for the conveyance of the Urine from the Bladder.

OF THE

ORGANS OF URINE AND GENERATION

IN THE FEMALE.

The *Kidneys*, *Renal Glands*, and Ureters, have the same situation and structure as in the Male.

The *Bladder* has also the same situation behind the Ossa Pubis, but rises higher when it is in the distended state.

It is proportionally larger than the Bladder of the Male, and is broader from one side to the other, corresponding to that part of the Cavity of the Pelvis to which it belongs.

The *Urethra* is much shorter,—being scarcely two inches in length,—and straighter than in the Male, having only a slight bend downwards between the extremities.

It is produced from the most depending part of the Bladder, has no prostate Gland, but is furnished, as in the Male, with *Lacunæ*, which open into it, and discharge a Mucus to defend it from the Urine.

The Parts of Generation in the Female (which are here supposed to be in the unimpregnated state) are divided into *Internal* and *External*. The former consist of the Uterus and its Appendages, the latter are those which are seen without any dissection.

Internal Parts.

The *Uterus Matrix*, or *Womb*, is a hollow Viscus, situated in the Pelvis, in the Hypogastric Region, between the Bladder and Rectum, with which it is connected.

It is of a *triangular figure*, and a little flattened before and behind, but more so anteriorly; is large above, small below, and has two angles at its upper and lateral parts, called *Corners* of the *Uterus*.

It is distinguished into *Fundus*, or upper part, which includes the space above the insertion of the Fallopian Tubes, the *Body* or middle, and *cervix* or under part, the two last being nearly of equal length.

The extent and figure of the Uterus varies considerably in different subjects.—In Women who have never been pregnant, it is commonly about two inches and a half in length, from one inch and a half to two inches in breadth at the Fundus, and about half as broad at the Cervix.—It is near an inch in thickness, and is larger in Women who have borne children, than in the virgin state.

The Cavity, like the External part of the Uterus, is of a *triangular form*, but is small in proportion to the size of the Organ,—being scarcely capable of containing the Kernel of an Almond, and has its sides closely applied to each other.

It is covered externally through its whole length, with a smooth polished coat, continued from the Peritoneum, which, at the under part of the Cervix, is reflected forwards upon the Bladder, backwards over the Rectum, and laterally towards the sides of the Pelvis.

Its substance is of a compact, Cellular, and Fleshy nature, and plentifully supplied with Blood-vessels:—The Fleshy Fibres, however, are seen distinctly only in the Gravid Uterus.

It is remarkably vascular in its Body, less so in its Cervix, and is nearly of the same thickness throughout, excepting at its corners, where the Uterine or Fallopian Tubes terminate.

It is lined with a fine and very vascular Membrane, of a somewhat porous and villous appearance, in which the Arteries terminate which discharge the Menstrual Fluid.

The Cavity of the Cervix has *two small Longitudinal Lines* projecting in it, one in the anterior, the other in the posterior part, on each side of which are numerous *Rugæ*.

The *Rugæ* run in an obliquely transverse direction, and are formed not only of the inner Membrane, but also by the Fibres which compose the Body of the Uterus.

Between the Rugæ are many small *Follicles*, which discharge a Mucus for lubricating the parts near which

they are placed:—Some of them, being of a roundish form were mistaken by Naboth for the Female Ovula.

The under part of the Cervix projects into the Vagina, somewhat in form of the Glans Penis. and is perforated, by a transverse slit, termed *Os Tincæ*, from its supposed resemblance to the Mouth of the Tench Fish.

The *Os Tincæ*, in an Uterus which has never been impregnated, is about the size of the orifice of the Urethra in the Male, but nearly twice as large in the Uterus of a Woman who has borne children.

It is smooth on its external surface, is placed obliquely in a direction towards the back-part of the Vagina, and is surrounded by several Mucous Follicles.

Appendages of the Uterus.

The *Appendages* of the Uterus, are the *Broad* and *Round Ligaments*, the *Ovaria*, the *Fallopian Tubes*, and the *Vagina*.

The *Ligamenta Lata*, termed sometimes *Alæ Vespertilionis*, from their resemblance to the Wings of a Bat, are two Membranous productions, or Doublings of the Peritoneum, sent from the edges of the Uterus and posterior extremity of the Vagina, to be fixed to the sides of the Pelvis.

Along with the Uterus, they separate the Pelvis into anterior and posterior Cavities. and are themselves divided into large and small, or anterior and posterior Alæ or Pinions.

They contain and support the Ovaria and Uterine Tubes, with part of the Spermatic and Uterine Vessels and Nerves. They likewise inclose a portion of the Ligamenta Rotunda, &c. connect the Uterus to the sides of the Pelvis, and assist in retaining it in its place. In the time of Gestation they become effaced, by furnishing the Uterus with part of its external covering.

The *Ligamenta Rotunda* are two long and slender cords, composed of Vessels and Ligamentous Fibres, arising from the corners of the Uterus, immediately before and below the Fallopian Tubes, from which they descend obliquely in the Ligamenta Lata, diminishing a little in their course towards the Groins.

They pass through the Rings of the Abdominal Mus-

cles, in the same manner as the Spermatic Cords do in the Male, and afterwards inserted by separate Branches into the upper and lateral parts of the Pudendum.

They assist the Ligamenta Lata in preserving the equilibrium of the Uterus.

The *Ovaria*, anciently called *Testes*, *Muliebres*, are situated at the sides of the Fundus of the Uterus, about an inch distant from it, and are contained in the posterior Pinions of the Ligamenta Lata, which form a coat to them similar to the Tunica Albuginea Testis.

The Ovaria are plain above, and prominent and semi-oval below, flattened at their anterior and posterior Surfaces, and the size of each, when in a state of the greatest maturity, nearly equal to half of the Male Testicle.

They are large, uniform, and smooth, in the vigour of life, but become small, unequal, and shrivelled, in Old Women, or in those who have borne many children.

They are attached to the Uterus by the Ligamenta Lata, and by two small cords, termed *Ligamenta Rotunda Ovarii*, which were mistaken by the Ancients for Vasa Deferentia, carrying a secreted Liquor to the Uterus.

They are composed internally of a loose whitish Cellular Substance, intermixed with Vessels and Nerves, and contain a number of small Vesicles, called *Ova*, filled with a limpid Fluid, which partakes of the qualities of the white of an egg.

These Vesicles differ much in size in the same Ovarium;—the largest of them are seldom equal to the size of a small Garden-pea.

The number of Ova is differently estimated by different Anatomists,—from ten to twenty and upwards having been found in one Ovarium.

According to experiments made by Mr. HUNTER, it is ascertained,—that the number of originally existing Ova in each Ovarium, whether that number be greater or smaller, may be diminished, but cannot be increased.

The Ovaria serve for the nourishment of the Ova, which contain the rudiments of the Fœtus.

The *Uterine*, or *Fallopian Tubes*, compared in shape, by FALLOPIUS, to that of a Trumpet, are two Conical Vermiform Canals, attached to the corners of the Ute-

rus, and terminating in it, each by a *small Opening* which scarcely admits the entrance of a Bristle.

They become gradually larger in their passage towards the sides of the Pelvis: Near their outer extremity, they are convoluted and considerably dilated, but are afterwards suddenly contracted. and terminate by *open Mouths* sufficiently large to admit the point of a Goose-quill.

Their outer ends are free and fluctuating in the Pelvis, and expanding into many irregular jagged or pointed extremities, called *Fimbriæ*, which are considerably longer at one side of the Tube than the other.

They are commonly upwards of a hand-breadth in length, and contained in a doubling of the Ligamenta Lata.—In their natural situation, they lie near the Ovaria; but when drawn out and extended, are a finger's-breadth distant from them.

The structure of the Tubes is nearly the same with that of the Uterus, and, like it, they are capable of dilatation and contraction: Their inner side, however, has a different appearance, being furnished with many small longitudinal Plicæ, which are most conspicuous towards the outer extremities.

The Tubes are supposed to convey the prolific part of the Male Semen from the Uterus to the Ovaria, in order to fœcundate the Ova; and by grasping that part of the Ovarium where the ripest Ovum is situated, to carry the Ovum, according to some Authors, or its contents only according to others, to be mixed with the Male Semen, and to be lodged in the Cavity of the Uterus.

The *Vagina* is a Membranous Canal, which extends from the Neck of the Uterus to the opening of the Pudendum.

It is situated behind the Bladder and Urethra, and before the under part of the Intestinum Rectum, to each of which it is closely connected by Cellular Substance.

It begins a little above the Internal Orifice of the Uterus, but reaches higher at the posterior than anterior part; from which circumstance, together with a slight Curvature, it has backwards, the Canal is found to be longer in its posterior than anterior Surface.

From the Os Tincæ, it passes downwards and for-

wards, and terminates between the Labia Pudendi the Axis of the Vagina forming a considerable Angle with that of the Uterus.

The dimensions of the Vagina correspond with the size of the Penis in the Male; but vary according to the temperament of the Body, and become larger in Women who have borne children.

The Body of the Vagina is composed of thick, strong, Membranous parts, and furnished internally with numerous irregular *Rugæ* or Wrinkles, and Nervous *Papillæ*, the former of which considerably diminish the capacity of the Canal, and the latter add to its sensibility.

The *Rugæ* run in a transverse direction, and are so disposed as to divide the Vagina into anterior and posterior *Columns*, which join together laterally, and produce a *Raphe* or Suture at the right and left sides.

They are deepest, largest, and most crowded upon the anterior and towards the outer part of the Vagina; are most conspicuous in Virgins, less so in married women, and become more and more effaced in those who have borne children. The Rugæ facilitate the distension of the Vagina during child-birth.

The whole extent of the Vagina, particularly towards its outer extremity, is furnished with small *Follicles*, the orifices of which can frequently be seen.

They supply the *Mucus*, with which the Canal is always lubricated, and which is discharged, in time of Coition in such abundance, as to have been formerly considered as an emission of female Semen.

The outer end of the Vagina is covered on each side, by a Substance composed of Blood-vessels and Cells similar to those of the Penis, and described by De Graaf under the name of *Plexus Reteformis*, and by later Anatomists under that of *Corpus Cavernosum Vaginæ*.

The *Corpora Covernosa* are covered by the Sphincter Vaginæ Muscle, the action of which, joined to the Dilatation of these Bodies, serves to contract the entry of the Vagina in the time of Coition.

The *use* of the Vagina is to receive the Penis and Semen, and to convey from the Uterus the Menstrual Flux, and Fœtus, the Secundines, and the Lochia.

The Uterus, with its Ligaments, Ovaria, and Uterine

Tubes, are supplied with Blood from the Spermatic and Uterine Arteries.

The *Spermatic Arteries* arise from the Aorta, as in the Male, and run in the Ligamenta Lata, to be dispersed upon the Ovaria and Uterine Tubes, and afterwards upon the Uterus itself.

The *Uterine Arteries* are derived from the Internal Iliacs, and are much larger than the Spermatics. They direct their course, first to the under part of the Uterus, after which they ascend along its edges, and near its upper part join the Spermatic Arteries.

From the Uterine chiefly, and partly from the Spermatic Arteries, many small Branches are furnished, which run in a serpentine manner, and communicate with their fellows in the opposite sides of the Uterus.

The Vagina is supplied with an artery on each side, —termed *Vaginal*,—from the Uterine, and with small Branches from the umbilical, Middle Hæmorrhoidal, and Pudendæ Communes.

The *Spermatic Veins* have the same termination as in the Male, but are considerably larger.—The other Veins runs into the Internal Iliac.

The *Lymphatics*, like the Blood-vessels, run also in two Sets. Those of the one set accompany the Spermatic Blood-vessels, and, like the absorbents of the Testes in the Male, go to the Lumbar Glands. Those of the other correspond with the Hypogastric Blood-vessels, and terminate in the Glands at the lateral parts of the Pelvis.

The *Nerves* are from the Sacral and Great Sympathetics.

The *use* of the Uterus is,—to receive from the Ovaria by means of the Fallopian Tubes, the Rudiments of the Fœtus,—to nourish it, and, after bringing it to maturity, —to expel it through the Os Interinum Uteri and Vagina.—From the Inner Surface of the Uterus, the Menstrual Evacuation is also discharged.

External Parts.

The *external parts*, called *Pudendum* or *Vulva*, are formed of two prominent sides, termed *Labia Pudendi*, *Labia Externa*, or *Alæ Majores*. These are contiguous

when the Limbs are not much separated, thereby preventing the access of the Air to the Internal Parts, which they at the same time protect and conceal.

The upper part of the Pudendum, named *Pubes* or *Mons Veneris*, is situated on the fore-side of the Ossa Pubis, and is covered with Hair similar to that in the Male, and beginning to grow about the same period of life.

The Pubes is composed of the common Integuments, under which a considerable quantity of Fat is situated, rendering it thick, soft, and prominent.

The *Labia Pudendi* extend from the Pubes to within about an inch of the Anus, the space between the Pudendum and Anus obtaining the name of *perineum*, from a moisture supposed to flow about this part of the Skin. —It is sometimes also called *anterior perineum*, to distinguish it from that part which extends from the Anus to the Coccyx, termed by some Anatomists *posterior perineum*.

The opening between the two Labia has the name of *Fossa Magna*;—it increases a little in size and depth as it descends, and forms a small boat-like Cavity at its under extremity, termed *Fossa Navicularis*.

The Labia are thickest above, become thinner below, and terminate in a transverse fold of the Skin, named *Frænum Furcula*, or *Fourchette*, which is frequently lacerated in the first child-birth.

The Labia are composed of the Skin elevated by a large quantity of Cellular Substance and some Fat, and lined by a very Vascular Membrane, which is thin, tender, and red like the inside of the lips, and is furnished with numerous Sebaceous Follicles, secreting a Liquor whereby the parts are preserved smooth and moist.

Between the upper ends of the Labia, is the Substance named *Clitoris*, and by some *Mentula Muliebris*, —not exceeding an inch in length, and little more than the third part of that in thickness, and tied down to the fore-part of the Symphysis Pubis.

It is extremely Vascular and Nervous, and is composed, like the Penis in the Male, of two *crura* and *corpora cavernosa*, contained in a Ligamentous Sheath, with a Septum between them.

The *Crura* are upwards of twice the length of the *Body*

of the Clitoris, and, together with Muscles belonging to them, arise, as the Crura of the Penis do in the Male, from the Crura of the Ossa Ischia and Pubis.

The Clitoris is also provided with a *Ligamentum Suspensorium*, by which it is connected to the Ossa Pubis, and with a *Glans*, which, like that of the Penis, is extremely sensible, but has no perforation in it for the passage of the Urine.

It is covered by a continuation of the Skin of the Labia, which at its inferior extremity, forms a Semilunar Fold, termed *preputium clitoridis*.

The Prepuce is furnished with *Glandulæ Odoriferæ* upon its inner Surface, and with a small Frænum which fixes it to the Glans.

In the time of Coition, the Glans Clitoridis is supposed to produce nearly the same sensation in the Female as the Glans Penis does in the Male.

At the under and outer part of the Clitoris are two Bodies called *Nymphæ*, from their being supposed to preside over and direct the course of the water proceeding from the Bladder.

The *Nymphæ* arise narrow from the Prepuce and Glans, and run obliquely downwards and outwards along the inside of the Labia, increasing in breadth, but suddenly contracting again at their lower extremity.

They are chiefly formed by a production of the inside of the Labia, have the same florid colour with them, and in their natural state are contiguous, and cover the Orifice of the Urethra.

They are sometimes of unequal size, and not unfrequently, particularly in warm climates, they project beyond the edges of the Labia.

Their Internal Structure consists of Cellular Substance, with a large proportion of Blood-vessels. They have also many Nervous Papillæ, which render them very sensible, and Sebaceous Follicles, the contents of which prevent them from being injured by the Urine.

The Nymphæ assist in directing the course of the Urine from the Urethra, and in preventing the Air from entering the Vagina.—They also tend to enlarge the passage for the child in the time of parturition.

Between the Perineum and Nymphæ, there is a smooth *cavity* or *vestibulum*, which is most complete in

Virgins, and leads to two passages, viz. to the Urethra above, and to the Vagina below.

The *Orifice of the Urethra* is placed a little below the Glans of the Clitoris, and between the two Nymphæ, and is surrounded by a Spongy Eminence, which projects at its under part, called by some Authors *Corpus Glandulosum*, or *Glandulæ Prostate Mulierum*.

The Corpus Glandulosum is perforated by *Lacunæ*, some of which are of considerable depth, and discharge a viscid matter round the Orifice of the Urethra.

The *Orifice of the Vagina* termed likewise *Os Externum Uteri*, is placed immediately under that of the Urethra, and is naturally straiter than the rest of the Canal, but in the virgin state is still more contracted by the Substance called *Hymen*, or *Circulus Membranosus*, which partly surrounds it.

The *Hymen* approaches to a Circular Figure, but the Circle is frequently incomplete next the orifice of the Urethra, the broad part being turned towards the Perineum.

When the Hymen is ruptured, it degenerates into small Conical Papillæ, termed *Carunculæ Myrtiformes*, from their supposed resemblance to Myrtle berries.

The Hymen has been considered as a Test of Virginity;—but neither the presence nor absence of this Membrane can be depended upon as a certain Criterion.

About the Orifice of the Vagina are several Mucous Follicles, similar to those round the opening of the Urethra.

The *Blood-vessels* and *Nerves* of the External Parts are from the Pudic branches, and are dispersed in numerous Ramifications upon the end of the Vagina, Labia Externa, and Clitoris.

The *Absorbents* pass partly to the Inguinal Glands, and partly to those placed at the sides of Pelvis, or upon the Lumbar Vertebræ.

OF THE GRAVID UTERUS.

When the Rudiments of the Fœtus have been conveyed from one of the Ovaria into the Cavity of the Uterus, through the medium of the corresponding Uterine Tube, whether in the state of a Fluid only, or of a complete Ovum, impregnation is said to have taken place.

Some days after Impregnation has commenced, an *Ovum*, consisting of a Vesicle filled with a limpid Fluid is found in the Cavity of the Uterus.

The Ovum, when first visible, is observed to have a smooth surface, but in a short time thereafter it sends off flocculent Branches, the greater part of which are by degrees converted into a *Placenta*, at that part of the Uterus where the Ovum happens to be first attached.

The Rudiments of the Fœtus, however, are not always conveyed to the Uterus after Impregnation, for sometimes a Fœtus is found in the Ovarium; at other times in one of the Uterine Tubes; and some rare instances have occurred where the Embryo has dropped from one of the Ovaria or Tubes into the Cavity of the Abdomen, where a placenta has been formed, by which, it has been nourished

The Ovum, at an early period of Gestation, consists of a thin *Membranous Capsule*, which encloses the Embryo or Germ with the umbilical cord and waters; and the Capsule, again, consists of an internal Membrane called *Amnios*, on the outside of which is the *True Chorion*, which is covered with a Filamentous and Spongy Substance, termed by Ruysch *Tunica Filamentosa*, and by more modern Authors, *False* or *Spongy Chorion*.

The *Spongy Chorion* is described by Dr. Hunter as consisting, in early Gestation, of *two Layers*, one lining the Cavity of the Uterus, and termed by him *Membrana Decidua*, from being supposed to be cast off from the Uterus; The other covering that part of the Ovum which does not adhere to the Uterus, he terms *Decidua Reflexa*.

The Decidua is least distinct between the Uterus and Placenta. Near the edge of the Placenta, both it and

that part of it called *Reflexa*, are thickest and strongest, and decrease in thickness towards the other end of the Uterus and Ovum, in proportion as these become more expanded.

The Decidua and Decidua Reflexa unite into one Membrane in advanced Gestation. They have been supposed to be formed originally by an efflorescence thrown out upon the parts on which they are placed, in the manner it is thrown out upon inflamed surfaces.

Between the Amnios and Chorion, a *Gelatinous Fluid* is contained in the early Months, at which period a small *Bag*, filled with a milky-like Fluid, is observed on the Amnios, near the Umbilical Cord, and is termed *Vesicula Umbilicalis* or *Alba*

The *Vesicula Umbilicalis* is connected to the Cord by a Filament consisting of an Artery and Vein, which, with the Fluid and Bag, soon disappear. The use of this Vesicle which has sometimes been mistaken for an *Allantois* is not yet understood

In early Gestation, the Ovum is large in proportion to the Embryo; but towards the latter period of pregnancy the proportion is reversed, as appears from the following observations

No well authenticated account has been yet received, of the Embryo being observable till near the end of the third week, when it is found to appear like an oblong Vesicle floating in the limpid Liquor of the Ovum.

In the fourth week, the Ovum is about the size of a Pigeon's Egg and the Embryo not larger than that of a common Fly.

About the end of the third month, the Ovum is the size of a Goose's Egg, and weighs eight ounces while the Embryo is between two and three ounces in weight and three inches in length;—and the Head and Extremities being now distinctly observable, it obtains the name of *Fœtus*, which it retains from this time till the end of Gestation.

In the sixth month, the Placenta and Membranes weigh seven or eight ounces, the Fœtus, twelve or thirteen, and is eight or nine inches in length, and perfect in all its external parts.

At birth, the Secundines weigh only between one and two pounds, the Fœtus six or seven, and is from eighteen to twenty-two inches in length.

Still however, from the difficulty of ascertaining when Pregnancy commences,—from the differences of Fœtuses of the same age in different women, and in the same women in different Pregnancies, and—from the Fœtus being frequently retained in the Uterus some time after it is dead, as well as from the small dependance to be placed upon many of the figures given of these Parts,—the above observations are not altogether to be depended upon.

Changes produced in the Uterine System by Impregnation.

Immediately after impregnation, a large *Orifice* is constantly observed in the Ovarium, leading to a *Cavity* in that part of it from whence the Rudiments of the Fœtus have been derived.

This *Cavity* appears first flocculent, and is afterwards filled up with a Granulous Substance, which has the name of *Corpus Luteum*, from the yellow appearance it assumes, especially in Quadrupeds.

The *Corpus Luteum*, consists of an outer vascular, and an inner Inorganic-looking Substance, which has been considered by some authors as the remains of the Ovum

The Corpus Luteum is not found till after impregnation. It continues during pregnancy, and for some time after delivery, when it gradually vanishes, but leaves a *Scar* in the Ovarium, which continues for life.—The number of Corpora Lutea correspouds with that of the Ova impregnated.

After the Embryo is received into the Cavity of the Uterus, the Os Tincæ is shut up by a *Ropy Mucus* secreted from the Follicles in the Curvix Uteri; the Menstrua *cease to flow*.—and the Uterus by degrees is changed from a triangular to an *oval* form.

From the influx of Blood, and the growth of the Ovum, the Cavity of the Uterus gradually enlarges from a size capable only of admitting an Almond, to that which contains the full-grown Fœtus, the Secundines and waters; composing together a Mass equal to nine or ten pounds weight.

Some time after impregnation, the Fundus and Body

of the Uterus, being softer and looser than the Cervix, first yield to the parts which it contains.

For the two first Months, the Uterus increases so little as to remain in the Cavity of the Pelvis, and it is generally after the third month, before the Tumour formed by it can be felt above the Symphysis of the Pubis

During the first three months, the Os Tincæ remains smooth and even and its Orifice is nearly as in the unimpregnated state: but between the third and fifth month the Cervix and Orifice begin to be dilated, the former becoming softer, and the latter changing its common appearance, and projecting more into the Cavity of the Vagina.

The Uterus continues to rise through the whole period of Gestation, but frequently inclines a little to one side.—In the seventh month, it reaches the Umbilicus, and at last touches the Scrobiculus Cordis, Stomach and Colon, occupying the whole of the Umbilical Epigastric Regions.

In the progress of Gestation, the whole Uterus becomes softer, looser, and more Vascular, and the Vessels are generally enlarged, the proportional increase being nearly similar to that of the Uterus.

The course of the Arteries is remarkably convoluted,—fully as much so as they are previous to conception, and greatly more so than that of the corresponding Veins.

The Veins are much larger than the Arteries, their diameters being such as to have distinguished them by the name of Sinuses;—and to them the great bulk of the Uterus is chiefly owing.

The Substance of the Uterus was formerly supposed by some to be thicker, and by others to be thinner in the Gravid, than in the unimpregnated state; but the generality of Anatomists seem now sufficiently satisfied, that it is nearly the same thickness in both states, and during the whole term of Pregnancy.

In the latter months, the Tubercle of the Os Uteri is considerably enlarged, and the firmness of its texture converted to the Spongy softness of the Body of the Uterus. The transverse Rima or Orifice is changed into an oval Pit, and in women who have borne several

children, it is considerably dilated near the end of Gestation.

The situation of the Appendages of the Uterus is also considerably altered. The Ovaria, with the Tubes and Ligaments of the Uterus, are lower situated, in respect to the Fundus Uteri, in proportion as it ascends; and at the full time, the Broad Ligaments, by assisting in forming a covering to the Uterus, are nearly obliterated.

In the enlarged state of the Uterus, the *Muscular Fibres* are distinctly seen.—They form Fasciculi which run in various directions, but cannot be traced far without interruption

A description is given by RUYSCH of a *circular muscle* in the bottom of the Uterus, for the expulsion of the Placenta;—but the Placenta is found to adhere to other parts besides the Fundus Uteri; nor has such a Muscle been observed by later Anatomists.

The Muscular Fibres of the Uterus assist in the delivery of the child and expulsion of the Placenta; and in a few days afterwards, the Uterus partly by the contractile power of these Fibres, and partly by that of the Blood-vessels, is restored to near its former dimensions.

Contents of the Uterus about the end of Pregnancy.

The contents of the Uterus, towards the end of Pregnancy, consist of the *Fœtus*, the *Umbilical Cord*, *Placenta*, *Membranes*, and *Waters*.

The Cord, Placenta, and Membranes, are named the *Secundines*, or *After-birth*, with which some include the waters though these are discharged previous to the expulsion of the child.

The Cord is fixed by one end to the Umbilicus of the Fœtus, and by the other it is attached to the Placenta at a little distance from its middle, from which circumstance the extraction of the Placenta is more easily effected.

It is commonly about two feet long,—in some instances more, in others less; but in general it is of sufficient length to allow the Birth of the child, while the Placenta adheres to the Uterus of the mother.

Its thickness is nearly equal to that of ones finger, but smaller and weaker at the extremity next the Placenta,

—It is seldom of a cylindrical form, being marked with Sulci corresponding to the course of its Vessels.

It is composed of *one Vein* and *two Arteries*, which twist about each other in a spiral direction, and are covered by a smooth coat derived from the Membranes.

The Trunks of the Vessels are inclosed in a *Gelatinous Cellular Substance*, which adds to the strength and elasticity of the Cord, and allows the Blood to pass freely between the Fœtus and Placenta, without being in danger of interruption from pressure.

The *Vein* is much larger than the Arteries; it is destitute of Valves, and sends off no Branches till it reaches the Fœtus.

It arises from the Substance of the Placenta, and after perforating the Umbilicus, it passes in the inferior part of the Ligamentum Suspensorium, to the under side of the Liver.

The *Arteries* arise from the Iliac Arteries of the Fœtus, perforate the Umbilicus, and run to the Placenta, in the substance of which they divide into their ultimate Branches, where the Ramifications of one Artery frequently form large Anastomoses with those of the other, and both communicate with the Branches of the Vein, in the manner Arteries and Veins do in other parts of the Body.

The *use* of the Cord is, by means of the Vein, to convey pure Blood from the Placenta for the nourishment of the Fœtus, and, through the medium of the Arteries, to return what is not used, in Nutrition, again to be mixed with the Blood of the Uterus.—By the intervention of the Cord also, the Placenta is more readily extracted.

The *Placenta*, so called from its resemblance to a broad Cake, is a spongy mass, of a round form, occupying near a fourth part of the Ovum.

It is about seven or eight inches in breadth, and upwards of one inch in thickness, but is thinner at the edges where the Membranes go off.

The external surface, or that next the Uterus, is divided into Lobules with deep Fissures, while the internal, or that next the Fœtus, forms a regular mass, which has numerous large Branches of the Umbilical Vessels dispersed upon it.

In the Placenta are to be observed,—on the side next the child, the ramifications of the Umbilical Vessels form-

ing the principal part of its substance,—on the side next the mother, branches of the Uterine Arteries, almost of the size of Crow-quills, passing in a convoluted manner between the Uterus and Placenta, and terminating in the latter;—Veins corresponding with these Arteries, but flat and of great size, running obliquely to the Uterus, and, in the substance of the Placenta, an appearance which has been supposed by many Authors to be the common Cellular Membrane, of a tender nature, and easily ruptured by injection, but which is considered by late Authors as a regular spongy Substance, similar to that in the Body of the Penis.

The Placenta is connected to the Uterus on one side, by Blood-vessels, and by the Decidua, and to the Fœtus on the other by means of the Umbilical Cord.

The common place of attachment is near the Fundus Uteri, though it is found at different times adhering to all the other parts of the Uterus, not even the Os Tincæ excepted.

In the case of Twins, there is sometimes only one, but most frequently two distinct Placentæ, adhering together by the intervention of a Membrane in which the Vessels of the two Placentæ occasionally communicate with each other.

There are in these cases also two distinct apartments separated by a partition, each apartment containing its own waters and Cord.

The *use* of the Placenta is, to receive Blood from the Uterus, and, according to the opinion of modern Anatomists, to purify it, (as the Lungs do in the Adult), for the nourishment of the Fœtus.

The *Membranes* consist of the *Spongy Chorion*, the *True Corion*, and the *Amnios*.

They form a complete but slender Bag, which lines the Cavity of the Uterus, and incloses the Fœtus, Umbilical Cord, and Waters.

The *Spongy Chorion* is a thick opaque substance, which adheres to the Uterus, and forms the outer Layer of the Ovum, but scarcely penetrates between the Lobules of the Placenta.

Between the Uterus and Placenta, it is less distinct than elsewhere, being perforated there, and in some de-

gree concealed by the Blood-vessels proceeding from the inside of the Uterus.

It has a Spongy and Villous appearance, and full of small Blood-vessels, which can be readily injected from those of the Uterus.

The *True Chorion*,—the term derived from *Chorus*, a *company*, *numerous* Vessels being found to exist in it in the Quadruped,—is thinner, smoother, and much denser than the former.

It is connected with the Spongy Chorion as far as the edge of the Placenta, where it separates from it, is reflected over the Surface of the Placenta, which is opposed to the Fœtus, and is afterwards continued over the whole of the Cord.

It is uniform in its texture, has a transparent appearance, adheres to the Spongy Chorion and Surface of the Placenta, by a delicate Cellular Substance, and has no Vessels visible to the naked Eye, or which can be injected.

The *Amnois*,—so called, according to some Authors, from its supposed resemblance to a Vessel used by the Ancients for the reception of Blood in Sacrifice,—lines the Surface of the True Chorion, and, with it, is reflected from the Placenta upon the Cord, which it supplies with an external covering.

It is thinner, more dense, and transparent, than the Chorion, to which it adheres every where by a Jelly.

It is smooth and polished on the side next the Fœtus, and is destitute of Blood-vessels.

The Membranes, besides containing the Child and Waters, give origin to the latter, and, in the time of Labour, assist in opening the Orifice of the Uterus.

The *Waters*, called *Liquor Amnii*, are thinnest and clearest in the first months, after which they acquire some degree of colour and ropiness.

The *Liquor Amnii*, is chiefly composed of the Serum of the Blood. In its natural state, it has all the characters of the Liquor Pericardii, or of the Liquors exhaled from the Surfaces of other Membranes similar to the Pericardium.—It is supposed to be derived from the Exhalent Arteries of the Amnois.

It is proportionally greater in quantity in the first than in the last months, but the proportion and quantity vary

considerably in different women, and in the same women in different pregnancies.

Between the Amnios and Chorion, water is frequently collected, but in much smaller quantity than in the Amnios, and is termed *False Water*, or *False Delivery*. It is frequently discharged some time previous to the birth of the child, without any danger.

The liquor Amnii defends the child and Umbilical Vessels from the pressure of the Uterus, assists in distending the Uterus during Gestation, and allows the Fœtus a certain degree of motion.

In the time of labour, it also assists in dilating the Mouth of the Uterus, and, by lubricating the Vagina, facilitates delivery.

Peculiarities of the *Fœtus*.

All the Bones of the Body, excepting a few, are *soft*, *yielding*, and *imperfect*, and many of them entirely in a *state of Cartilage*.

The head is large in proportion to the rest of the body, and the bones of the Cranium are united by *Membrane*, which allows the size of the head to be diminished, whereby its passage is facilitated in the time of delivery.

Between the Frontal and Parietal bones, is the Membrane called *Bregma*, formed by the Dura Mater and Pericranium, which commonly disappears before the child is two years of age, the margins of the bones being then united.

—*The other peculiarities of the Bones of the Fœtus are taken notice of in the Description of the bones of the Adult.*

There is a large *proportion* of Fluids, and the Solids are generally *softer* than in the Adult.

The Skin is of a *bright red colour*, in consequence of its greater degree of Vascularity.

That part chiefly of the Cellular Membrane is *Adipose*, which is upon the Surface of the body; scarcely any Fat being found in the interior parts, where it gradually accumulates as the person grows older.

The Brain, Spinal Marrow, and Nervous System, are proportionally *larger*, but *softer*.

The Sanguiferous System, and Glandular Organs, are *larger*.

In the Eye is the *Membrana Pupillaris*, which arises from the inner margin of the Iris, and completely covers the Pupil.

It separates the Cameræ from each other, and is very Vascular. According to BLUMENBACH, it keeps the Iris expanded, during the rapid increase of the Ball of the Eye.

The Crystalline Lens is almost *Spherical*, and has numerous *Vessels* dispersed upon its Capsule.

The Meatus Auditorius is wholly *Cartilaginous*, and adheres by its extremity to an imperfect Bony Circle, in which the Membrana Tympani is placed.

The Meatus Externus, and Membrana Tympani, are lined by a *Mucous Membrane*, which is cast off after Birth.

The Thymus Gland, in the Fœtus, is a *large* Substance situated in the upper part of the Thorax, between the Layers of the Anterior Mediastinum.

It lies over the Pericardium, and occupies the space where the Aorta sends off the Carotid and Subclavian Branches, and extends a short way into the fore-part of the Neck.

It has *two long Cornua* above, and *two broad Lobes* below, is of a pale-red colour, and becomes afterwards of a darker hue.

A *white serous liquor* can frequently be squeezed from its substance; but it has no Excretory Duct; nor is the use of the Fluid, or of the Gland itself, yet ascertained.

Some Anatomists are of opinion, that the white Fluid is Chyle sent by a retrogade motion from the Thoracic Duct, and that the Thymus Gland is a Diverticulum to the Chyle, when too great a quantity of Lymph is sent to the Subclavian Vein.

In the Adult, the Thymus Gland is so completely absorbed, that scarcely any thing but Cellular Substance remains in its place.

The Blood-vessels of the Thymus are Branches of the Subclavian and Internal Mammary; the Nerves come from the great Sympathetics and Eighth Pair.

Its Lymphatics have not yet been very accurately traced.

The Lungs are small, firm, and of a dark-red colour,

and *sink* when thrown into water, in consequence of the Bronchial Cells having not yet received Air.

But if Air be admitted to them by putrefaction or otherwise, they swim in water, in the same manner as if Air had been conveyed to them in consequence of Respiration.

The Valve of Eustachius is *distinct* in the Fœtus, but frequently Cribriform in the Adult, is *larger* in proportion, and is supposed to direct the Blood of the Inferior Cava, immediately through the Foramen Ovale to the Left Auricle.

In the back-part of the Septum, between the Right and Left Auricles, is the *Foramen Ovale*, nearly equal in size to the Mouth of the Inferior Cava, bounded by a thick Muscular edge termed *Annulus Foraminis Ovalis*.

Upon the left side of the Foramen Ovale, a *Membranous Valve* is placed, which allows part of the Blood of the Right Auricle to pass through the Foramen Ovale immediately to the left one, but which completely prevents its return.

The Blood going through the Foramen Ovale, assists in keeping up the balance of circulation between the two sides of the heart, till the Lungs be ready to receive it.

The pulmonary Artery divides into three Branches, the right and left of which run to the Lungs, while the middle one, called *Ductus Arteriosus*, larger than both the other Branches, and its Area nearly equal to that of the Foramen Ovale, passes in an oblique direction to the beginning of the descending Aorta.

The Ductus, or Canalis Arteriosus, forms nearly one half of the Aorta, carries part of the Blood of the right Ventricle into that Artery, without allowing it to pass to the Lungs ; and the Aorta, formed in this manner, receives the force of both Ventricles, by which it is more enabled to send Blood through the Umbilical Arteries to the Placenta.

The Stomach is of a *rounder* form than in the Adult, and commonly contains a small quantity *of* a *Gelatinous Matter*.

The Appendix Vermiformis is *larger* in proportion, and is inserted into the extremity of the Colon, which, at this time, does not project to form a proper Cæcum.

The Colon, and frequently also the end of the Ilium, are filled with a *greenish black Fæces*, of a viscid consistence, termed *Meconium*.

The Liver is so *large* as to occupy both Hypochondriac Regions.

The *Umbilical Vein* passes from the Umbilicus, in a duplicature of the Peritoneum, to the left Branch of the Vena Portæ, and carries the Blood from the Placenta to the Liver.

From the Trunk of the Umbilical Vein, where it terminates in the Liver, a Branch called *Ductus*, or *Canalis Venosus*, runs in a somewhat waving direction, and joins the left Vena Hepatica, where that Vein enters the Cava.

The Ductus Venosus is much smaller than the trunk of the Umbilical Vein, and carries part of the Blood of the Vein directly to the heart, without allowing it to enter the circulation in the Liver.

The Umbilical Vein sends Branches to the Right Lobe of the Liver, but is principally distributed through the Left Lobe; while the Right Branch of the Vena Portæ carries the Blood of the Splenic and Mesenteric Arteries to the Right Lobe of the Liver.

After birth, the Left Lobe of the Liver, which was formerly more particularly supplied by the Umbilical Vein, receives an additional proportion of Blood from the Vena Portarum.

The reason why the Umbilical Vein goes partly to the Cava, and not entirely to the heart, is not understood.

The Kidneys are irregular on their Surface being formed of Lobes, each of which consists of a Cortical, a Medullary part, and a Papilla, and is covered by a proper Membrane.

The Glandula Renalis is almost as large as the Kidney, but afterwards rather diminishes than increases in size.

The Bladder of the Urine is of a long form, and extends almost to the Umbilicus. The greater part of it is above the Pelvis, and is more particularly covered by the Peritoneum than in the Adult.

The Urachus, which is of a *Conical form*, ascends from the bottom of the Bladder, between the Umbilical

Arteries, and between the Peritoneum and Linea Alba, to the Umbilicus, and vanishes by degrees in the Umbilical Cord.

It is formed by a production of the Fundus Vesicæ, and in the Human Body is generally solid, forming a Suspensory Ligament of the Bladder.

It has been sometimes found hollow at its beginning and has been said to be so, in one or two instances, throughout its whole length

In the Fœtal Quadruped, it is a large Tube, which transmits Urine from the Bladder to a Bag between the Amnios and Chorion, called *Allantois*.

The common Iliac Arteries divide, on each side, into a *small* External, and *large* Internal Branch.

The principal part of the Internal Iliac is occupied in forming the *Umbilical Arteries*, which mount by the sides of the Bladder, on the outside of the Peritoneum, and perforate the Umbilicus in their progress to the Umbilical Cord.

Soon after delivery, the Foramen Ovale, Ductus Arteriosus, and Venosus, with the Umbilical Vein and Arteries, begin to contract, and are, in general, completely closed, and the Vessels shrivelled into Ligaments within a year after birth.

This obliteration is produced by a contractile power in the parts, by a pressure in the surrounding Viscera, and by the Blood being directed through other channels.

The Pelvis of the Fœtus is commonly so *small*, that the principal parts of its Viscera are contained in the open Cavity of the Abdomen.

The Prepuce of the Clitoris is proportionally so much *larger* in a young Fœtus than it is afterwards, that, in an Abortion, a Female Fœtus has been frequently mistaken for a Male.

The Tests are lodged during the greater part of Gestation, in the Cavity of the Abdomen, over the Psoæ Muscles, and a little below the Kindneys.

They then constitute a part of the Abdominal Viscera, and, in a similar manner with them, are connected to the body by a production of the Peritoneum, which forms their Tunical Albuginea.

Between the Testicle and Scrotum, a Fibrous and

Vascular Substance, of a Conical form, is extended,—called by Mr. HUNTER, *Guburnaculum*, or *Ligamentum Testis*, which he considers as a principal agent in directing the course of the Testicle, and in making way for it in its descent.

About the eighth month of pregnancy, the Testis, by means not yet completely ascertained, passes gradually along to the Scrotum, a process of the Peritoneum preceding it, which afterwards forms its Vaginal Coat.

The Testes through the whole of its course, continues to be covered by the Peritoneum, is connected to the parts on which it rests, and has its Vessels passing to it from behind forwards, the same as when situated in the Abdomen.

While the Testicle is passing through the Ring of the Abdominal Muscle, the Ligamentum Testis is found to be in some measure inverted, and to form the under and fore-part of the Vaginal Coat, on which the Cremaster Muscle is expanded.

After the descent of the Testicle, the Peritoneal process, which descends along with it, begins to contract at the Ring, and a firm adhesion of its sides, to within a little distance of the Testicle, is commonly found to be produced by the time of birth.

Position of the Fœtus.

In the first months, the Embryo swims in the liquor Amnii, free from the pressure of the surrounding parts —and from many dissections and observations made by the latest Anatomists, it is ascertained,—that the head preponderates, and in general continues undermost till the child is delivered.

Formerly it was supposed that the Embryo, in the first months, was situated with the head uppermost, and that, in the latter months, the attitude of the Fœtus was inverted.

The Fœtus is observed to be coiled up into as round a figure as possible, so as to be properly adapted to the Cavity of the Uterus.

The head is bent towards the Thorax, and the arms are folded:—The knees are drawn towards the Abdomen, and the heels towards the Nates.

The Spine is bent into an arch, and one side of the body of the Fœtus is frequently turned forwards.

The head is placed diagonally, with its long Diameter corresponding to that of the Pelvis, and the occiput opposed to the Os Tincæ.

Circulation of the Blood in the Fœtus.

The blood is sent by the Arteries of the Uterus to the Substance of the Placenta, from which according to most of the ancient Anatomists, it passes to the Umbilical Vein by a direct communication of Branches; or, according to the opinion of the greater part of modern Anatomists,—by Absorption.

By the Umbilical Vein it goes principally to be circulated in the Liver, and by the Ductus Venosus, a small portion of it goes to the right Auricle of the heart.

The blood sent from the Inferior Cava is transmitted by the Foramen Ovale to the left Auricle, and that sent by the Superior Cava is transmitted to the right Auricle and Ventricle, and from thence to the Pulmonary Artery.

From the Pulmonary Artery, one portion of it passes through the Circulation of the Lungs, and another goes by the Ductus Arteriosus to the Aorta Descendens.

From the Lungs it is returned by the Pulmonary Veins to the Left Auricle, where it mixes with that coming from the right Auricle by the Foramen Ovale, and is sent by the Aorta to the different parts of the body.

From the Iliac Arteries, it is conveyed by the Umbilical Branches to the Substance of the Placenta, where one portion of it returns by corresponding Veins to the Fœtus, the rest going to the Uterus in the manner it was discharged from the Uterine Arteries to the Branches of the Umbilical Vein.

PART V.

OF THE ABSORBENT SYSTEM.

Of the Absorbents *in General.*

THE *Absorbent System* consists of the *Absorbent Vessels* and *Conglobate Glands*, the former of which are divided into *Lymphatic* and *Lacteal Vessels*.

The *Absorbents* are small pellucid *Tubes*, which have been discovered in most parts of the body, and are supposed to exist in all.

They begin by numberless open mouths, too minute to be visible to the naked Eye; though, by the assistance of Glasses, the Orifices of the Lacteals have been seen in the human body by Mr. Cruickshank, and those of the Lymphatics, in certain kinds of Fishes, by Dr. Monro.—*See their Treatises upon this Subject.*

They arise from the External Surface of the body, from the Cellular Substance, from the Surfaces of the large Cavities, and from the Surface and Substance of the different Viscera;—but have not yet been observed in the Cavity of the Cranium, or in the Placenta and its Membranes.

In the different parts of the Body in general they run in two sets, one superficial and very numerous, the other accompanying the Arteries, and at least double their number.

The Lacteals are of the same nature with the other Absorbents. They begin from the inside of the Intes-

tines, and, when these contain Alimentary matter, they carry a white Fluid, called *Chyle*, and at other times a *Clear Fluid* or *Lymph*, to be mixed with the contents of the *Lymphatics*.

Most of the Lymphatics, and all the Lacteals, terminate in the Thoracic Duct, by which the Lymph and Chyle are conveyed to the red Veins, to be mixed with the Blood.

The common place of termination is in the large Veins in the bottom of the Neck;—no facts or observations having been yet established of their terminating in any other part of the Venous System.

The *coats* of the Absorbents are thinner and more transparent, but stronger than those of the Red Veins, being able to support a Column of Mercury of considerable weight; but from their thinness they cannot be enumerated.

They are generally supposed however to be formed of different *Membranous Layers*, like the Blood-vessels. Fibres can be seen in them, and their Muscularity is rendered probable by the Contractile power which they are observed to possess in a living or moribund Animal.

By this contractility they convey their contents from their Origins towards their terminations, in which they are assisted by the motions of the surrounding parts, independent of such a *Vis a tergo* as contributes to propel the Blood through the Veins.

They are furnished with *Blood-vessels* for their nourishment, as sometimes observed by penetrating injections; and this is rendered still more evident by their being susceptible of inflammation and pain.

The presence of Nerves also appears probable from the acuteness of their feeling when in a state of inflammation.

In general, they form an irregular Net-work, having frequent communications with each other; and these are most numerous in the vicinity of their Glands.

Through their whole extent, they are intercepted by *Valves*, which are placed in pairs, and are of a semicircular form, having one edge of each Valve fixed to the side of the Vessel, and the other edge loose across its cavity, but turned towards the general terminations.

The Valves are found, in some parts, to be situated

at equal distances; in others, more irregularly,—Their number also is very uncertain, amounting in some parts to three or four, and in others to seven or eight, or upwards, in the length of an inch;—but varying still more with respect to number, in different Bodies, and in different parts of the Body.

When the Absorbents are destended, they appear largest on the side of the Valves towards their general termination, and the enlargements are such as to give the Lymphatics a jointed, and the Lacteals frequently a vesicular appearance.

In the termination of the Absorbents, whether in the Thoracic Duct, or in the Red Veins, there is always one and commonly two Valves, to prevent the contents of the Duct or of the Veins from passing into them.

The *use* of the Valve is to promote the general course of the Lymph and Chyle, and to prevent the retrogade motion of these Fluids within their Vessels.

Use of the Absorbents: The Lymphatics take in the Fluids applied to their orifices by the Capillary Attraction, and by a power inherent in themselves, and by their contractile nature conduct them into the Mass of Blood, whereby they prevent morbid accumulations.—The Lacteals, in like manner, receive the Chyle from the Intestines for the nourishment of the Body.

The *Conglobate Glands*, or Glands of the Absorbent Vessels, are found in various parts of the Body, and are situated in the Cellular Substance under the Skin, or over the Trunks of the Blood-vessels belonging to the different Viscera:—They are of a round or Oval form, and frequently a little flattened.

They are of different sizes, from that of a Millet-seed to that of a Substance near an inch in diameter; and sometimes several are collected into one mass.

Their colour also varies in different parts of the body and at different times of life.

In young subjects, they are generally largest, and of a redish or brown colour, but become smaller and paler with increasing age; and immediately under the Skin, they are reder and firmer than within the large Cavities.

They have a smooth, dense, *Membranous Coverings*

which give them a shining appearance, and are connected to the surrounding parts by loose Cellular Substance.

Their Coat is connected to the Glandular part by a Cellular Membrane, which according to Dr. HALLER, is pervaded by a *Succus proprius* full of Globules, which Mr. HEWSON supposed, afterwards form the Red Globules of the Blood.

Like other Glands, they have Arteries, Veins, and Nerves, entering their composition.

They are described by some Anatomists, as being composed of *Cells internally*, while others consider them as being a Congeries of convoluted Absorbent Vessels. Most of the Glands have much of the former, but many of them of the latter appearance.

The Absorbents entering into the Glands, are called *Vas Inferntia.* When they approach, or come in contact with the Gland, they split into radiated Branches, which, after spreading over it, penetrate into its Substance.

The greater part of the Absorbents, approaching a Gland, terminate in it in this manner, while others turn aside, or go over it, and terminate in other Absorbents or in other Glands.

From the opposite side of the Glands, vessels go out in the manner they entered it, and are termed *Vasa Efferentia.* They are frequently, though by no means always, fewer in number, but larger than the *Vasa Inferentia.*

Most of the Absorbents go through several Glands, but in some parts through one only, before they reach their general terminations.

The Lymph and Chyle are strained through the Glands, by which they are supposed to undergo certain changes,—but the nature of these changes has not yet been ascertained.

Of the Particular Absorbents.

The *Superficial Absorbents of the Lower Extremities*, consist of numerous vessels, which lie between the Skin and Muscles.

They belong to the Integuments in general, and are much more numerous than the Subcutaneous Red Veins.

They can be traced from the Toes, round which they form a Plexus.

From the Toes, several Branches, likewise forming a Plexus, run over the top of the Foot to the inner part of the Leg, and from that along the corresponding part of the Knee.

From the outer part of the Foot, another Plexus arises, which runs along the outside of the Leg, where it splits into two divisions, one of which crosses obliquely over the fore-part of the Tibir, to the Lymphatics at the inner side of the Knee.

The other division passes partly to the Political Glands, some ascending upon the outer and back-part of the Thigh.

The *Political Glands* are commonly two or three in number, and are situated near the Artery of the same name, but frequently they are so small and so much buried in Fat, as to be discovered with difficulty.

From the Sole, another Plexus of Lymphatics arises, and joins these upon the Leg already described.

From the inside of the Knee a Plexus runs up, consisting of from twelve to twenty Trunks, which pass afterwards on the fore and inner part of the Thigh to the Groin.

The greater part of the Trunks of the Plexus, accompany the Vein called *Saphena Major*, and in their passage they receive many small branches from the outer and back-part of the Thigh.

In the Groin, they split into Branches which penetrate the Inguinal Glands.

The *Inguinal Glands* are generally from six or eight to a dozen in number, and are of very different sizes; but sometimes the number is smaller, in consequence of two or more of them being united into one large Gland.

Of the Inguinal Glands, some lie in the angle between the Thigh and Abdomen, and others a few inches farther down on the fore-part of the Thigh.

The greater number are placed upon the outer part of the Tendinous Aponeurosis, the rest deeper, being in contact with the great Blood-vessels.

The *Superficial Lymphatics of the Thigh* enter the lowest of these Glands; one or more of them, however, frequently pass by the first Glands they meet with, and penetrate others higher in the Groin, and sometimes a few do not enter any Glands till they go into the Abdomen.

Into the Inguinal Glands enter likewise the superficial Lymphatics of the upper and back-part of the Thigh with those of the Nates and of the Abdomen and Loins.

The *deep-seated Lymphatics of the Lower Extremity* are situated among the Muscles.—they accompany the Blood-vessels and are few in number when compared with the Subcutaneous set.

In several places, one only has been yet observed on each side of the Trunks of the Arteries, though, in others, they are somewhat more numerous, forming a Plexus over the Blood-vessels.

They arise from the sides of the Toes, and from the deep parts of the Sole, accompanying the Plantar Arteries; and after reaching the Leg, they run up with the posterior Tibial Artery to the Ham.

In the Ham, they lie close upon the Trunk of the Artery, and enter the Political Glands.

Besides these, there are similar but smaller Lymphatics, which begin upon the upper part of the Foot, and afterwards accompany the anterior Tibial, and the Fibular Arteries, receiving Branches from the deep parts of the fore and outer-side of the Leg.

The anterior Tibial and the Fibular Lymphatics, terminate with the posterior Tibial in the Glands of the Ham.

From the Political Glands, two and sometimes more Trunks of considerable size are sent out, which accompany the Femoral Artery, and at different distances, which communicate with each other, by Branches which pass obliquely across the Artery.

At the upper part of the Thigh, they enter the undermost of the Inguinal Glands, where the Lymph of the superficial and deep-seated Absorbents of the Limb is mixed and incorporated.

The *superficial Lymphatics of the Scrotum* enter the upper and inner Inguinal Glands, those deaper seated

passing with the Lymphatics of the Testicle into the Abdomen.

The *superficial Lymphatics of the Penis* begin at the Prepuce, and form a few Trunks which run principally upon the Dorsum Penis, receiving in their passage Branches which turn round from its inferior surface.

In some Subjects, they unite into trunks in the middle of the Dorsum Penis, which afterwards separate into right and left parts.

In others, they are more unconnected, and in all they appear to divide at the root of the Penis into right and left Branches, passing into the corresponding Inguinal Glands, which lie next the Symphysis of the Pubis.

The *deep-seated Lymphatics of the Penis* arise from the Glans, and from the Body of the Penis, and accompany the Arteries into the under part of the Pelvis.

The *Lymphatics of the Testicle* are numerous, and are among the largest of the Body some of them exceeding the size of a Crow-quill.

They arise from the Coats and Body of the Testicle, and from the Epididymus, and run with the Spermatic Cord through the Ring of the Abdominal Muscle, to terminate in the Lumbar Glands.—In their passage, they have few communications with each other.

The *Lymphatics of the external parts of Generation in Women*, go partly to the Inguinal Glands of each side, and partly through the Rings of the external oblique Muscles, in company with the round Ligaments of the Uterus, and terminate in the Iliac or in the Lumbar Glands.

The *superficial Lymphatics of the under part of the Abdomen*, those of the *Loins*, *Nates*, and verge of the *Anus*, pass into the Inguinal Glands, each set terminating in such of the Glands as lie nearest parts to which the Vessels belong.

The Inguinal Glands, having received the Lymphatics of the Inferior Extremity, and likewise the superficial Lymphatics of the external parts of Generation, send out Trunks fewer in number, but considerably larger than those which entered the Glands.

The Vassa Efferentia of the Inguinal Glands enter the Abdomen under POUPART's Ligament, in company with the Inguinal and Iliac Artery.

Some of them go into the Glands situated about the Iliac or the Lumbar blood-vessels. The *Iliac Glands* are frequently almost as numerous as the Glands of the Groin, and one of them is generally found larger than the rest, and placed at the inner edge of *Poupart's* Ligament. The Lumbar Glands are more numerous than any of the classes already described, and are placed over the Abdominal Aorta, Inferior Cava, and bodies of the Lumbar Vertebræ.

The rest of the Lymphatics from the Lower Extremity descend at the side of the Pelvis, near the Internal Iliac Blood-vessels, and pass through some of the Glands which are situated there.

The last-mentioned Lymphatics are joined by absorbents from the viscera of the Pelvis in general, especially by those of the Bladder and Vesiculæ Seminales in the Male, and by a portion of those of the Uterus and of the Vagina in the Female.

The *Lymphatics of the Bladder*, in both sexes, accompany its principal Blood-vessels, pass through some small Glands upon the side of it, and, at the under part of the Pelvis, go into the Glands which surround the Internal Iliac Artery and Vein.

The *Lymphatics of the Uterus* run in two Sets; one, which is the largest, goes with the Appogastric, the other with the Spermatic Blood-vessels.

The *Hypogastric Lymphatics* form a Plexus which runs from above downwards, into Glands situated on the sides of the Vagina.

From these Glands they pass to others which surround the Internal Iliac Vessels, and then intermixing with the Trunks from the extremities, they terminate in the Thoracic Duct.

The Lymphatics, corresponding with the Spermatic Vessels, terminate in the Lumbar Glands, as in the Male.

The Lymphatics of the Uterus, like its Blood-vessels are much enlarged and of consequence easily discovered, in the Gravid state.

The *Lymphatics of the Rectum* go first into small Glands which lie between it and the Os Sacrum, and afterwards terminate in the Lumbar Plexus of Glands and Vessels.

Besides the Lymphatics which lie on the inside of the external Iliac Artery, there are others situated on the outside of it, upon the Psoas Muscle.

Of these, one part passes up to the Lumbar Plexus, and goes under the Aorta, in different Branches which terminate in the Thoracic Duct.

Another part passes under the Iliac Arteries, and appears upon the Os Sacrum, forming a remarkable Plexus, which goes through many Glands, and is chiefly situated behind the Aorta and Vena Cava.

The *Lacteal Vessels*, so called from conveying a fluid like milk, which is termed *Chyle*, begin upon the inner Surface of the Intestines. Each Lacteal takes its origin upon one of the Villi, by numerous short radiated Branches, and each Branch is furnished with an Orifice for imbibing the Chyle.

From the Villi the Lacteals run a considerable way under the Muscular Coat of the Intestines, and then pass obliquely through them, uniting in their course into larger Branches.

They follow the direction of the Blood-vessels, and their Trunks are double the number of the Arteries,—one being situated on each side of them.

Upon the outside of the Intestines an external set appears. They run between the Peritoneal and Muscular Coats, and commonly placed someway in the direction of the Intestine, and with a few ramifications.

The Superficial and deep-seated Lacteals communicate in the Substance of the Intestines, and, after leaving them, commonly form a Plexus, which runs between the plies of the Mesentery and Mesocolon, without following the course of the Blood-Vessels.

The *Lacteals of the Jejunum* are larger and more numerous than those of the *Ilium*, the principal part of the Chyle being contained in this Intestine.

In their course, they pass through a great number of Lacteal or Mesenteric Glands, which like the Lacteals themselves, are largest and most numerous in that part of the Mesentery which belongs to the Jejunum.

The *Mesenteric Glands* are seated in the Fat between the Layers of the Mesentery, near the Branchings of the Blood-vessels.

They are commonly scattered over the Mesentery, at a little distance from each other; but there are seldom any observed within two or three inches of the Intestines.

They are of different sizes in different parts of the Mesentery, some being about a half, or two thirds of an inch in diameter, while others are so small as to be traced with difficulty.

Their Structure is the same with that of the Absorbent Glands in other parts of the Body, but they are generally flatter, and are of a white colour when filled with the Chyle.

They are considered by some Authors as dividing the Lacteals into different Orders.

From the Intestines to the Glands, the Lecteals are called *Vassa Lactea Primi Generis*, and from the Glands to the Thoracic Duct, *Vassa Lactea Secundi Generis*.

Some divide them into three Orders;—the first consisting of those which go from the Intestines to the Glands,—the second of those which run from one set of Glands to another,—and the third, of those which pass from the Glands to the Thoracic Duct.

The *Lacteals of the small Intestines*, after passing through the different Glands of the Mesentery, form at last one, and frequently two, three, or more Trunks, which accompany the Trunk of the superior Mesenteric Artery, till they arrive at the right side of the Aorta, where they sometimes pass into the Thoracic Duct: At other times they descend a little, and join the Trunks from the Inferior Extremities, to form that Duct.

The Absorbents of the *Great* are of an Inferior size in proportion to those of the *Small Intestines*, and have seldom, though sometimes, been observed to be filled with Chyle.

In their course they go through the Mesocolic Glands, which are situated between the Layers of the Mesocolon, but are generally much less numerous and considerably smaller than those of the Mesentery, or of most other parts of the Body.

The Absorbents of the *Cæcum*, and of the *right portion of the Colon*, join those of the Small Intestines, about the root of the Mesentery.

Those of the *left portion of the Colon* accompany the Inferior Mesenteric Artery, and communicate with large Lymphatics near its Root.

They terminate at last in the Lumbar Glands, or go directly into the lower part of the Thoracic Duct.

Of the Absorbents of the *Stomach*, one set runs upon its small, and another upon its great Curvature, but neither the one nor the other are found to carry Chyle, though a few have been observed filled with it in other animals,—as the Dog.

The former of these, composed of Branches from the upper and under surfaces of the Stomach, accompany the Superior Coronary Artery.

In their passage, they go through a few small Glands situated at the junction of the Omentum Minus to the Stomach, and, after becoming larger they enter other Glands in company with the deep-seated Lymphatics of the Liver, along with which they terminate in the Thoracic Duct.

The other set passes from the great Curvature of the Stomach, partly to the right, and partly to the left side, and, as on the small Curvature, are formed of Branches from its opposite Surfaces.

Those on the Left side receive the Lymphatics of the middle and corresponding half of the Omentum Majus. Running to the left side of the large Curvature of the Stomach, and passing through one or two small Glands on it, they go with the Lymphatics of the Spleen and Pancreas to the Thoracic Duct.

Those of the right side receive the Lymphatics of the corresponding half of the great Omentum, and also pass through one or two small Glands which lie close to the right Gastric Artery.

In their descent by the Pylorus, they meet the Plexus which accompany the superior Coronary Artery, and run with them, and with the deep Lymphatics of the Liver to the Thoracic Duct.

The *Lymphatics of the Liver*, as in other Viscera, run in two sets, the superfical of which are numerous, and unite into Trunks in the manner Roots unite to form the trunk of a tree.

The Superficial and deep sets communicate so freely that upon injecting the Lymphatics on the external sur-

face, the deep-seated Absorbents are readily filled from them.

The principal part of the Lymphatics upon the convex Surface of the Liver, go by a right and left Plexus towards the Suspensory Ligament.

Running along this Ligament they directly perforate the Diaphragm, after which they pass through Glands situated upon the anterior part of the Pericardium.

Other Lymphatics from the convex part of the Liver run towards the lateral Ligaments, where they form on each side one or more Trunks of considerable size.

From the lateral Ligaments they pass through the substance of the Diaphragm, and afterwards run forwards on its convex Surface, following the direction of the Ribs.—Not unfrequently, these Vessels, instead of perforating the Diaphragm, run downwards and terminate in the Thoracic Duct, within the Abdomen.

In their course upon the Diaphragm, they often send Branches backwards, which terminate in Glands upon the Esophagus—in other instances, these Branches are observed to go directly into the Thoracic Duct.

They receive Branches from the Substance of the Diaphragm, and after perforating two or three Glands upon its Surface; they join the Trunks from the Ligamentum Suspensorium.

The Lymphatics from the lateral Ligaments, joined by those from the Ligamentum Suspensorium, form either a principal Trunk, or a Plexus, which runs up, sometimes between the Layers of the anterior Mediastinum, and at other times, in company with the internal Mammary Blood-vessels on each side.

When this trunk or Plexus runs in the anterior Mediastinum, it most frequently terminates in the upper end of the Thoracic Duct;—sometimes, however, it communicates with the general termination of the right side of the Neck.

When they accompany the internal Mammary Vessels, they are observed to terminate, the left in the Thoracic Duct, and the right in the general termination of that side.

The Lymphatics on the concave Surface of the Liver run towards the Porta, and join the deep-seated Set.—One part of them goes over the under Surface of the

Gall-bladder, from which they receive numerous small Branches.

The deep-seated Lymphatics accompany the Blood and Biliary Vessels, and communicating with the Superficial Absorbents already mentioned, they pass through several Glands situated about the Trunk of the Vena Portæ, and terminate in the Thoracic Duct, near the root of the superior Mesenteric Artery.

The Superficial Lymphatics of the *Spleen* are remarkably small. They pass from its convex to its concave Surface, where they join the deep-seated Lymphatics, which are very considerable in size and number.

The *Splenic Plexus* of Lymphatics accompany the Splenic Artery, and go through several Glands of a dark colour scattered along the Surface of that Vessel.

The Lymphatics of the Spleen receive those of the Pancreas, which run into them in a transverse direction.

In their course, they unite with the Lymphatics of the Stomach and those descending from the under part of the Liver; and the whole of them, near the head of the Pancreas, form a considerable Plexus. From this Plexus, Branches are sent off, some passing over the Duodenum, and others under it, and all of them going into the Thoracic Duct near the termination of the Lacteals.

The *Lymphatics of the Kidney* are seldom seen, excepting when it is enlarged or ulcerated, in which case they may sometimes be distinctly observed.

The Superficial Absorbents run from its outer towards its inner edge, where, meeting with those deep-seated, they commonly unite with them, and form a Plexus which accompanies the Renal Blood-vessels, after which they pass through some of the Lumbar Glands, and terminate in large Lymphatics near the Aorta.

The *Lymphatics of the Capsula Renalis*, which are numerous in proportion to its size, terminate in the Renal Plexus.

All the Absorbents already described, excepting those from the convex Surface of the Liver, terminate in the Thoracic Duct near its beginning.

The *Thoracic Duct*, at its under extremity, is formed by the union of three, or sometimes of more principal Trunks, the first of which is composed of the Lymphatics of the right, and the second of those of the left infer-

ior Extremity;—the third Trunk, or set of Trunks, belongs chiefly to the Lacteals.

These large Absorbents unite so as to form the Duct over the third Vertebra of the Loins.

Sometimes they unite upon the second Vertebra of the Loins, where the Duct formed by them is twice or thrice as large in diameter as it is higher up.

Commonly it enlarges again upon the first Vertebra of the Loins, where it has generally been called the receptacle of the Chyle and considered as the beginning of the Duct, being often found forming an oval, or Pyriform Bag, about the third of an inch in diameter.

These large Trunks which form the Thoracic Duct lie close upon the Spine, those of the right side being placed below the right Crus of the Diaphragm, and those of the left between the Aorta and Spine, while the Thoracic Duct itself lies at first behind the Aorta, but afterwards passes from it upwards, and a little to the right side, till it gets before the first Vertebra of the Loins.

Here it is situated behind the right Crus of the Diaphragm, a little higher than the right Renal Artery, from whence it passes upwards, and afterwards appears in the Thorax, upon the fore and right side of the Spine, between the Aorta and Vena Azygos, where it is supposed to be considerably assisted by the strokes of the Aorta in impelling its Fluids.

In the middle of the Thorax, it is smaller than elsewhere, being only about a line in diameter. After this it gradually enlarges, and, near its termination, is about an eighth or tenth of an inch over.

In the Thorax, it receives the Lymphatics of the Spatia Intercostalia, one or two of which accompanies each of the Intercostal Arteries, and the whole go through small Glands placed near these Arteries, but most numerous about the sides of the Dorsal Vertebræ where they form a sort of chain.

Here, likewise, it receives Branches from the Esophagus and Lungs, the former of which is surrounded with a number of Glands, and with a remarkable and intricate Plexus of Lymphatic Vessels.

The Superficial *Lymphatics of the Lungs* form large Areolæ, which have smaller Areolæ within them, the

larger running chiefly between the Lobules, and the smaller passing over them in such a manner as to cover almost the whole Surface of the Lungs.

From the surface they go to the root of the Lungs, where they pass through the Bronchial Glands, which have already been taken notice of in the description of the Lungs.

At this place they are joined by the deep-seated Lymphatics which creep along the Branches of the Trachea and of the Pulmonary Blood-vessels.

Through the medium of the Bronchial Glands, the Lymphatics of the two sides of the Lungs communicate freely with each other.

Having left the Glands, the principal part of those from the left Lung form a trunk of considerable size, which terminates in the Thoracic Duct behind the bifurcation of the Trachea.

The rest of the Absorbents of the left Lung pass through Glands behind the Arch of the Aorta, which are likewise common to those of the Heart. They run at last by a principal Trunk into the Thoracic Duct near its termination.

After leaving the Bronchial Glands, the Absorbents of the right Lung form a few principal Trunks, one of which commonly ascends on the fore part of the Vena Cava Superior, and, running in a convoluted manner, opens into the Trunk which terminates in the Veins in the right side of the Neck.

The rest of these Trunks go into the Thoracic Duct, near the bifurcation of the Trachea.

The *Absorbents of the Heart* are small, but numerous, and form principal Trunks which accompany the Coronary Arteries, and, like them, the largest belong to the left Ventricle.

From the side of the right Coronary Artery, an Absorbent Trunk which corresponds with it, passes over the Arch of the Aorta to a Gland commonly found behind the origin of the Carotid Arteries.

From this Gland it goes afterwards to the general termination in the right side of the Neck.

The Lymphatic trunk accompanying the left Coronary Artery is formed of two principal Branches, one of which runs in the Groove between the Ventricles on the superior Surface of the Heart: The other runs in a similar Groove on the under side of the Heart, and hav-

ing reached the space between the Auricles and Ventricles, turns round to join the former Branch near its corresponding Artery.

The Trunk runs next to a Gland placed behind the Pulmonary Artery, between the arch of the Aorta and root of the Trachea, which, with the others here situated, is common to the Absorbents of the Heart and Lungs.

This trunk terminates at length in the upper end of the Thoracic Duct.

The Thoracic Duct, after receiving numerous Lymphatics within the Thorax, and having reached as high as the third or fourth Dorsal Vertebra, passes obliquely over to the left side of the Spine, behind the Esophagus and end of the arch of the Aorta, or beginning of the Aorta Descendens, till it reaches the left Carotid Artery.

After this, it emerges from the Thorax, and runs between the Longus Colli Muscle and Internal Jugular Vein, to about the sixth Vertebra of the Neck.

It now makes a turn downwards, and, after descending near an inch, terminates in the upper and back part of the angle formed by the left Internal Jugular and Subclavian Vein.

Throughout its whole course, it has a waving appearance, and this becomes more conspicuous in proportion as it is distended by injection. Near the middle of the Thorax, it not unfrequently splits into two or more branches, and sometimes forms a Plexus, the Branches of which again unite into a common trunk a little higher up.

After emerging from the Thorax, it commonly divides into two parts, which unite again previous to the termination of the Duct in the red Veins; and where there is no division, there is generally a Dilatation or Sac at the termination.

Sometimes there is one termination in the angle formed by the red Veins, and one or two in the Subclavian Vein, and now and then, though more seldom, in the Internal Jugular, near the angle.

In a few instances, it has been found double through its whole length, one Duct going to the common place of termination in the left side of the Neck, and the other in the corresponding part in the right.

It has also, in a few rare instances, been found terminating in the Veins in the right side of the Neck, while a short trunk, similar to that commonly found there, has terminated in the left side.

The *Superior*, in a similar manner with the Inferior Extremities, have two sets of Lymphatics, one lying immediately under the Integuments, and belonging to the Skin and Cellular Substance under it, the other accompanying the principal Blood-Vessels, and belonging to the parts deep-seated.

The Superficial Lymphatics are numerous, and readily seen in emaciated Subjects.

They arise from the fore and back-parts of the fingers and hand, by a considerable number of Branches, and form an extensive Plexus upon the corresponding sides of the Fore-Arm.

Those upon the anterior part of the Fore-arm run directly upwards to the Arm, while the Lymphatics on its back-part, separate into two sets, one of which passes obliquely over the Muscles on the anterior part of the Fore-Arm.

The Lymphatics of the Fore-Arm run over the bending of the elbow, and afterwards ascend upon the fore and inner part of the Arm, the greater number of them running near the Basilic Vein.

Some of them frequently pass through small Glands placed along the Humeral Artery, one of which is commonly found a little above the inner Condyle of the Os Humeri, others do not appear to enter any Glands till they reach those of the Axilla.

A few Lymphatics accompany the Cephalic Vein, and receive Branches from the outer part of the arm, and, after passing between the Pectoral and Deltoid Muscles, penetrate Glands at the under side of the Clavicle.

Of the deep-seated Lymphatics, two commonly accompany each principal Artery in the Fore-Arm, and these uniting at the elbow, form two principal Lymphatics, which accompany the trunk of the Humeral Artery.

Having reached the upper part of the arm, they enter the Axillary Glands, where they are joined by Lymphatics which come from the Mamma and lateral parts of the Thorax, after passing through small Glands pla-

ced upon the under edge of the former and of the large Pectoral Muscle.

The *Axillary Glands* vary in number and size in different persons. They are somewhat smaller, and fewer in number than those of the Groin. They are generally surrounded by a considerable quantity of Fat, and are situated in the hollow between the large Pectoral and Latissimus Dorsi Muscles, adhering closely to the Trunks of the Axiliary Blood-Vessels and Nerves.

From the Axillary Glands large Branches go under the Clavicle, and form a Trunk, which in the left side, commonly joins the Thoracic Duct near its termination. In the right side, they join the short Trunk which forms the second general termination of the Absorbent System. Sometimes this Trunk, proceeding from the Superior Extremity, terminates in the Subclavian Vein, at a little distance from the general termination.

The Axillary Glands receive also the Subcutaneous Lymphatics from the back-part of the Thorax, and likewise the Lymphatics from the Integuments and Muscles of the Scapula.

The Lymphatics on the *outside of the Head* accompany the Blood-vessels, and pass through Glands in their way to the Neck.

Those passing down with the Temporal Artery go through small Glands connected with the Parotid Gland, and also through others situated immediatcly under the root of the Zygoma.

The Lymphatics which accompany the Occipital Blood-vessels penetrate one or two minute Glands placed a little behind the root of the ear, over the Mastoid Process of the Temporal Bone.

The Lymphatics proceeding from the different parts of the *Face* accompany the Branches and Trunk of the Facial Artery.

Some of them pass through Glands situated upon the outside of the Buccinator Muscle, while the principal Trunks go through a number of large Glands placed upon the outer, and also at the under part of the Lower Jaw, at the anterior edge of the Masseter Muscle, and about the Inferior Maxillary Gland.

The Lymphatics from the *inner part of the Nose* run principally with the internal Maxillary Artery, and pass

through Glands situated behind the Angle of the Lower Jaw, where they are joined by those which belong to the inner parts of the Mouth.

The Lymphatics of the *Tongue*, and likewise of the *Muscles* and other parts about the Os Hyoides, enter the Glands placed behind the angle of the lower Jaw.

Lymphatics have been frequently searched for in the *Brain*, but their existence in that Organ is not yet fully ascertained, though rendered highly probable,—from an appearance of Lymphatics having been now and then observed upon the surface of the Dura Mater, and between the Tunica Arachnoides and Pia Mater,—from Lymphatics and Glands being occasionally found in, or immediately on the outside of the passages of the Blood-vessels of the Brain,—from swellings in the Lymphatic Glands of the Neck, following diseases of the Brain,—from the Absorption of Water, which has sometimes happened in Hydrocephalous cases, and from their having been found on the Brain of Fishes.

From the superficial and deep part of the Head in general, the Lymphatics accompany the External and Internal Jugular Veins and the Carotid Arteries, receiving at the same time Branches from the Muscles and other parts of the Neck.

The principal part of these Lymphatics go along with the Internal Jugular Vein and Carotid Artery, and in their passage form a remarkable Plexus, which goes through the numerous Glands seated near the Blood-vessels, composing a chain, from which they are termed *Concatenatæ*.

The *Glandulæ Concatenatæ* are more numerous than any other set of Glands in the Body, excepting those which belong to the Mesentery.

The Cervical Plexus of Lymphatics having passed through the Glandulæ Concatenatæ, unite at the bottom of the Neck into a trunk, which in the left side, enters the Thoracic Duct near its termination, and in the right goes into the trunk, which forms the general termination of that side.

The trunk which forms this general termination is only from a quarter to half an inch in length, but its size not much less than that of the Thoracic Duct.

It is formed by Lymphatics from the right side of the Liver, Diaphragm, Heart, and the right Lobe of the Lungs, by those of the right Arm, right side of the Head, Neck, and Thyroid Gland ; the Lymphatics of the left side of the Thyroid Gland forming a trunk which ends in the Thoracic Duct.

Besides this common Termination, some of these Lymphatics occasionally open into the Internal Jugular, or into the Subclavian Vein, at a little distance from the angle formed by these two Veins.

PART VI.

OF THE

BLOOD-VESSELS IN GENERAL.

THE Blood-Vessels are divided into *Arteries* and *Veins*.

ARTERIES.

The *Arteries* are elastic Canals, which convey the Blood from the Heart to the different parts of the Body, and are distinguished from the Veins by their *Pulsation*.

They have obtained their name from the Ancients, supposing that they carried the finer parts of the Blood mixed with *Air*,—forming what they considered the *Animal Spirits*.

The Original Trunks of the Arteries, or those which arise from the Heart, are two in number, viz. the *Pulmonary Artery* and Aorta,—all the others being derived from these.

They are dispersed over the whole Body, and every where surrounded with Cellular Substance.

The principal trunks run in the *Centre* of the Body, or of the Extremities, where they are least exposed to danger,—deriving support or defence from the Bones along which they pass.

The largest Arteries go to the *Viscera*, within the great Cavities, the smaller ones to the *Skin* and *Muscles*, and those still smaller to the *Bones*,—and, in a few

places, they become so extremely minute as altogether to exclude the red Blood, carrying a colourless Fluid only.

The Arteries are distinguished, in the Subject, from the Veins, by the *whiteness* of their Colour and *thickness* of their coats.

They are composed of different *Layers* or *Coats* which are readily separated by dissection.

In several parts of the Body, as in the *Posterior Mediastinum*, they are surrounded by a *Membrane*, common to them and to the neighbouring Viscera.

In other parts of the Body, especially in young Subjects, they are surrounded with so much Cellular Substance, as to give them the appearance of being inclosed in *Sheaths*.

The first of the proper coats is the *External Membranous*, or *Cellular*, called also by some Authors the *Nervous Coat*.

In the large Arteries, this coat is frequently furnished with *Fat*, and is of a very *elastic* nature. Owing to this elasticity, the Arteries, in receiving the Blood from the Heart, become dilated and elongated, and start from their place, in consequence of which they form the *Pulse*, called also the *Diastole* of the Arteries.

The *Second*, or *Middle Coat*, is composed of Fibres running in a transverse direction,—of a pale red colour,—each Fibre appearing to form only the Segment of a Circle, although the whole constitute a cylinder round the Artery.

By the Contractility of this, and the elastic nature of the former Coat, the Arteries are enabled to drive the Blood to the Veins, in proportion as they receive it from the Heart ;—and this contraction is called the *Systole* of the Arteries.

The *Third*, or *Inner Coat*, is formed of a transparent Membrane, remarkably thin, smooth, and dense, by which the Blood is prevented from transuding.

The different coats of the Arteries are connected to each other by fine Cellular Substances, which some Authors have considered as so many Lamellæ.

The Arteries are supplied with their own Blood-vessels, termed *Vasa Vasorum*, which come from the near-

er small Branches, and are every where dispersed upon their external Surface.

They have also their *Lymphatics*, which, on the large Arteries, as the Aorta, are so numerous as sometimes to cover them.

They are likewise furnished with *small Nerves*, forming, in some parts of the Body, a Plexus, which vanishes in their external coat.

There are no *Valves* belonging to the Arteries, excepting those which are placed at the mouths of the Pulmonary Artery and Aorta.

Where the Arteries run a certain way without sending off Branches, they are observed to be of a *Cylindrical* form; but where Branches come off, their Capacity is diminished, and this in proportion to the number of their Ramifications.

Whenever an Artery divides into two Branches, the Areæ of these two Branches, taken conjunctly, are found to be nearly one half larger than that of the Trunk from which they issue.

When the Trunk and Branches of an Artery are regarded collectively, they appear evidently of a *Conical* figure, the point of the Cone being formed by the trunk, and the Basis by the Branches of the Artery.

The Section of the Arteries is circular;—when empty, they become flat, but recover their round form upon being distended by injection.

The angles at which the Branches go off from their Trunks are in general in proportion to their vicinity to the Heart, and are such as are most favourable to the parts they have to supply.

In the trunk of the Body, or where they belong to tender and delicate Viscera, the angles are more obtuse; in the extremities, they are more acute, the former circumstance tending to diminish, and the latter to increase the force of the Blood.

The Arteries form many Divisions and Subdivisions before they reach their Terminations, and at last become invisible to the naked eye.

The Divisions formed by any particular Artery have been variously enumerated by different Authors,—one reckoning them at forty, and another, of equal respectability, at twenty only;—the number of them, however,

is such as to allow them to supply the most minute parts of the Body.

The strength of the Arteries depends upon the thickness of their coats, which is found to vary in different Arteries.—In the Aorta, the coats are thick and strong; —In the Arteries of the Brain and Spleen, they are thin and tender ;—but the thickness and consequent strength are proportionably greater in the small Branches than in the large trunks.

The Arteries run more or less in a waving direction, which breaks the force of the Blood in them, and prevents them from being strained by the motions of the parts to which they belong.

The Flexions are most frequent in Arteries belonging to parts the size and situation of which are changeable.

The windings of many of the Arteries are in proportion to the degree in which they are distended, those which are nearly straight in their natural state, frequently becoming serpentine when their distension increases.

Several of the large Arteries form communications with each other, termed by Anatomists *Anastomoses;* but the Anastomoses are more frequent among the small Branches, where they form a Plexus which lessens the danger of the obstruction.

The Anastomoses are most frequent in the Skin and Membranous Parts. In the solid Viscera, the Arteries run in a different manner, being in some crowded together in the form of Trees or Bushes, in others having a serpentine appearance, and in several forming Penicilli, or little Brushes, according to the disposition of the part.

The Arteries obtain their particular names from their situations, place of destination, &c. and the term *Capillary*, as expressive of their smallness, is applied to their minutest Branches.

The Diameters of the different Trunks and Branches of the Arteries, vary much in different parts of the body; but those of the Capillaries are more nearly equal to each other.

The Arteries terminate in the following manner, viz.

In red Veins, as is observed by the assistance of the Microscope and by Injections :

In Glands or Follicles by Secretory Ducts, which separate a Fluid from the general Mass of Blood.

In exhalent vessels, which discharge their contents into the internal Cavities, or upon the external Surface of the Body.

In colourless or Lymphatic Branches, which are afterwards continued to the circulating Veins, as in the Cartilages and Cornea.

The *use* of the Arteries is :

To convey Blood from the Heart to the different parts of the Body :

To assist in converting the Chyle into Blood :

To nourish the Body, and promote its growth :

To assist in preserving the fluidity of the Blood, and the heat and life of the Body :

To form the different Secretions : and

To renew the growth of parts destroyed by accident or disease.

Veins.

The Veins are elastic flexible Tubes, returning the Blood from the different parts of the Body to the Heart, —and have no pulsation.

The Coats of the Veins are the same in number with those of the Arteries, but are thinner, denser, and less elastic.

In the large Veins, as the Vena Cava, the coats can be separated from each other ;—but in the small Branches their separation is difficult.

The *Muscular Coat* of the Veins being much thinner, loose like Cellular Substance, and more indistinct than that of the Arteries, has occasioned its existence to be denied by many Authors.

The Veins are also furnished with their *Vasa Vasorum* similar to and from the same source with those of the Arteries.

The Colour of the Veins is somewhat blue, and when full of Blood they appear of a purple tinge, in consequence of their thinness.

Their Size is more than double that of the Arteries to which they belong, excepting the Pulmonary Veins, the size of which scarcely surpasses that of their corresponding Arteries.

In the fleshy parts of the Body, particularly in the extremities, they consist of *Two Sets*, one deep-seated accompanying the Arteries, the other running immediately under the Skin, and termed Subcutaneous.

The Veins of the Thoracic and Abdominal Viscera in general, accompany their Arteries ; and the same is observable in the small Branches belonging to Membranous parts.

The *Figure* of the Veins is similar to that of the Arteries ; and upon comparing the Area of their Trunks with the collective Areæ of their Branches, like them too, they are perceived to be conical, the base of the Cone being formed by the Branches and the Apex by the Trunks.

The size and number of the Veins is so much greater than that of their corresponding Arteries, that when the vessels of a membranous part are distended by an Injection of different colours, the Veins are observed in a great measure to conceal the Arteries—In the Intestines, however, the number of the Arteries and Veins is nearly equal.

There is much greater variety among the trunks of Veins, with respect to situation and division into branches, than is observable among the Arteries.

The variety in Nature is such, that the Veins of every Subject differ a little from those of another.

The Veins are capable of suffering greater distention than the Arteries, yet are more frequently ruptured.

The Anastomoses are greater and more frequent in Veins than in Arteries, those of the former being frequently by large Trunks, whereas those of the latter, excepting in a few places, are by small branches only.

Where the Veins are exposed to Muscular action, they are furnished with *Valves*, which are semilunar Folds continued from the inner side of the Vessels and placed in pairs at irregular distances, their nature being similar to those of the Absorbents.

The Valves are concave towards the Heart, and when close or applied to each other, present a figure somewhat like that of the shut end of a thimble.

Between the Valves and Sides of the Veins next the Heart, the blood insinuates, and Cavities are formed, termed *Sinuses* of the Valves, which appear externally in the form of Varices.

The Valves are found in the fleshy parts of the Body in general, but are chiefly situated in the Veins of the Extremities.

They are a wanting in the Veins of the deep-seated Viscera, viz. in those of the Cranium, Thorax, and Abdomen, excepting the Spermatic Veins, and sometimes the Internal Mammary Veins, and the Branches of the Vena Azygos.

The Valves direct the Blood towards the Heart, and prevent Regurgitation.

The *use* of the Veins is:

To convey the Blood from the extremities of the Arteries, with the Chyle and Lymph, from the Absorbents to the Heart.

DISTRIBUTION OF THE BLOOD-VESSELS

Of the Pulmonary Artery *and* Veins.

The *Pulmonary Artery* arises from the right Ventricle of the Heart, and ascends behind the Sternum, and within the Pericardium, inclining a little to the left.

Having run as high as the concave side of the Arch of the Aorta, it divides into right and left lateral Branches, which terminate in the corresponding sides of the Lungs.

The right Branch passes behind the curvature of the Aorta and the superior Vena Cava, and is of course the longer of the two.

The two Branches are dispersed throughout the substance of the Lungs, by ramifications which accompany those of the Bronchi.

From the extreme Branches of the Pulmonary Artery, the Blood is returned by corresponding Veins.

The *Pulmonary Veins* run contiguous to the Arteries,

and unlike the other Veins in general, are nearly of the same size with their Arteries.

In their course, they unite into larger Branches, which at length form four principal Trunks,—two from the right, and two from the left Lung,—which after perforating the Pericardium, terminate in the left Auricle of the Heart.

General Course of the Aorta and Vena Cava.

The *Aorta* arises from the left Ventricle of the Heart and sends off, at its Origin, the Coronary Arteries formerly described.

Where it takes its origin, it turns a little to the right, and is afterwards directed upwards, backwards, and towards the left side.

It ascends as far as the top of the Thorax, under the name of *Aorta Ascendens*, and is afterwards reflected obliquely backwards over the root of the left Branches of the Trachea, forming what is termed *Curvature* or *Arch* of the Aorta.

It then commences *Aorta Descendens*, which runs down close upon the Spine, till it reaches the fourth Vertebra of the Loins, where it divides into the two Iliac Arteries.

The Thoracic portion of the Aorta Descendens is situated on the fore and left part of the Spine, between the Layers of the Posterior Mediastinum.

Where it passes from the Thorax to the Abdomen, it goes between the long Crura of the Diaphragm, after which it descends more immediately upon the fore part of the Vertebræ.

The Aorta sends off Arteries which carry Blood to the different parts of the Body, from whence it is returned by the Veins to the Inferior and Superior Vena Cava,—excepting what passes to the Coronary Vessels.

The *Inferior Cava* is formed by the union of the two Venæ Iliacæ, upon the last Vertebra of the Loins, a little below the Termination of the descending Aorta.

It is situated upon the fore-part of the Spine, and at the right side of the Aorta, which it accompanies for a considerable way through the Abdomen.

Near the upper end of the Abdomen, it recedes from the Aorta, and passes behind the large Lobe of the Liver.

It perforates the Diaphragm in its Tendinous part, and having entered the Pericardium, it goes immediately into the right Auricle of the Heart.

The Inferior Cava receives the Blood from the Inferior Extremities, from the Pelvis and Abdomen, and carries it to the Heart.

The *Superior Cava*,—formed by the union of the two great Venæ Subclaviæ, with the addition of the Vena Azygos,—is situated in the upper part of the Thorax, upon the right side of, and a little more anteriorly than the ascending Aorta.

It begins behind the Cartilage of the first Rib, somewhat higher than the arch of the Aorta, and has at first a small inclination towards the right side.

After descending about an inch, it perforates the Pericardium, and having run down nearly twice this space, it enters the right auricle, opposite to the termination of the Inferior Cava.

The Superior Cava receives the Blood from the Head, Neck, arms, and containing parts of the Thorax, and also carries it to the Heart.

BLOOD-VESSELS OF THE HEAD, AND PART OF THOSE OF THE NECK.

Arteries.

From the upper side of the arch of the Aorta, *Three Large Arteries* arise, which supply the Head, Neck, and Superior Extremities.

Of these three Arteries, one on the right side, termed *Innominata*, soon divides into the *Right Carotid*, and *Right Subclavian Artery*.

The other two are the *Left Carotid*, and *Left Subclavian*, which come off in separate Trunks.

Carotid Arteries : The Carotid Arteries, after emerging from the Thorax, run up on each side of the Neck, between the Trachea and Internal Jugular Veins, and behind the Sterna-mastoid Muscles, gradually receding from each other.

In the Neck, they do not send off any Branches till they reach the top of the Larynx, where each, opposite to the Os Hyoides, divides into *External* and *Internal Carotid Arteries* ; the former supplying the outer parts of the Head, the other the Brain.

The *External Carotid* is placed more anteriorly, and nearer the Larynx than the *Internal*, which lies deeper, and is at its root, the larger of the two.

The External, though smaller than the other, appears as a continuation of the common Trunk.

It runs up behind the angle of the Lower Jaw, and in its passage before the Ear towards the Temple, is sunk deep in the substance of the Parotid Gland, which it supplies with Blood, and is divided into the following principal Branches, viz.

The *Arteria Laryngea Superior*, *Gutturalis Superior*, or *Thyroidea Superior*, which comes off from the root of the external Carotid, and sometimes from the top of the common Carotid.

It passes downwards in a winding direction, and sends Branches to the Muscles about the Os Hyoides ;—

To the Muscles, Jugular Glands, and Skin near the Larynx ;—and

To the different parts of the Larynx itself, the continuation and principal part of the Artery terminating in the Thyroid Gland.

The *Arteria Lingualis*, which is sent off immediately above the former.—It goes forwards and upwards over the corresponding Cornu of the Os Hyoides, and under the Hyo-glossus Muscle, in a direction towards the under and fore-part of the Tongue.—It gives

A small Branch to the Pharynx ;—

A Branch, termed *Ramus Hyoideus*, to the Muscles placed between the Tongue and Larynx ;—

The *Dorsalis Linguæ* to the Fauces, Amygdala, Epiglottis, &c.—

The *Ramus Sublingualis*, which comes off under the middle of the Tongue, and is dispersed upon the Sublingual Gland and adjacent Muscles ;—and

The *Ramus Raninus*, which is the principal Branch of the Lingual Artery, running at the under and lateral part of the Tongue, and terminating near its point.

The *Arteria Facialis, Maxillaris Externa, Labialis*, or *Angularis*, which also runs forwards, and goes under the Stylo-hyoid, and Tendon of the Diagastric Muscles. It perforates the Submaxillary Gland, mounts suddenly over the angle of the Lower Jaw, at the under and fore-part of the Maseter Muscle, from whence it proceeds in a tortuous manner towards the inner corner of the Eye.

In this course, it sends the following Branches to the adjacent parts.

The *Palatina Inferior*, which runs upwards upon the side of the Pharynx.—

A Branch to the Tonsil, &c.—

Branches to the Inferior Maxillary Gland ;—

Small Branches to the root of the Tongue, to the Skin, Muscles, &c. near the angle of the Jaw ;—

The *A. Submentalis*, which runs forwards under the Base of the Lower Jaw, furnishing Branches to the parts near it, and terminating on the middle of the Chin :

Upon the outside of the Jaw,—a Branch to the Masseter Muscle ;—

While upon the Buccinator Muscle,—Branches to the Cheek and to the lower part of the under Lip ;—

Near the corner of the mouth,—the *A. Coronaria Inferior* to the under Lip ; and a little higher,—

The *Coronaria Superior* to the upper Lip, from whence Branches run to the under part of the Partition and Point of the Nose.

The Coronary Arteries run near the edge of the lips, where meeting with their fellows of the opposite side, they form an *A. Coronaria Labiorum*.

Frequently one or both Coronary Arteries are larger than ordinary, in which case those on the opposite side are proportionally smaller.

After sending off the Coronary Branches, the Facial Artery runs near the wing and side of the Nose.

From this part of the Artery, Branches are sent inwards to the Nose, and outwards to the Cheek.

The Facial Artery is at last lost upon the parts about

the inner corner of the Eye, and middle of the Forehead.

The *Pharyngea Inferior*, which is a small Artery arising near the Lingual Artery, and frequently from the root of the Occipitalis.

After ascending some way, it divides into Branches, which are dispersed upon the Pharynx, Fauces, and Base of the Skull, where some of them enter the large Foramina, and supply part of the Dura Mater.

The A. Occipitalis, which arises from the back-part of the External Carotid, and at its origin is concealed by the other original Branches sent off from that Artery.

It runs over the beginning of the Internal Jugular Vein, and afterwards passes under the Mastoid Process, and posterior Belly of the Digastric Muscle.

It goes likewise under the upper ends of the Trachelo-mastoideus, Splenius, and complexus Muscles; after which, it becomes more superficial, where it runs near the middle of the Occiput.

In its course, it is very tortuous, and gives off different Branches to the surrounding Muscles: viz.

One which descends along the Sterno-mastoid Muscle, and communicates with the Thyroid, Cervical, and Vertebral Arteries:

Another which passes, with the Jugular Vein, to the under and back-part of the Dura Mater:

A Twig, through the Foramen Stylo-mastoideum, to different parts of the Internal Ear:

A Branch which proceeds to the back-part of the ear, under the name of *Auricularis Posterior*;—and

Another of considerable size, which descends between the Trachelo-mastoideus and Complexus Muscles, and, after bestowing Twigs upon several Muscles of the Neck, communicates with the Cervical and Vertebral Arteries.

The Artery is at last dispersed upon the beginning of the Occipito-frontalis Muscle, and Skin of the Occiput, where it communicates with its fellow, and with the Temporal Artery.

Sometimes, a Twig of this Artery passes to the Dura Mater, through that small hole occasionally found near the Mastoid Process of the Temporal Bone.

The *A. Maxillaris Interna*, which goes off from that

part of the Trunk which is covered by the Parotid Gland, and at its origin lies behind the middle of the upright Plate which divides into the Condyloid and Coronoid Processes of the Lower Jaw.

It passes first between the Jaw and External Pterygoid Muscle, and afterwards runs in a very winding manner, towards the back-part of the Antrum Maxillare, sending numerous Branches to the parts belonging to both Jaws.

At its origin, it furnishes Twigs to the fore-side and adjacent parts of the outer Ear.

It then sends off the *A. Duræ Matris Media Maxima Meningea*, or *Spheno-spinalis*, which runs between the External and Internal Carotids, passes through the Foramen Spinale of the Sphenoid Bone, and spreads over the Surface of the Dura Mater and inside of the Parietal Bone, like the Branching of a Tree.

The *Inferior Maxillary* Branch, which runs in the Inferior Maxillary Canal, sending Branches to the substance of the Bone, and to the Teeth ;—the remainder of it passing out at the Anterior Maxillary Foramen, and communicating upon the Chin with Branches of the Facial Artery.

Branches to the Pterygoid, Masseter, and inner part of the Temporal Muscle, under the names of *A. Pterygoideæ*, *Masseterica*, and *Temporales Profundæ :*

The *A. Buccales* to the Buccinator Muscle and other soft parts of the Cheek.

The *A. Alveolares*, which run behind the Antrum, and send Branches to the soft parts surrounding the Upper Jaw.—The Maxillary Artery sends other Branches, which enter by small Holes to the Antrum, and to the Substance and back teeth of the Jaw ; one of which is larger than the rest, and is the Proper Alveolaris.

The *Infra-orbitar*, which passes in the Canal under the Orbit, giving, at its entrance, Twigs to the soft parts in the bottom of the Orbit. and in its progress, other Twigs to the Antrum, Substance of the Jaw, and Fore-Teeth ; after which it goes out at the Foramen Infra-orbitarium, and terminates on the cheek by small Branches which communicate with those of the Facial Artery.

The *Palato-maxillary* Branch, which passes through the Foramen Palatinum Posterius, and runs between the Osseous and Fleshy parts of the Palate, supplying

these with Branches, and frequently proceeding through the Foramen Incisivum to the inner part of the Nose.

The *Superior Pharyngeal*, which is a small Branch terminating in and about the upper part of the Pharynx.

The *Large Lateral Nasal*, which enters the Foramen Sphenopalatinum, and divides into many Branches which supply the greater part of the inside of the Nose.

A. *Temporalis*.—The Trunk of the External Carotid, having given off the Arteries already mentioned, passes up between the Meatus Auditorius and root of the Zygoma, and forms the *Temporal Artery*, named also *Temporalis Externa*, or *Superficialis*;—from the root of which are sent off,

The *Transversalis Faciei*, which proceeds forwards under the Zygoma, supplying a large portion of the Cheek, and communicating with the Facial and Infra-orbitar Arteries :

Some small Branches to the Articulation of the Jaw :

Several small Branches to the root of the Ear, part of which are dispersed upon the External Meatus and Membrana Tympani,—some Twigs penetrating as far as the inner Ear.

A little above the root of the Zygoma, where the Pulsation of the Temporal Artery can be felt, and frequently even seen, it divides into two large Branches, an *Anterior*, and *Posterior*, which are placed superficially between the Integuments of the Head and Aponeurosis of the Temporal Muscle.

The *Anterior Branch* proceeds forwards, in a serpentine direction, to the side and upper-part of the Forehead, supplying the Skin and Muscles near it, and communicating with Branches of the Facial and Ocular Arteries, and with those of its Fellow on the opposite side of the Head.

The *Posterior* ascends obliquely backwards, giving a few Branches to the upper part of the Ear, but is chiefly dispersed on the Integuments and Muscles upon the lateral part and crown of the Head, communicating with its fellow of the same and of the opposite side, and also with the Occipitalis, by numerous Ramifications.

Internal Carotid Artery.

The *Internal Carotid*,—sometimes termed *A Cerebra-*

lis,—is arched back at its origin, and then ascends in a waving direction on the fore-part of the Rectus Capitis Anterior Major Muscle, as far as the Foramen Caroticum, without giving off any Branches.

At the Base of the Cranium, it makes a sudden turn forwards, and enters the Carotic Canal of the Temporal Bone; While in the Canal it passes upwards and forwards like the Canal itself, and is surrounded by a considerable quantity of Cellular Substance, and by the Dura Mater, which form a Cushion between it and the Bone.

After leaving the Canal, it again bends upwards and then forwards, by the side of the Sella Turcica; and perforating the Dura Mater, at the root of the Anterior Clinoid Process, it is suddenly reflected obliquely backwards and upwards, after which it divides into Branches

Through the whole of its course, it runs in a serpentine manner, which prevents the Blood in it from rushing too quickly and forcibly upon the tender Substance of the Brain, and, contrary to the nature of other Arteries.—it is of a Conical form, though it does not send off any Branches till it enters the Cranium.

While at the Side of the Sella Turcica, it furnishes small Twigs to the Dura Mater and parts adjacent, one of which passes through the Foramen Lacerum to the Orbit, and, another, accompanied by a similar Twig from the Meningeal Artery, through the Pars Petrosa, to the Tympanum.

As soon as the Carotid perforates the Dura Mater, at the root of the Clinoid Process, it transmits

The *Arteria Ophthalmica*, which is the principal Artery belonging to the Eye and its Appendages.

The Ophthalmic, or Ocular Artery, immediately after it comes off from the Carotid, enters the Foramen Opticum, and creeps under the Optic Nerve, included in the Dura Mater, towards the outer part of the Orbit.

After proceeding some way through the Orbit, it traverses its Cavity, taking a Spiral direction towards the Nose, between the Optic Nerve and Muscles in the upper part of the Orbit.

In this course, it first transmits Filaments to the Dura Mater and Substance of the Optic Nerve, and to the be-

gimning of the Muscles in the bottom of the Orbit, after which it gives off the following Branches, viz.

The *Arteria Lacrymalis*, which runs at the outside of the Orbit, and is chiefly dispersed upon the Lacrymal Gland, some Threads advancing to the Eye-lids:

The *A. Centralis Retinæ*, which penetrates the Optic Nerve a little behind the Ball of the Eye,—runs in the centre of the Nerve, and spreads out into many small Branches upon the inside of the Retina.

When the Nerve is cut across, the orifice of the divided Artery is observeable, which, before its nature was understood, was long known by the name of *Porus Opticus*.

In the Adult, the Central Artery appears to terminate entirely upon the Retina; but in the Fœtus, after furnishing, at the bottom of the Orbit, the Branches proper to the Retina, the Trunk is continued forwards through the Axis of the Vitreous Humour, supplying its Cells and Membrane with delicate Filaments, and afterwards spreading out upon the back-part of the Capsule of the Lens.

Its Branches are dispersed upon the Lens in a radiated manner, and after surrounding it, some of them are sent forwards to the Membrana Pupillaris.

The *Arteriæ Ciliares*,—two or sometimes more in number,—which divide into Branches running in a serpentine direction along the opposite sides of the Optic Nerve, and dividing into the Ciliares Breves, and Ciliares Longæ.

The *Ciliares Breves*, or *Posteriores*,—formed not only of Branches from the original Ciliary Trunk, but also of Twigs from the Muscular Branches,—are numerous. They perforate the Sclerotica, near the insertion of the Optic Nerve, give Twigs to that coat, and dividing into still smaller Branches, creep forwards upon the Tunica Choroides,—forming many Communications with each other as they advance, and retiring gradually from the convex to the concave surface of this coat to supply the Iris and Ciliary Processes.

The *Ciliares Longæ*,—which seldom consist of more than two Trunks,—perforate the Sclerotica a little farther forwards than the former, pass along the Choroid

coat to its anterior part, and then separate into Branches.

Besides the Ciliares Breves et Longæ, there is another set, termed *Ciliares Anteriores*, which are a few Arterious Filaments from the Muscular Branches, entering the eye where the straight Muscles are inserted.

At the root of the Iris, the different sets of Ciliary Arteries unite into arches, which form an irregular circle, called *Circulus Iridis*.

From this circle, many Arteries run upon the Iris, in a radiated serpentine manner, towards the Pupil, near which several of them also unite into Arches; and from these Twigs are sent, along with the rest of the radiated Branches, to the inner edge of the Iris.—In the Fœtus, they are continued to the Membrana Pupillaris.

The *Muscularis Superior*, and *Inferior*, which are dispersed upon the Muscles and Fat of the Eye.

The *OEthmoidalis Anterior*, and *Posterior*, two extremely small Twigs, especially the latter, which pass through the Foramina Orbitaria Interna,—Anterius, et Posterius,—to the Bones and Membranes of the Nose.

The *Supra-orbitalis*, or *Frontalis*, which, emerging from the Socket, passes through the Foramen Supra orbitorium, and is divided into two parts;—one dispersed upon the Periosteum of the Fore-head, the other running to the Skin and Muscles on the Fore-head and upper eye-lid, and communicating with the anterior Branch of the Temporal Artery.

The remains of the Ocular Artery are continued to the inner angle of the Eye, and are dispersed upon the Eye-lids, Lacrymal Sac, side of the Nose, and Frontal Muscle, communicating with the upper end of the Facial Artery.

Arteries of the Brain.

The Arteries of the Brain consist of the two *Internal Carotids*, and the two *Vertebrals*.

Each Internal Carotid, after sending forwards the Ocular Artery, gives a Branch backwards to the Vertebral, termed *A. Communicans*, and then divides into the *A. Anterior*, and *A. Media Cerebri*.

The Anterior Cerebri, turns towards its fellow of the

opposite side, and commonly sends Filaments to the first and second Pair of Nerves.

A little before the union of the Optic Nerves, the right and left anterior Cerebral Arteries become almost contiguous, and anastomose by means of a short, but large transverse Branch, which forms part of that communication of vessels termed *Circus Arteriosus Willisii*.

From the transverse Branch, but more frequently from the Anterior Cerebral Artery near it, a Branch is sent off, which passes into the third Ventricle, and furnishes Twigs to the Septum Lucidum, and fore-part of the Fornix.

The Anterior Cerebral Artery ascends upon the inner side of the Anterior Lobe of the Brain, and sends off a principal Branch and commonly another soon after both of which arch backwards upon the inner flat surface of the Hemisphere.

The continuation of the Anterior Cerebral Artery is termed *A. Corporis Callosi*, and is reflected back upon the union of the Corpus Callosum and Hemisphere, as far as the posterior Lobe of the Brain.

The Branches of the Anterior Cerebral Artery are divided into minute Ramifications, which are first spread out upon the flat surface of the Hemisphere, and afterwards upon its upper part.

The Ramifications form numberless Anastomoses with each other upon the surface of the Brain, and afterwards pass, by minute Filaments, into its Cortical and Medullary Substance.

Besides the Anastomoses of the different Branches of this Artery on the surface of the Hemisphere, small Branches run across the Corpus Callosum, and inosculate with those of the opposite side.

The *Arteria Media Cerebri*,—which is larger than the former,—runs outwards in a lateral direction through the *Fossa* of *Sylvius*, to the outer part of the Brain.

It gives first Filaments to the Glandula Pituitaria and parts adjacent to it, and then divides into principal Branches, of which one set go to the Anterior, and the other to the Lateral part of the Posterior Lobe of the Brain.

From this Artery, one or two Twigs run up into the

Anterior Cornu of the Lateral Ventricle, and assist in forming the Choroid Plexus of that Cavity.

Upon the outer surface of the Brain, the Branches of this Artery inosculate with each other, and with those of the Anterior Cerebral Artery, and then plunge into the substance of the Brain, where they meet with the deep Branches of that Artery.

Vertebral Arteries.

The two *Vertebral Arteries*,—which are only a little smaller than the Internal Carotids,—arise from the Subclavian Arteries at the bottom of the Neck.

Each of them, at a small distance from its origin, enters the Canal formed for its reception by the six uppermost Cervical Vertebræ.

It ascends through the Neck, nearly in a straight direction, sending Twigs outwards between the Vertebræ to the deep Muscles of the Neck, and others which pass inwards to the Spinal Marrow and its Membranes, by the Holes which transmit the Spinal Nerves.

Immediately below the Head, it gives out more considerable Branches to the deep Muscles at the back-part of the Neck, which inosculate with the Occipital Artery.

At the upper part of the Neck, it forms contortions somewhat similar to, and answering the same purpose with those of the Internal Carotid Artery.

One turn is formed upwards and outwards, in passing from the third to the second Vertebra; and another outwards and forwards, in going between the second Vertebra and Atlas.

After perforating the Atlas, it bends suddenly back, and runs in an Horizontal direction in a Notch upon that Bone.

Having reached the Foramen Magnum Occipitis, it turns upwards, perforates the Dura Mater, and enters the Cavity of the Cranium.

After entering the Cranium, it passes with the Medulla Oblongata, upon the Cuneiform Process of the Occipital Bone, inclining towards its fellow on the other side, and at the beginning of the Medulla, the two Vertebrals unite into the Trunk called *Basilar Artery*.

Upon entering the Skull, each Vertebral Artery sends a small Branch, termed *A Meningea Posterior*,—to the posterior part of the Dura Mater.

It then disperses Twigs to the Medulla Oblongata, and frequently gives off the small Branch which forms the Posterior Artery of the Spinal Marrow.

Near the part where it unites with its fellow, it sends down the Anterior Artery of the Spinal Marrow.

From the Vertebral, or from the Basilar, or sometimes from each a principal Branch is sent off, named *A. Cerebelli Posterior*, or *Inferior*, which passes between the Cerebellum and Medulla Oblongata, and furnishes branches to the under part of the Cerebellum, to the back-part of the Medulla Oblongata and Tuber Annulare, and forms the Choroid Plexus of the Fourth Ventricle.

The Basilar Artery runs along the middle of the Tuber Annulare, which it slightly impresses, and lies upon the Cuneiform Process of the Occipital Bone.

From the sides of this Artery, numerous Filaments run transversely, to be dispersed upon the Tuber and adjacent parts.

One Branch, larger than the rest, called *Auditoria Interna*, passes between the two portions of the Seventh Pair of Nerves to the Internal Organ of Hearing.

At the extremity of the Cuneiform or Basilar Process of the Occipital Bone, and at the upper and fore-part of the Tuber Annulare, the Basilar Artery divided into four principal branches, two to each side, and these go off almost at right angles from the Trunk, viz.

The *A. Superior*, or *Superior Cerebelli*, which turns round the Crura Cerebri, expands its Branches upon the upper part of the Cerebellum, and sinks into its substance, supplying also the Nates, Testes, and Parts near them.

The *Arteria Posterior Profunda Cerebri*, which sends Twigs to the Tuber and to the Crura Cerebri, and unites with the Internal Carotid by the Arteria communicans.

It supplies also parts lying near the third Ventricle, and afterwards turning round the Crura Cerebri, passes between the Cerebrum and Cerebellum.

It distributes its numerous Branches chiefly to the Posterior Lobe of the Brain, one Branch in particular

penetrating into the posterior Cornu of the Lateral Ventricle, and with Branches of the Internal Carotid, forming the Arterious part of the Choroid Plexus.

The Branches of this Artery anastomose with those of the anterior part of the Internal Carotid, at the inside of the Hemisphere,—and with those of the lateral part of the Artery, at the outside of the Hemisphere, in the manner these do with each other in the other parts of the Brain.

The *Arteria Communicans*, which unites the posterior Cerebral Branch of the Vertebral Artery to the Trunk of the Internal Carotid, and is nearly the same diameter, but longer than that transverse Artery which connects the anterior Branches of the Internal Carotid.

It sends minute Threads to the Crura Cerebri, &c. and contributes to the formation of the *Circle of* Willis,—or that kind of Communication by which the Blood or Injected Matter can pass readily across from one Internal Carotid to the other,—or from these backwards to the Basilar Artery.

Veins of the Head and of Part of the Neck.

The Veins which return the Blood from the Arteries of the Head and Neck, unite into the following Trunks, viz.

The *Facial Vein*, which is formed by the Frontal Vein, and by an intricate Plexus of Branches upon the Face.

It winds obliquely downwards and outwards, at a distance from the Artery; but in crossing the Jaw, it goes close by the outside of it, and terminates in the External Jugular Vein.

The *Temporal Vein*, formed by superficial and deep Branches from the sides and upper part of the Head, and running down upon the Temple at some distance from the Artery.

The Branches of the Temporal Vein form large anastomoses, before, with those of the Frontal Veins, above, with their fellows on the other side; and behind, with the Branches of the Occipital Vein.

The Trunk descends at the fore-part of the ear, and, along with the Artery, is sunk in the substance of the Parotid Gland.

In its descent before the Meatus Auditorius Externus, it receives Branches from the ear, Parotid Gland, and Cheek, corresponding with the Arteries sent to these parts from the Carotid or Temporal Artery.

At the under part of the Lower Jaw, the Facial and Temporal Veins commonly unite and form the External Jugular.

The *External Jugular Vein* receives the following Branches at the upper part of the Neck, viz.

Branches of the *Internal Maxillary Vein*, the principal part terminating in the Internal Jugular.

The *Lingual Vein*, one Branch of which, termed *Ranina* from its complexion, is seen under the Tongue, and is that Vein which is opened in the Venesection of this Organ.

Branches of the *Occipital Vein*, the rest passing to the Internal Jugular, and Vertebral Veins, and sometimes also communicating by a Foramen Mastoideum with the Lateral Sinus.

The Trunk of the External Jugular Vein descends in the Neck, between the Paltysma Myoides and Sternomastoid Muscles, receives in its course Branches from the adjacent parts, and terminates in the Subclavian Vein.

In the formation and termination of this Vein, there is great variety in different Subjects.

It frequently happens that most of the Ramifications, which commonly run from the Face and Throat into this Vein, go to the internal Jugular.

Often the Facial Vein goes into the Internal Jugular, and the Temporal continued forms the External Jugular.

Sometimes one of the external Jugulars terminates in the usual way, and the other in the Internal Jugular.

In some rare cases, the external Jugulars have both been found terminating in one side of the Neck.

Anterior External Jugular Vein. Besides the Vein commonly called External Jugular, a small Subcutaneous Vein, termed *Anterior External Jugular*, descends in the fore-part of the Neck, receiving Branches from the adjacent parts, and terminating in the Subclavian Vein.

Veins of the Eye and its Appendages.

The Blood sent to the Contents of the Orbit is returned partly to the Facial Vein at the inner corner of the Eye, but chiefly to the proper Ocular Vein, which terminates in the Cavernous Sinus by the following Veins, viz.

The *Vena Centralis Retinæ*, which is formed by many small Branches expanded upon the inner surface of the Retina, along with those of the corresponding Artery.

The Vena Centralis enters the Optic Nerve, where the Artery leaves it; and a little behind the ball of the Eye, it emerges from the Nerve, and runs between it and the Sheath which covers it, receiving many Twigs from the Nerve and its Membranes.

It passes afterwards under the Fasciculus of Nerves which belongs to the Eye, and terminates, sometimes in the Ocular Vein, but in general, directly in the Cavernous Sinus.

From the Iris and Choroid Coat, the Blood is returned by the *Short* or *Anterior Ciliary Veins*, and by the *Long* or *Posterior Ciliary Veins*, and also by a principal set of Ciliary Veins, termed *Vasa Vorticosa*.

Small Veins return from the Iris, which go under the Arterious Circle to the Veins of the Choroid Coat, and communicate with each other; but without forming any Circle, such as is found in the Eyes of Oxen, and which corresponds, in them, with the Arterous Circle.

The *Anterior Ciliary Veins* pass from the Iris through the Sclerotic coat, near the same part where the Anterior Ciliary Arteries enter.

The long *Ciliary Veins* are commonly two in number, like the Arteries, and of a smaller size than the Vorticose Veins.

They run from the Iris backwards along the Choroid coat, communicate in their passage by minute Branches with the Vorticose Veins, and afterwards perforate the Tunica Sclerotica behind.

The *venæ verticosæ*, are numerous, and obtain their name from the whirls composed by their Branches, the course of which has been compared to a *Jet d'eau*, or to the Spiral Ridges upon the points of the fingers, &c.

Of these Veins, four, or sometimes five, are by much

the most conspicuous, the rest being smaller, and having less of the Vorticose appearance.

The Branches of each of the four principal Venæ Vorticosæ run in close congeries, unite at acute angles into larger Branches which have a curved direction, and these proceeding from all sides, meet in point, and form the Trunk of the Vein.

The Trunks of these Venæ Vorticosæ, thus placed in the centre of their respective whirls are situated at the opposite sides of the Eye, and perforate the Scierotic coat obliquely near its middle.

The rest of the Venæ Vorticosæ, or smaller Ciliary Veins, communicate with the adjacent larger Vorticose Veins upon the surface of the Choroid coat, and also perforates the Sclerotica near its middle.

After piercing the Sclerotica, the different Vorticose Veins unite into four or five small Ciliary Trunks, receiving a number of minute Twigs, which paint the Cellular Substance covering the Surface of the Sclerotica.

The Ciliary Veins run in a serpentine direction at the opposite sides of the Eye, and pass either separately or united with other small Veins in the Orbit, into the trunk of the Ocular Vein.

The other Venous Branches within the Orbit Correspond in a great measure with their respective Arteries; such as,

Branches from the Palpebræ and inner corner of the Eye.

The *Lacrymal Branch*:

The *OEthmoidal Branches*:

Muscular Branches,—and *Branches* from the Fat in the Orbit, and from the Membranes lining it.

The different Branches from the Eye and its appendages form, by their union, the *Ocular vein*, which greatly exceeds the size of the corresponding Artery.

The Ocular Vein forms large Anastomoses, at the inner corner of the Eye, with the Facial Vein, and afterwards passes back at the inner side of the Orbit.

From the inner, it goes across to the outer side of the Orbit, under the Attollens Muscle; and after running back under the Anterior Clinoid Process, covered by the Third and Sixth Pair of Nerves, it terminates, under the Carotid Artery, in the Cavernous Sinus.

Veins of the Dura Mater corresponding with its Arteries.

The *veins of the Dura Mater* accompany their Arteries and go partly through Perforations in the Base of the Cranium, to terminate in Branches of the External or Internal Jugular Veins;—the rest go into the nearest Sinuses of the Brain.

Veins of the Brain.

The smaller Veins of the Brain accompany the Arteries. Their Trunks run chiefly between the Circumvolutions of the Brain, at a distance from the Trunks of the Arteries.

They terminate in the different *Sinuses* of the Dura Mater, and generally in an oblique direction, which prevents the Blood from returning into them.

The Sinuses most commonly found are the following,

The *Superior Longitudinal Sinus*, which begins at the under part of the Spine of the Frontal Bone, runs along the upper edge of the Falx,—and becoming gradually wider, terminates upon the middle of the Occipital Bone, in the two Lateral Sinuses.

It receives the Blood from the upper part of the Brain by several large Venous Trunks, which enter it obliquely forwards.

The *Torcular Herophili*, or *Fourth* Sinus of the Ancients, chiefly formed by the Vena Galeni, which returns the Blood from the Choroid Plexus, Corpora Striata, Septum Lucidum, and other Internal parts of the Brain.

The Torcular passes back in the joining of the Falx and Tentorium, and terminates along with the Superior Longitudinal Sinus, in the beginning of the Lateral Sinuses.

The *Inferior Longitudinal Sinus*, a remarkably small one, situated in the under edge of the Falx.—It receives Branches from that Membrane, and from the Corpus Callosum and parts of the Brain near it, and terminates in the beginning of Torcular Herophili.

The *two Lateral Sinuses*, or *Second* and *Third* Sinuses of the Ancients, formed by the Longitudinal and Torcular Sinus.

They run at the Posterior edge of the Tentorium, along the lateral ridges of the Os Occipitis, as far as the Base of the Petrosal Processes of the Temporal Bones, from whence they wind downwards, pass through the Foramina Lacera common to the Occipital and Temporal Bones, and Terminate in the Internal Jugular Veins.

Frequently one of the Lateral Sinuses is formed by the Longitudinal, and the other by the Torcular Sinus ; in which case, the one is found larger than the other.

The Lateral Sinuses receive Veins from the Cerebellum and from the under and back-part of the Cerebrum ; they likewise receive the Blood from the following small Sinuses, situated under the Brain, viz.

The *Circular Sinus* of Ridley, which is placed about the Glandula Pituitaria, and frequently surrounds it completely, receiving the Blood from it and from the adjacent Bones and Membranes, and terminating in the Cavernous Sinuses :

The *Cavernous Sinuses*, which are situated at the sides of the Sella Turcica, and receive Blood from Veins lying near the lateral branches of the Internal Carotid Arteries from the Ocular Veins, and from the Circular Sinus of Ridley :

The Cavernosus Sinuses surround the Carotid Arteries and Sixth Pair of Nerves, and have a Cavernous Structure within, somewhat resembling that of the Penis :

The *Superior Petrosal Sinuses*, situated upon the ridges of the Partes Petrosæ.

They receive some small Veins from the Dura Mater and Base of the Brain, and communicate backwards with the Lateral, and forwards with the Cavernous Sinuses.

The *Inferior Petrosal Sinuses*, placed at the roots of the Partes Petrosæ.—They receive the Blood from the Cavernous, and discharge into the ends of the Lateral Sinuses.

Besides the Sinuses mentioned above, the following others are frequently met with, viz.

A *Perpendicular Occipital Sinus*, situated in the Falx Cerebelli, which is sometimes single, sometimes double and terminates in the Lateral Sinuses.—It receives Veins from the Dura Mater, and communicates with the Vertebral Veins.

Anterior Superior, and *Anterior Inferior Occipital Sinu-*

ses, placed over the Cuneiform Process of the Occipital Bone, and communicating with the Inferior Petrosal and Lateral Sinuses, and with the Vertebral Veins.

Internal Jugular Veins.

The Lateral Sinuses, having received the Blood sent to the Brain from the Carotid and Vertebral Arteries, pass out of the Cranium, and form the Internal Jugular Veins; each of which, at its origin is bulged back in form of a Varix, which is termed *Diverticulum*; and this is lodged in a Fossa at the root of the Pars Petrosa of the Temporal Bone.

The Internal Jugular Vein descends behind the Sterno-mastoid Muscle, upon the fore and outer part of the common Carotid Artery, with which it is included in a Sheath of Cellular Substance; and is frequently a good deal dilated towards its under Extremity, especially in advanced life.

In its course in the Neck, it receives

Branches from the Pharynx and Muscles adjacent to it:

The *Internal Maxillary vein*:

One or more *Branches* from the Occiput:

The *Lingual vein*, which sometimes terminates in the External Jugular:

The Superior Laryngeal, and now and then Inferior Laryngeal which more frequently goes into the Subclavian, or to the top of the Cava.

The Internal Jugular also receives Branches from the Muscles of the Neck, and at the length terminates in the Subclavian Vein.

The remaining BLOOD-VESSELS *of the Neck, with those of the* SUPERIOR EXTREMITY *in General.*

ARTERIES.

Subclavian Artery. The Subclavian Artery has been already observed to arise on the right side, in common with the Carotid; and on the left, to come off directly from the Aorta.

After the Artery leaves the Thorax, it passes transversely outwards at the under part of the Neck, behind the under end of the Sterno-mastoid Muscle, and continues its course outwards between the Anterior and middle Scaleni Muscles, and between the Subclavian Muscle and first Rib.

After crossing the first Rib, it goes under the Pectoral Muscles to the Axilla, where it obtains the name of *Axillary Artery*.—In this course, it sends off the following branches, viz.

The *vertebral*;—The *Internal Mammary*;—The *Superior Intercostal Artery*. The first of these has been already described; the two others belong to the inner part of the Thorax.

The *Thyroidea*, or *Gutturalis Inferior*, which arises at the outer side of the Vertebral, and, ascending obliquely inwards behind the Carotid Artery, gives Branches to the Trachea and Esophagus, and Muscles near them; but is chiefly dispersed upon the Thyroid Gland, communicating by large Anastomoses with the Laryngea Superior.

The *Cervicalis Antærior*, which frequently comes off from the root of the Inferior Thyroid, and ascends in the Neck, furnishing superficial Branches to the Muscles which go from the Trunk of the Body to the Neck, and deep Branches to the Glands, Nerves, &c. lying on the fore and lateral parts of the Cervical Vertebræ.

The deep Branches anastomose with the Vertebral and Occipital Arteries; and some passing through the Intervertebral Holes where the Nerves come out, communicate with the Spinal Arteries.

The *Cervicalis Posterior*, which arises in common with the Anterior Cervical, or with the Inferior Thyroid.—This is larger than the former, lies farther out, and runs in a winding direction outwards and upwards.

It supplies the Skin and Muscles at the lateral and back-part of the Neck, communicates with Branches of the Occipital and Vertebral Arteries, and sends a principal Branch downwards to the parts about the top of the shoulder.

The *Dorsalis Superior Scapulæ*, which comes frequently from the root of the Thyroid, and running transversely behind the origin of the Sterno-mastoid Muscle,

near the Clavicle,—perforates the Notch in the superior Costa of the Scapula, and expanding its Branches upon the Dorsum of that Bone, supplies the Spinati and other Muscles situated there, and likewise furnishes Branches to the joint of the Shoulder.

The *Axillary Artery*, lying in the Axilla, and surrounded by the Lymphatic Glands and Fat, and by the large Nerves which form the Brachial Plexus. The Axillary Artery, give some small Branches to the parts adjacent; but its principal Branches are,

The *Thoracicæ*, or *Mammairæ Externæ*,—three or four in number,—which, by some Authors, are described by particular names ; as,

The Ahoracica Superior, which gives Branches to the Pectorales and Serratus, and some to the Intercostal Muscles :

The *Thoracica Longa*, which sends Twigs to the Axillary Glands ; but goes chiefly to the large Pectoral Muscles, Mamma, and Integuments, and inosculates with the Branches of the Thoracica Superior.

The *Thoracica Humeralis*, or *Thoracic Artery of the Shoulder*, which goes off opposite the Thoracica Superior, and divides suddenly into Branches which run to the upper parts of the Thorax near it, and to the Muscles and Integuments surrounding the Articulation :

The *Thoracica Axillaris*, which, when present, goes off from or near to the Thoracica Humeralis, and is bestowed upon the Glands, Fat, &c. frequently dispersing Branches upon the under edge of the Subscapularis Muscle.

The *Scapularis Interna*, which soon divides into the *Proper Scapularis Interna*, and the *Dorsalis Scapulæ Inferior*.

The Scapularis Interna runs near the inferior edge of the Scapula, sends off many large Branches, the principal part of which are dispersed upon the Latissimus Dorsi, Teres Major, and Subscapularis Muscles, and have large Anastomoses with each other, and with the Superior Dorsal Artery of the Scapula.

The *Dorsalis Scapulæ Inferior*, immediately after leaving the Internal Scapulary Artery, turns round the inner edge of the Scapula, a little below its Cervix.

Upon the Posterior Surface of the Scapula, it spreads

out into Branches of considerable size, which are dispersed upon the Muscles covering the under and back-part of the Bone; while the Trunk, ascending, inosculates with that of the Superior Dorsal Artery of the Scapula, whereby an Arch common to the two Arteries is formed at the root of the Acromion.

The *Circumflexa Anterior*, or *Articularis*, which passes in a transverse direction between the Heads of the Coracobrachialis and Biceps Muscles, and Body of the Os Humeri, immediately below the Joint of the Humerus.

The *Circumflexa*, or *Articularis Posterior*, which arises directly opposite to the former, and is by much the larger of the two.

It passes first between the Subscapularis Muscle and Teres Major, and then turns round between the back-part of the Os Humeri, and long head of the Triceps, and the Deltoid Muscle, and is dispersed upon the Deltoides and parts about the Joint;—its extreme Branches anastomosing with those of the Anterior Circumflex Artery, so as completely to encompass the Body of the Bone.

After giving off these different Branches, the Axillary Artery emerges from behind the edge of the great Pectoral Muscles, and runs along the Os Humeri, where it is termed Humeral or Brachial Artery.

The *Humeral Artery* descends behind the inner edge of the Biceps Muscle, covered by the Tendinous Aponeurosis of the Arm, and having the Triceps Extensor Cubiti behind. In this course, it bestows Branches to the Muscles and Integuments, and to the Peritoneum and Bone, viz.

The *Profunda Humeri*, or *Spiralis*, which arises near the upper part of the Arm, at the insertion of the Latissimus Dorsi and Teres Major Muscles, taking a Spiral direction downwards and outwards, between the Triceps Muscle and Bone, and terminating at the outer Condyle of the Os Humeri.

The Arteria Profunda sends Branches chiefly to the Coracobrachialis and Triceps Muscles, and to those at the outer part of the Elbow;—and one of them, descending at the inner side of the Arm, is sometimes so considerable as to form—

The *Profunda Inferior*, or *Minor*. This Artery is frequently a Branch of the Profunda Superior, but more commonly an original Branch sent off from the Trunk of the Artery, near the middle of the Arm.

It gives Branches to the Muscles and other parts at the inside of the Arm, and terminates about the inner part of the Os Humeri.

The *Ramus Anastomosticus Magnus*, which comes off a little above the Elbow, and bestows Branches to the Brachialis Internus, to the under end of the Triceps, and to the Parts in general about the Elbow-Joint.

Besides these, there are several other Branches sent in succession from the Trunk of the Humeral Artery into the Muscles and other parts adjacent.—These are shorter than the rest, and run more in a transverse direction, especially those to the Biceps Muscle.—One small Branch, termed *Nutritia*, or *Medullaris*, penetrates the substance of the Bone by the passage near its middle, and supplies the Marrow and parts which contain it.

The Trunk of the Humeral Artery having sent off the different Branches which belong to the Arm, passes to the middle of the bending of the Elbow, between the Aponeurosis and round Tendon of the Biceps Muscle.

About an inch below the Elbow, it commonly divides into two principal Arteries, the *Radial* and *Ulnar*. It happens, however, now and then, that this Division takes place about the middle of the Arm; and in certain instances, as high as the Axilla.

The *Radialis* passes over the Pronator Teres Muscle, and follows the course of the Radius through the whole length of that Bone.

At the upper part of the Fore-Arm, it is covered by the Supinator Longus: In its descent, it becomes more superficial, and, at the under part of the Fore-Arm, it lies close upon the Radius, and immediately under the Skin, in consequence of which, the Pulse is commonly felt in this place.

The *Recurrens Radialis*, which is reflected to the Muscles and Parts of the Joint near it, and anastomoses freely with the Arteria Profunda Humeri at the outer part of the Elbow.

Numerous Lateral Branches, in the descent of the

Artery, to the Muscles and Integuments, and parts in general situated about the Radius.

A *Branch* at the Wrist, which goes over the Root of the Thumb, and sometimes a principal Branch along one side of it ;—at other times, it is dispersed upon the Palm of the Hand.

Small Branches to the Ligaments, Bones and other parts about the Wrist.

One, or sometimes two Branches, termed *Dorsal*, to the back-part of the Metacarpos and Fingers.

At the under end of the Fore-Arm, the Radial Artery turns back under the Tendons of the Extensors of the Thumb, and gets between the Roots of the Metacarpal Bones of the Thumb and Fore-Finger, where it divides into three principal Branches, viz.

The *A. Magna Pollicis*, which runs along the side of the Thumb next the Fingers, and sometimes divides at its root, into two Branches, which supply both sides of it.

The *Radialis Indicis*, which runs along the side of the Fore-fingers next the Thumb.

The *Palmaris Profunda*, which crosses the Hand between the roots of the Metacarpal Bones and Flexures of the Fingers, and forms an *Arcus Profundus*, from which Branches go off to the Interossei Muscles and other deep parts of the Palm.

The *Ulnaris* appears at first as the continuation of the Trunk of the Humeral Artery.

At its upper part, it sinks deep behind the Flexor Muscles of the Hand, and passes afterwards for some way between the Flexor Sublimis and Profundus Digitorum.

Near the Wrist, it becomes more superficial, and runs between the Tendons of the Flexor Carpi Ulnaris and Flexor Digitorum Profundus, to the Hand.

In this course, it sends off many Branches to the Forearm, among which the following are the most considerable.

The Recurrens Ulnaris, which runs deep among the Flexor Muscles, and soon divides into Branches which ascend and supply the parts about the under and inner side of the Elbow.—In the Groove behind the inner Condyle of the Os Humeri, it communicates by distinct

Anastomoses with the Profunda Inferior, or with the Ramus Anastomoticus, sent down from the Humeral Artery.

The Interossea Posterior, which comes off at the upper end of the Interosseous Ligament, perforating it immediately at its origin, and going to the back part of the Fore-arm.

From this place, it sends upwards a Recurrent Branch which communicates, upon the back-part of the Elbow, with the other Recurrent Arteries, and with the Branches sent down from the Humeral Artery, and forms along with these a Plexus of Vessels upon the back-part of the Joint.

The Interossea is afterwards continued downwards, and is chiefly dispersed upon the Bellies of the External Muscles of the Hand and Fingers, being commonly exhausted before it reaches the Wrist.

The Internossea Anterior, which comes off sometimes immediately below the former, and at other times in common with it. It is considerably the larger of the two; but only about half the size of the Ulnar Artery from which it springs.

It runs close upon the Interosseous Ligament, and furnishes Branches to the Muscles and deep parts upon the anterior side of the Fore-arm.

Near the Wrist, it perforates the Ligament, and goes to the Posterior side of the Carpus and back of the Hand, dividing into Branches which inosculate with others of the Posterior Interosseous and Radial Arteries.

The Ulnar Artery, having given off its recurrent Branch, and the Arteriæ Interosseæ, with many Lateral Branches to the inner side of the Fore-arm, passes by the side of the Os Pisiforme, and then over the Annular Ligament into the Palm, where it forms the *Arcus volaris superficialis*.

At the under end of the Fore-arm, it sends off a *Dorsal Branch*, which passes under the Tendon of the Flexor Carpi Ulnaris to the back of the Hand, where joining with the Branches of the Anterior Interosseous and Ulnar Arteries, it assists in forming a Plexus which supplies the back-part of the Wrist and of the Hand and Fingers with a number of Branches, which are small when compared with those in the Palm.

The Arcus Volaris Sublimis, or Superficialis, is placed with its convex side downwards, and extends obliquely from the root of the Metacarpal Bone of the little Finger towards that of the first Bone of the Thumb, being covered by the expansion termed *Aponeurosis Palmaris*.

From the Arcus Volaris, Branches are sent off in the following order, viz.

Several small Branches to the Integuments and other superficial parts of the Palm :

A considerable Branch which sinks near the root of the Metacarpal Bone of the little Finger, and inosculating with the Palmar Branch of the Radial Artery, assists in forming the Arcus Profundus :

A Branch to the inner side of the little Finger :

Three large Digital Branches which run opposite to the Interstices of the Metacarpal Bones, to the roots of or Clefts between the Fingers.

At these Clefts, each of the three Digital Arteries is divided into two Branches, one of which Branches of each division runs along the Anterior Radial margin of one Finger, and the other along the Anterior Ulnar margin of the Finger next it ;—the three Digital Arteries thus supplying the margins of all the Fingers, excepting the inner margin of the little Finger, and the outer margin of the Index.

At the roots of the Fingers, each of the Digital Arteries receives a small Branch from the Arcus Profundus.

At the roots and Joints, but more particularly at the Points of the Fingers, the Arteries communicate by cross Arches, and send Branches to the parts adjacent.

The Superficial Arch of the Palm commonly sends off one of the Arteries of the Thumb, and ultimately communicates by a large Anastomoses with the root of the Arteria Magna Pollicis.

VEINS OF THE SUPERIOR EXTREMITY AND OF PART OF THE NECK.

The Veins of the Superior Extremities have numerous Valves, and are divided into a *Superficial* and a

Deep Set; the former lying immediately under the Integuments, the latter accompanying the Arteries, and taking their name from them.

The Subcutaneous Veins have many large Anastomoses with each other, particularly on the Fore-arm, where they unite, separate, and re-unite several times, thus forming a Plexus by which it is surrounded.

The Superficial Veins from the back of the Hand (one of which, belonging to the little Finger, was termed *Salvatella* by the Ancients) go chiefly to the *Superficial Radial*, and partly also to the *Ulnar veins*.

The Superficial Radial Veins form the *vena Cephalica*, and the Superficial Ulnar Veins the *vena Basilica*, at the Joint of the Elbow.

The Superficial Veins on the Anterior part of the Fore-arm communicate laterally with the Radial and Ulnar Veins, and, in their ascent, form a Trunk termed *Mediana Longa*.

The *Mediana Longa*, a little below the bending of the Elbow, is divided into *Mediana Cephalica* and *Mediana Basilica*, which running obliquely upwards, terminate a little above the Elbow, the former in the Cephalic, and the latter, crossing over the Humeral Artery, in the Basilic Vein.

Though this description corresponds with the general distribution of the Veins of the Fore-arm; yet, so great is the variety among them, that they are scarcely found to agree exactly in any two Subjects.

The *Basilica*, in its ascent, forms the principal Humeral Vein, which passes along the side of the Os Humeri, a little to the inside of the Humeral Artery, and receiving Branches from the corresponding side of the Arm, it runs into the Arm-pit, and forms the Vena Axillaris.

The *Cephalica* ascends at the outside of the Biceps Muscle, receives Branches from the adjacent parts of the Arm, and communicates in several places with the Basilic, and passing in the Groove between the large Pectoral and the Deltoid Muscle, terminates in the Axillary Vein.

The *Deep veins*, termed also *venæ Satellites*, or *Concomites* run close by the side of their respective Arteries, one lying commonly on each side of the Artery, and receiving the Blood from the adjacent parts.

In various places they anastomose with each other by short Branches, which cross over the Arteries.

Near the joint of the Elbow, the *Deep Radial Ulnar*, and *Interosseous Veins*, form a Plexus over the Bifurcation of the Humeral Artery.

From this Plexus, a short but large Branch passes outwards, and forms a Communication with one of the Subcutaneous Veins, and, in general, the Communications is with one of the Median Veins.

The Vena Axillaris, formed by the Trunks of the Superficial and Deep Humeral Veins, receives the *Veins* corresponding with the *Circumflex Arteries*, and the *Internal*, and the *Inferior Dorsal Veins* of the *Scapula*.

A little higher, it is jointed by the *Venæ Thoracicæ Externæ* and about this place, changes its names for that of *Subclavian* Vein.

The *Vena Subclavia* passes between the Clavicle and first Rib, at the inner side of the trunk of the Artery, and afterwards goes over the fore-part of the Anterior Scalenus Muscle, at the under end of the Neck.

After crossing the first Rib, it receives the *Vein* corresponding with the *Superior Dorsal Artery* of the Scapula *others* which belong to the *Cervical Arteries*, and also *small veins* from the *Skin* and *Muscles* on the *back-part* of the *Neck*.

While situated in the Neck, it likewise receives the *External*, and then the *Internal Jugular Veins*; and near this last a *Vein* of considerable size, which corresponds with the Trunk of the *Vertebral Artery*.

The *Vertebral Vein* communicates within the Cranium, by small branches, with the Inferior Petrosal Sinuses, or with Occipital Sinuses; but is chiefly formed by branches arising from the Spinal Marrow and its Membranes, and from the Bones and deep-seated Muscles of the Neck.

Behind the top of the Sternum, the Subclavian Vein frequently receives the *Inferior Laryngeal Vein*, the *Anterior External Jugular*, and the *Internal Mammary Vein*.—Besides these, the *Left* Subclavian receives also the *Left Superior Intercostal Vein*; after which, it goes across the Root of the Great Arteries sent up from the Arch of the Aorta, and joins its fellow on the opposite side to form the Superior Cava.

BLOOD-VESSELS WITHIN THE THORAX.

Of the Blood-Vessels within the Thorax, the *Pulmonary Artery* and *veins*, the *Aorta*, the *Coronary Vessels*, and the other Vessels connected with the Heart have been already noticed.

The following are those which remain to be described.

The *Mammaria Interna*, which arises from the Subclavian, opposite to the Inferior Laryngeal, and descends between the Pleura and Cartilages of the True Ribs, at the edge of the Sternum;—sending off,

A *Small Reflected Branch* to the Integuments and Muscles adjacent to the Clavicle:

One or two small Branches, termed *Thymicæ*, to the Thymus Gland, and which, like the Gland itself, are most considerable in the Young Subject:

A minute Branch, termed *Comes Nervi Phrenici*, which accompanies the Phrenic Nerve, and after giving Twigs to the neighbouring Membranes, is distributed upon the Diaphragm:

Some small Branches, called *Mediastinæ*, *Pericardiæ*, to the Mediastinum and Pericardium:

Several Branches outwards, to the Intercostal Muscles; and *others* between the Cartilages of the True Ribs at the edge of the Sternum, to the Pectoral Muscles, Mamma and Integuments, which communicate with those of the Thoracicæ Externæ:

A *Large Branch*, at the under end of the Thorax, which is dispersed upon the Diaphragm.

The Mammary Artery afterwards emerges from the Thorax, commonly under the Cartilage of the Seventh True Rib, and runs upon the back-part of the Rectus Abdominis Muscle, upon the upper end of which it is dispersed, after sending a Branch to the Oblique Muscles of the Abdomen.

The *Intercostalis Superior*, which comes off a little farther out than the Mammary, and descending near the Spine, commonly divides into two or three Branches, which supply an equal number of Intercostal Spaces. It also sends a Branch upwards to the Deep Muscles at the under and fore-part of the Neck.

The *Arteriæ Bronchiales*, one in the right and two or three in the left side of the Thorax, which are dispersed upon the corresponding sides of the Lungs.

The *Bronchialis Dextra*, which arises most frequently from the uppermost Intercostal Artery of the Aorta; and the *Bronchiales Sinistræ*, which are of unequal size, from the forepart of the Aorta at a little distance from each other.

The Bronchial Arteries send small Branches to the Esophagus, to the Posterior Mediastinum and Pericardium, and afterwards accompany those of the Trachea through the Substance of the Lungs.

The *Arteriæ Esophageæ*, which are minute Branches arising from the Aorta, and dispersed upon the Esophagus, also sending Twigs to the Posterior Mediastinum.

The *Intercostales inferiores*, which are nine or ten pairs in number, arising from the back-part of the Aorta, and running in the Grooves at the under edges of the Ribs, between the External and Internal Intercostal Muscles.

They furnish Branches to the Spine and Spinal Marrow, to the Intercostal Muscles, Pleura, &c. also numerous Branches to the Muscles in the back of the Thorax, and communicate with those of the Internal and External Mammary Arteries.

Veins.

The Blood sent to the Thorax by the Arteriæ Mammariæ Internæ, Intercostales, and Esophageæ, is returned to the Heart by the following Veins, viz.

The *Mammariæ Internæ*, which accompany their corresponding Arteries, and terminate, the Left in the Subclavian, and the right in this, or in the top of the Vena Cava.

Some small Veins, as the *Pericardiaco-Diaphragmatic*, the *Thymic* and *Pericardiac*, which, in place of joining the Mammary Trunk, commonly terminate, the Right in the Subclavian or top of the Cava, and the Left in the corresponding Subclavian Vein.

The *venæ Intercostales*, which are the same in number with their Arteries, and accompany them along the edges of the Ribs.

Several of the Lower left Intercostals unite into a trunk, termed *vena Azygos*, which crosses over the Spine about the middle of the Thorax,—behind, but sometimes before the Trunk of the Aorta,—to the right side.

The *vena Azygos*, or *vena sine Pari*, thus originally formed by the Lower Left Intercostals, ascends on the fore part of the Spine over the Intercostals, Arteries, at the right side of the Aorta.

At its lower extremity, it generally communicates with one of the Lumbar Veins, or with the Vena Renalis; and not unfrequently with the Trunk of the Inferior Cava.

Upon the Spine, it receive the *Right Intercostals*, and the *Right Bronchial vein;* and turning forwards over the Root of the Great Pulmonary Vessels of that side, it terminates in the Superior Cava.

The Upper Left Intercostal veins, or such as are not received by the Vena Azygos, terminate in a trunk on the left side, improperly called Left Vena Azygos.

The *Left vena Azygos*, *Left Bronchial*, or *Left Superior Intercostal vein*, besides the Superior Intercostal Branches, receives the Left Bronchial Veins and Branches, from the Esophagus and other parts near it, and terminates in the Subclavian Vein.

The *vena Cava Superior*,—formed by the union of the Subclavian Veins, with the addition of the Vena Azygos, —passes down at the right side of the ascending Aorta, perforates the Pericardium, and terminates in the upper part of the Right Auricle.

Blood-vessels of the Diaphragm.

The Diaphragm is supplied with Blood-vessels from various sources, viz. those entering its upper-part from the Internal Mammary, already described; also small Branches from the Intercostal and Lumbar Arteries. Its principal Branches, however, are the Phrenic, or Diaphragmatic.

The *Arteriæ Diaphragmaticæ*, are two in number, one on each side, which arise from the fore-part of the Aorta as soon as it enters the Abdomen.

In general, their origin is distinct from each other, but sometimes by a common Trunk; and now and then, one or both, originate from the root of the Cœliaca.

They afterwards go obliquely upwards and outwards over the Crura of the Diaphragm, spread out into many Branches which are chiefly dispersed upon its Fleshy sides, and inosculate with those which enter at is upper surface.

They likewise give small Branches to the Glandulæ Renales, to the Cardia, and parts in general which lie near them.

The *venæ Diaphragmaticæ*, like their corresponding Arteries, run upon the under part of the Diaphragm, and terminate in the Inferior Cava, behind the Liver,—the right being commonly at a little lower than the left.

BLOOD-VESSELS *of the* CHYLOPOETIC, *and* ASSISTANT CHYLOPOETIC VISCERA.

ARTERIES.

The Arteries of these Vicera, consist of the Cœliac, and the Superior and Inferior Mesenteries; all of which are Azygus or single Arteries arising from the fore part of the Aorta.

Arteria Cœliaca.

The *Arteria Cœliaca*, arises from the Aorta, immediately after it emerges from between the Crura of the Diaphragm into the abdomen; and is situated at the upper edge of the Pancreas.

The Trunk of the Cœliac Artery is remarkably short, being little more than half an inch in length, before it divides into its three principal Branches, called from their destination, Superior Gastric, Hepatic, and Splenic.

The *Gastrica Superior*, or *Coronaria ventriculi Superior*, is the smallest of the three. It goes upwards, and a little towards the left, to reach the right side of the upper Orifice of the Stomach.

Here it sends Branches to the Cardia, which encircle it, and ascending someway upon the Esophagus, communicate with the Arteriæ Esophageæ.

The Trunk of the Artery afterwards divides upon the small Curvature of the Stomach, into principal Branches, some of which run across the upper and under Surfaces, and others obliquely towards the right side; supplying a large portion of the Stomach, and sending Twigs to the Omentum Minus,—while the trunk is frequently extended as far as the Pylorus.

The *Arteria Hepatica*, the largest of the three, passes obliquely upwards, towards the Pylorus,—before, and a little to the right side of the Lobulous *Spigelii*,—till it arrives at the Cavity of the Liver called *Porta*.

Where it approaches the Porta, it divides into the Gastrica-Inferior Dextra, and the Proper Hepatic Artery.

The *Gastrica Dextra*, or *Gastrica Inferior Dextra*, or *Gastro-Epiploic a Dextra*, sends out—

The *Arteria Pylorica*, which, however, is frequently produced immediately from the Hepatic Artery. It gives Branches to the Pylorus and other parts about the small end of the Stomach, and afterwards runs some way along its small Curvature, inosculating with the Superior Gastric Artery.

Besides this principal Branch, there are a few smaller ones sent from the Gastrica Inferior to the Pylorus.

The *Duodenalis*, which is dispersed upon the beginning and right portion of the Duodenum, along with other Branches coming from the same source, but of inferior size.

Rami Pancreatici, distributed to the right end of the Pancreas.

After furnishing the Branches already mentioned, the Inferior Gastric Artery passes under the Pylorus to the great Curvature of the Stomach, along which it runs; being included, to near its large extremity, in the Layers of the Anterior Portion of the Omentum.

In this course, it sends off—

The *Rami Epiploici*, which are long and slender Branches dispersed upon the Epiploon or Omentum.

The *Rami Gastrici*, which plunging suddenly into both sides of the Stomach, communicate with the Pyloric and superior Gastric Arteries.

The Hepatic Artery, having given out the Inferior Gastric, and frequently, the Ploric Artery, soon divides into two principal Branches, a right and left, of unequal size, which run into the Porta;—the one,—under the Hepatic Duct,—to supply the great, and the other the small Lobe of the Liver.

From the Right Branch, before it plunges into the Liver, is sent off the *Arteria Cystica* afterwards divid-

ing into two smaller Branches, termed *Gemellæ*, which are dispersed upon the Gall-bladder.

Frequently, besides the Hepatic Artery, sent off from the Cœliac, there is another coming sometimes from the Superior Gastric, at other times from the Superior Mesenteric Artery, to be sent into the Liver. In such cases, the Trunk which gives origin to this additional Artery is greater than usual, and the Hepatic Branch which it accompanies is proportionally smaller.

The *Arteria Splenica*, nearly equal in size to the Trunk of the Hepatica, takes a long and serpentine course across the left side of the Body; running first behind, then at the upper part of the Pancreas in its way to the Spleen. Its Branches are,——

The *Rami Pancreatici*, which are few in number and small. They run from the Splenic Artery nearly at right angles, and supply the greater part of the Pancreas.

The *Gastrica Sinistra*, *Gastrica Inferior Sinistra*, or *Gastro-Epiploica Sinistra*, which is considerably inferior in length and size to the Gastrica Dextra. It communicates by its Branches with the Gastrica Superior, and Inferior, while its Trunk runs a little way towards the right side along the great Curvature of the Stomach.

It sends some Rami Pancreatici, and Gastro-Epiploici, and Meso colici Sinistri, to the Pancreas, left portions of the Omentum and Mesocolon; while its Trunk frequently forms a common Arch with the Gastrica Dextra.

Three or four considerable Branches, termed *vasa Brevia*, or *Arteriæ Breves*, which run to the left part of the great Curvature of the Stomach, to be distributed upon its large extremity; their Ramifications anastomosing with those of the Superior and of the Left Inferior Gastric Arteries.

The *Rami Splenici*, several in number and of considerable size, which go at the concave side of the Spleen, to be distributed throughout the whole of its substance.

Mesenterica Superior.

The *Mesenterica Superior* arises from the Aorta, immediately below the Cœliac Artery, which it equals in

size ; and running under the Pancreas, and then over the Duodenum, it passes between the Layers of the Mesentery towards the under side of the Abdomen.

In its descent, it is bent a little to the left side, its lower extremity turning towards the beginning of the Colon.

From the convex side of the Artery, many large Branches are sent off to the small Intestines ; while others proceed in the opposite direction to the right side of the Colon.

The *First Arteries* sent off from the Trunk are very inconsiderable, running to the Pancreas and to the left portion of the Duodenum, and communicating there with Branches of the Cœliac Artery.

The principal Branches from the left side of the Trunk are dispersed upon the Jejunum and Ilium, supplying, in their course, the Layers of the Mesentery with the parts it contains.

The first of these Branches are short and small, those which succeed gradually increase in length and size to the middle of the Arch, after which they diminish again somewhat in the same proportion towards the lower part of the Ilium

In their course through the Mesentery, the principal Branches communicate, first by reciprocal Arches, then by Areolæ of different figures, which increase in number, but diminish in size as they approach the Intestines.

From these Areolæ, many Branches are detached, which take a straight course to the Intestines, and are afterwards ramified through their substance, forming numberless Anastomoses with each other.

The Branches produced from the right or concave side of the Trunk are situated between the Layers of the Meso-colon,—their length being almost equal to the breadth of that Membrane.

Near the Intestines, they communicate by large and then by smaller Arches : These last, however, are less frequent than those which belong to the small Intestines.

The principal Branches are the following :—

The *Ileo-colica*, which arises near the under part of the Trunk, supplies the end of the Ilium and beginning

of the Colon, and communicates with the Branches sent from the extremity of the Trunk of the Artery.

A *Short Trunk*, which divides into—

The *Colica Dextra*, for supplying the right side of the Colon, its Branches communicating with those of the Ileo-Colica : And

The *Colica-Media*, or *Media Anastomotica*, which proceeds to the great Arch of the Colon.

Near the Colon, the Colica Media divides into two large Branches ; one forming an Arch with the Dextra, the other with a Branch of the Mesenterica Inferior.

From the opposite side of the Colon Branches of this Artery run to the Omentum, and communicate with the Gastro-Epiploic Arteries.

Besides the Colic Branches already described, there is frequently an additional one, which arises from the beginning of the Superior Mensenteric Artery, and in its ascent splits into two others, one of which, uniting with the Colica Media, forms the large Mosocolic Arch and the other a similar Arch with the ascending Branch of the Inferior Mesenteric Artery.

Mesenterica Inferior.

The *Mesenterica Inferior* arises from the Aorta somewhat lower than half way between the Superior Mensenteric and the Bifurcation of the Aorta.

It descends obliquely upon the left Psoas Muscle, and soon divides into principal Branches.

These near the Intestines join each other, and form Arches, from which others go off composing Areolæ in some measure similar to those which belong to the right side of the Colon.—The principal Branches are :—

The *Ramus Ascendens*, which divides near the Intestine, into two Branches; one of which joins the Colica Media, to form the great Mesocolic Arch, the other is reflected upon the left portion of the Colon.

The *Colica Sinistra*, which is frequently double from its origin, or at other times splitting into two Branches, one joining the Ramus Ascendens, the other passing down by the Sigmoid Flexure of the Colon.

The *Hemorrhoidalis Interna*, which is the Trunk continued. It anastomoses with the Colica Sinistra, and

afterwards descends upon the back-part of the Rectum to near its under extremity.

Veins.

The Veins which return the Blood from the Chylopoetic and assistant Chylopoetic Viscera, accompany their respective Arteries,—the Hepatic Branches excepted. They have, like their Arteries, large and frequent communications with each other, are much superior in size, and, as well as the other Veins of the Viscera situated in the great Cavities, are destitute of Valves.

The following are the principal Trunks.

The *Mesenterica*, or *Mesaraica Minor*, or *Hæmorrhoidalis Interna*.

The *Mesenterica Minor*, running up at the left side of the Spine, receives—

The Proper *vena Hæmorrhoidalis Interna*, which returns the Blood from the Intestinum Rectum;—the name obtained from the Vein being supposed to be connected with the Tumours called *Hæmorrhoids* or *Piles*.

The *venæ Colicæ Sinistræ*, which return the Blood from the left portion or side of the Colon.

A *vena Duodenalis*, which returns the Blood from the left portion of the Duodenum.

The Mesenterica Minor commonly terminates in the Vena Splenica, though not unfrequently in the Mesenterica Superior.

Vena Splenica.—The Vena Splenica, situated at the under side of its Artery and immediately behind the Pancreas, receives—

The *Rami Splenici*, which return the Blood from the Spleen:

The *Rami Pancreatici*, which pass from the under end of the Pancreas:

The Vena Breves, or Vasa Brevia, which come from the left or great end of the Stomach.

The Vena Gastrica Sinistra, or Epiploica Sinistra, which comes from part of the great Arch of the Stomach, and corresponding portion of the Omentum:

The Gastrica Superior, which come from the small

Curvature of the Stomach and Omentum Minus, and goes into the Splenic near its termination, or into the beginning of the Vena Portæ.

The Splenic and Inferior Mesenteric Veins, after receiving their respective Branches, form a short Trunk which joins the Superior Mesenteric.

Vena Mesenterica Superior, or Major. The Great Mesenteric Vein, situated at the under side of the Artery, receives—

The *Rami Mesenterici*, which are very large and numerous, returning the Blood from the Jejunum and Ilium,—the Branches going into the left side of the general Trunk.

The *Ileo-Colica*, which comes from the end of the Ilium and beginning of the Colon.

The *Colica Dextra*, which belongs to the right side of the Colon, and terminates in the right or concave side of the Mesenteric Trunk.

The *Colica Media Anastomotica*, which comes from the right portion of the Great Arch of the Colon, forming, with the descending Branch of the Mesenterica Minor, a large Arch similar to that of the corresponding Artery, and terminating also in the right side of the Trunk.

The *Gastro Epiploica Dextra*, which belongs to the right portions of the Stomach and Omentum, and frequently unites with the Veins from the side of the Colon, forming a short common Trunk, which has the term of Gastro-Colica applied to it.

The *Pylorica* and *Duodenalis*, which sometimes terminate in the Superior Mesenteric, at other times in the Gastrica Dextra.

The Great Mesenteric Vein, formed by the Branches mentioned above, passes over the beginning of the corresponding Artery, and joins the Vena Splenica.

The Trunk formed by these Veins, run under the head of the Pancreas, and here obtains the name of *Vena Portæ*, or *V. Portarum*.

Vena Portæ.

The *Vena Portæ*, formed by the two Mesenteries, and by the Splenic Vein, returns the blood from the Sto-

mach and Intestine, and from the Spleen, Pancreas, and Omenta.

The under part of the Vena Portæ is termed by some Authors Vena Portæ Abdominalis, or Ventralis; while the upper part,—being of great size, but without having any particular Dilatation in it,—is called Sinus of the Vena Portæ.

The Vena Portæ, at its beginning, frequently receives the Vena Gastrica Dextra, the Gastrica Superior, the Pylorica, and the Duodenalis, which at other times terminate in one of the great Trunks which form it.

It passes upwards, inclining a little to the right in its course to the Liver, having the Trunks of the Biliary Ducts before, and the Hepatic Artery on the left side of it,—and is about three or four inches in length.

When it reaches the Porta of the Liver, it receives the Venæ Cysticæ into its Trunk, or into its right division, either by two separate Branches, or these united into a single Vein.

In the Porta, it divides into two great Branches, a right and a left, sometimes termed Venæ Portæ Hepaticæ, which go off nearly at right angles, to be dispersed through the substance of the Liver, after the manner of an Artery, the subordinate Branches accompanying those of the A. Hepatica.

From the extremities of the Vena Portarum, and likewise from the extremities of the Hepatic Artery, a set of Veins arise, termed Venæ Hepaticæ, and sometimes Venæ Cavæ Hepaticæ, which accompany the Branches of the Hepatic Artery and Vena Portarum.

The Branches of the Venæ Hepaticæ afterwards unite into large Trunks, which recede from the Hepatic Artery and Vena Portæ, and terminate in the Inferior Cava.

Their termination in the Cava is by two, and frequently by three Trunks, at the place where it perforates the Diaphragm; but commonly, below this, a few small Hepatic Branches go into the Cava where it is situated behind the Liver.

BLOOD-VESSELS OF THE ORGANS OF URINE AND GENERATION.

Arteria Renalis. The Arteria Renalis, called also *A. Emulgens*, arise from the side of the Aorta, a little below the root of the Superior Mesenterica Artery.

It commonly comes off by one large Trunk, though frequently by two or more, in which case, each of these is smaller than when the Artery is single.

It runs across the Spine and Psoas Muscle, nearly in a transverse direction. The Artery of the right side goes behind the Vena Cava, and is longer than the left in consequence of the Cava being situated between the Aorta and the right Kidney.

At the concave edge of the Kidney, the Artery divides into three or four Branches, which sometimes sends Twigs to the Glandula Renalis and Tunica Adiposa of the Kidney.

The Renal Branches then plunge into the substance of the Kidney, surround its Pelvis, and afterwards ramify chiefly in its Cortical Substance ;—forming Arches with each other, but few in number, at the roots of the Papillæ.

The *Vena Renalis*, or *Emulgens*, terminates in the Inferior Cava ; and is more superficial than its corresponding Artery. It is the largest Vein received by the Cava from its origin to the part where it reaches the Liver.

The left Renal Vein is the longer of the two ;—the Aorta, before which it passes, being situated between the Cava and left Kidney.

Arteriæ Capsulares. The Arteriæ Capsulares, or *Arteries of the Renal Capsules* or *Glands*, are small but numerous.

They are derived from the Renal and Diaphragmatic Arteries ; and, in general, the left Renal Gland receives additional Branches from the Trunk of the Aorta.

The *Venæ Capsulares* commonly unite into a large Trunk, which, in the lift side, terminates in that of the

Kidney, while in the right it frequently goes into the Cava.

Arteriæ Adiposæ. The Arteries which supply the Tunica Adiposa of the Kidney, are numerous Twigs proceeding from the Diaphragmatic, Capsular, and Renal Arteries, or form others near it.

The *veins* which return from the extremities of these Arteries pass into the Trunks adjacent.

Arteria Spermatica. The Spermatic Artery, the diameter of which is small when compared with its great length, arises opposite to its fellow, from the fore-part of the Aorta, a little below the Renal Arteries.

Sometimes it arises from the A. Renalis, at other times a little higher from the Aorta, and in rarer instances from the Diaphragmatic Artery.

It descends, in a waving direction, on the surface of the Psoas Muscle, covered by the Peritoneum; the right passing obliquely over the Cava, the left behind the Colica Arteries of the same side, and both before the Ureters to the under part of the Abdomen.

After this, it perforates the Ring of the Obliquus Externus, and runs in the Spermatic Cord, where it divides into Branches which are dispersed in a very convoluted manner upon the Testicle and Epididymis.

In the descent of the Artery it imparts—

Twigs to the Tunica Adiposa of the Kidney.

To the Peritoneum and Cellular Substance near it; —and

To the Ureters,—which are also supplied with other Arters from the adjacent Vessels, viz. from the Renal and Capsular Arteries, from the Aorta, the Iliacæ and Vesicales.

The *vena Spermatica* is much larger than its corresponding Artery, and is furnished with Valves within, but more particularly without the Abdomen.

It forms a Plexus which accompanies the Artery, and about the place where it recedes from it, which is nearly opposite the under end of the Kidney, it forms a single Trunk, which in the right side goes into the Cava a little below the Emulgent Vein, and in the left into the corresponding Vena Renalis.

Besides the Artery commonly termed Spermatic, the Testicle generally receives a *Minute Branch*, which a-

rises from the Hypogastric, and accompanies the Vas Defarens to the Body of the Testicle upon which it is dispersed,—communicating there with the Branches of the Spermatic Artery.

The *vein* proper to this Artery, terminates in the Vena Hypogastrica.

The Spermatic Artery, in the female, has the same kind of Origin, and the same course through the Abdomen as in the male ;—but in place of perforating the Abdominal Ring, as it does in the latter, it descends into the Pelvis, between the Lamina of the Ligamentum Latum, to be dispersed first upon the Ovarium and Uterine Tube, and then upon the body of the Uterus itself,—passing in at its corner, and communicating with the Artery of the opposite side.

The Spermatic Vein has the same termination in the female as in the male,—but is considerably larger.

Arteriæ Iliacæ. The Iliac Arteries consist of the *Two Common Iliacs*, which are formed by the Bifurcation of the Aorta ; and of the *External* and *Internal Iliacs* of each side, which are formed by the Bifurcation of the Iliacæ Communes.

The *External Iliac* passes out of the Abdomen behind the *Ligament of* POUPART ; the *Internal*, termed also *A. Hypogastrica*, descends obliquely into the Pelvis.

At the side of the Pelvis, the internal divides into many Branches, some of which belong to the Organs of Urine and Generation, the rest to other parts of the Pelvis and adjacent parts of the thigh.

The following are the Branches sent from the Hypogastric Artery to the Organs of Urine and Generation.

Arteria Umbilicalis. The Arteria Umbilicalis appears in the Fœtus, as the continued Trunk of the Internal Iliac ; but in the Adult, is shrivelled in the form of a Ligament, excepting at its beginning or under part.

The beginning of the Umbilical Artery gives off—

One or more *Arteriæ vesicalis*, which run to the under part of the Bladder, and extend along its sides as far as the Fundus Vecicæ. At their origin, they furnish Twigs to the Vesiculæ Seminales, Prostrate Gland, and Rectum.

In the female, the Umbilical Artery sends minute Branches to the Uterus and Vagina.

Arteria Uterina. The Arteria Uterina, termed also *Uterina Hypogastrica*, is much larger than the Spermatic Artery.

It arises from the Hypogastric, near the origin of the A. Pudica, and runs into the Uterus at its under extremity.

It is afterwards reflected upwards along the edge of the Uterus, towards its Fundus or upper part, where it meets with the Spermatic Artery, with which it forms frequent Anastomoses, and afterwards many communications with the Uterine Artery of the opposite side.

The Uterine Artery sends Branches downwards to the substance of the Vagina, and others forwards to be dispersed upon the Bladder.

Arteria Vaginalis. The Arteria Vaginalis is frequently awanting.—When present, it arises from some of the Branches of the Hypogastric,—as that common to the Ischiatic and Pudic,—or from the Hæmorrhoidalis Media; and is distributed upon the under part of the Vagina.

Besides this, there are other Vaginal Branches from the neighbouring Arteries; as from the *vesicales*, *Uterina*, and *Pudica*, which communicate with each other, and with the proper Vaginalis, upon the substance of the Vagina.

Arteria Pudica, or *Pudenda Communis.*—The Arteria Pudica, named from its belonging to the Parts of Generation in both sexes, comes off either immediately from the Trunk of the Hypogastric, or form the A. Ischiatica.

It passes out of the Pelvis, through the under part of the Notch of the Os Ilium, at the lower edge of the Pyriform Muscle.

It then turns between the Sacro-sciatic Ligaments, to get to the inner side of the Tuber Ischii, where it is lodged deep in the Cellular Substance.

From the Tuber, it proceeds along the inner side of the Crus of the Os Ischium and of the Os Pubis, and behind the Crus of the Penis, till it approaches the Symphysis of the Pubis.

In its course, it sends off many Branches, of which the following are the principal, viz.—

Branches to the Vesiculæ Seminales, Prostate Gland, Neck of the Bladder, and Rectum.

Branches of the Muscles and parts adjacent to the Sacro-sciatic Ligaments; some of them extending as far as the joint of the Thigh-bone.

Branches to the Muscles, Membranes, and Fat about the Tuber of the Os Ischium.

The *Arteria Hæmorrhoidalis Externa*, which soon divides into Branches, to supply the Muscles and Integuments about the verge of the Anus.

The *A. Perinei*, which passes under the Transversalis Perinei Muscle, in the space between the Crus of the Penis and Bulb of the Urethra, and gives Branches to the Skin and Muscles at the fore-part of the Anus and root of the Penis, and to the Scrotum; while the Artery itself terminates on the under side of the Penis.

After dispersing the Branches already mentioned, the Pudic Artery divides, at the Penis, into three principal Branches, viz.—

The *First Branch*, which passes into the Bulb of the Urethra, and is continued forwards in the Corpus Spongiosum Urethræ, into the Cells of which many of its Branches open.

The Second Branch, termed *Profunda Penis*, which goes into the Crus Penis, and directs its course in the Corpus Cavernosum; its Branches communicating with the Artery of the opposite side, and with the Cells of the Penis.

The Third Branch, called *Dorsalis Penis*, which turns between the Symphysis of the Pubis and root of the Penis, and proceeds along the Dorsum, as far as the Glans, adhering closely to the Ligamentous Substance which incloses the Corpora Cavernosa, and sending Branches to it and to the Integuments.

In the female, the Pudic Artery has the same general course as in the male.

After reaching the inner side of the Tuber of the Os Ischium, it is extended forwards, and sends Branches to the Anus, Perineum, end of the Vagina, and Labia Externa, and terminates in the Clitoris, somewhat in a similar manner as in the Penis.

The Blood is returned from the Branches of the Hypogastric Artery dispersed upon the Organs of Urine and Generation, by the following Veins, viz.

The *Vena Vesicalis*, which returns the Blood from the Bladder

The *Vena Uterina Hypogastrica*, which comes from the Uterus

The *Vena Magna Ipsius Penis*, which runs along the middle of the Dorsum, and is often double to near the root of the Penis; after which it passes between this and the Arch of the Pubes, forming a Plexus which surrounds the Neck of the Bladder, and sending out Branches which terminate in others at the sides of this Viscus.

The *Vena Pudica*, which communicates anteriorly with the Branches of the Vena Magna at the root of the Penis, and afterwards passes back with the corresponding Artery.

The *Vena Tegmentorum Penis*, which is formed by small Subcutaneous Branches, and ends in the top of the Femoral Vein.

The Veins abovementioned, the last excepted, terminate in the Hypogastrica, along with other Veins belonging to the Pelvis, to be afterwards described.

BLOOD-VESSELS

Of the CONTAINING PARTS *of the* ABDOMEN, *and of the* PELVIS *and* INFERIOR EXTREMITY.

Arteriæ Lumbares.—The Lumbar Arteries, which are commonly four in number on each side, arise in pairs from the back-part of the Abdominal Aorta, in the same manner as the Intercostals do from the Aorta in the Thorax.

They run first over the fore-part of the Bodies of the four uppermost Lumbar Vertebræ, and afterwards go

between them and the Psoæ Muscles, in their way towards the sides of the Abdomen.

They give Branches to the Spine, to the Spinal Marrow and its Membranes; are particularly dispersed upon the Lumbar Muscles, and upon the Transversus and Obligui Abdominis; and perforating these, they also furnish Branches to the large Muscles and the Integuments in the back-part of the Loins.

Superiorly, they communicate with the lower Intercostal and Diaphragmatic Arteries.

Sacra Media. The Sacra Media is a small Azygos Artery, which arises from the under and back-part of the Aorta, immediately at its Bifurcation.

It generally sends off a Branch over each side of the last Vertebra of the Loins, which takes nearly the same course backwards with the Arteriæ Lumbares.

The Sacral Artery afterwards descends along the middle of the Sacrum, as far as the Os Coccygis, sending Branches to the Membranes and Substance of these Bones, and to the back-part of the Rectum.

Iliacæ Communes. After giving off the Arteries of the contents and of the containing parts of the Abdomen, the Aorta, upon the under part of the Fourth Lumbar Vertebra, divides into the Two Common Iliac Arteries, which are of equal size.

They pass obliquely downwards and outwards; and at the under and lateral parts of the last Vertebra of the Loins, *i. e.* opposite to the posterior Symphysis of the Pelvis, each divides into two others, an Anterior, termed *Iliaca Externa*, and a Posterior, termed *Iliaca Interna*, or *Hypogastrica*.

Iliaca Externa. The Iliaca Externa, which appears in the Adult as the continuation of the common Trunk, descends along the Brim of the Pelvis, taking a curved direction by the side of the Psoas Muscle, and afterwards passes behind the *Ligament of* Poupart, to form the Femoral Artery.

In this course, it does not send off any Branches, excepting sometimes a Twig or two to the Peritoneum, Psoas Muscle, &c. till it is about to leave the Abdomen, where it gives rise to two principal Arteries,—the *Epigastrica*, and *Circumflexa Ossis Ilii*.

The *Arteria Epigastrica*, obtaining its name from its

situation in the fore-part of the Belly, goes off from the inner side of the Femoral Artery, immediately before that Vessel gets behind the *Ligament of* POUPART.

At its origin, it is a little bent downwards, and about half an inch from the place where it first comes off, it crosses obliquely upwards and inwards, behind the Spermatic Cord in the male, and round Ligament in the female.

It proceeds in this oblique manner behind the Tendon of the Transversus, till it reaches as high as the point of the Pyramidalis, after which it takes a perpendicular direction along the back-part of the Rectus Abdominis Muscle.

It furnishes Branches to the Muscles, Integuments, and Membranes of the fore-part of the Abdomen, communicates in several places with the Lumbar Arteries, and terminates a litile above the Umbilicus, where it forms several distinct though small Anastomoses with the under end of the Mammaria Interna.

Circumflexa Ossis Ilii.—The Circumflex Artery of the Ilium, almost as large as the Epigastric Artery, arises nearly opposite to it, though frequently a little lower,—immediately behind the under end of the Follopian Ligament.

It runs at the under edge of the Os Ilium, till it arrives near the Vertebræ of the Loins.

It gives Branches to the Psoas and Iliac Muscles, to the under end of the Oblique and Transversus Abdominis, and at length communicates with the Epigastric, and with the inferior Arteries of the Loins.

Iliac Interna. The Iliaca Interna, or Hypogastrica passes downwards and backwards in the posterior and lateral part of the Cavity of the Pelvis, for about a couple of fingers breadth, after which it generally divides into a posterior and anterior Set of Branches; the former supplying the parts nearest the Sacrum and Illium, the latter belonging more immediately to the parts about the Anterior region of the Pelvis.

Posterior Branches.

Ileo-Lumbaris, or *Iliaca Interna Minor.* The Ileolumbar is a small Artery, arising sometimes from the end of the Hypogastric, at other times from the beginning of the Glutea.

It passes outwards under the Psoas Muscle, and divides suddenly into Branches, one of which frequently forms a kind of *Lumbalis Ima.*

The other Branches go to the Psoas, and Iliacus Internus Muscles, communicating there with the Lumbar Arteries and Circumflex Branches of the Ilium ;—a particular Twig constituting an *A. Nutritia,* or *Medullaris* of the Os Ilium.

Sacræ Laterales. These are generally two or three in number, arising from the common Trunk, or frequently from the Gluteal Artery ;—though sometimes, there is only a single Artery, which descends by the sides of the Sacral Holes, giving Branches, which supply the place of the Sacræ Laterales, and sometimes also of the Sacræ Media.

They furnish Branches to the Membranes on the surface of the Os Sacrum, and inosculate by cross Twigs with the Sacra Media.

Their principal Trunks enter the anterior Sacral Holes to be distributed upon the Cauda Equina and the Membranes and bones inclosing it.

Arteria Glutea. This is sometimes termed *Iliaca posterior,* and is the largest Branch of the Hypogastric Artery.

Soon after it arises, it passes through the upper part of the great Notch of the Os Ilium, and is reflected over the edge of the Bone, in the manner of the Inferior Scapulary Artery.

At the under edge of the Gluteus Medius, it is divided into two sets of Branches, one of which runs in a radiated direction close upon the Bone, and is chiefly dispersed upon the two smaller Glutei, while Branches of inferior size run some of them downwards to the Muscles and Ligaments about the Joint of the Thigh, and others backwards to the parts about the Sacrum, communicating with the Lateral Sacral Arteries through the Posterior Foramina of the Os Sacrum.

The other set of Branches of the Gluteal Artery creeps in between the Gluteus Medius and Maximus Muscles, upon the latter of which it is chiefly dispersed.

Anterior Branches.

Anterior Obturatoria, or *Obturatrix.*—The Obturator

Artery has its origin from the Trunk of the Hypogastric, or from the Ileo-lumbar, or from the Ischiatic, and sometimes from the end of the Iliaca Externa.

It descends in the Pelvis by the side of the Psoas Muscle, and afterwards passes through the Hole at the upper part of the Obturator Ligament.

While in the Pelvis, it frequently gives Twigs to the Bladder and other parts near it.

After perforating the Ligament, it divides into Branches, one set of which are dispersed upon the parts about the Hip-joint, while another belongs to the Obturator Muscle, and to the Muscles which are situated at the upper and inner part of the Thigh,—the two sets of Branches inosculating with each other.

Arteria Umbilicalis.—The Umbilicalis Artery sends off Rami Vesicales from its under part or beginning; the rest of it, in the Adult, being shrivelled into Ligament, as already observed.

Vesicalis Ima of *Haller.*—This is a long and slender Branch which frequently comes off from the root of the Pudica, and runs to the under part of the Bladder, and to the Prostate Gland.

Arteria Uterina. The Uterine or Uterine-Hypogastric Artery, is dispersed upon the Uterus, as has been already described.

Hæmorrhoidalis Media. The middle Hæmorrhoidal Artery is sometimes sent off from the original Trunk, and at other times from some of its Branches, as the Pudic in the male, or Umbilical in the female.

It is chiefly distributed upon the lower end of the Rectum, where it anastomoses with the Hæmorrhoidalis Interna. It frequently sends Branches to the under part of the Bladder, to the Vesiculæ Seminales and Prostate in the male; and to the Vaginia and Bladder in the female.

Pudica Communis.—The Pudica Communis, termed by some Authors *Hæmorrhoidalis Externa*, belongs to the parts of Generation and Anus, as was formerly taken notice of.

Arteria Sciatica. The Sciatic, or Ischiatic Artery is the largest of the Iliac Branches, the Glutea excepted.

It goes through the under part of the *Sciatic* Notch,

accompanied by the Nerve of that name, having the Pyriform Muscle between it and the Gluteal Artery.

It afterwards descends someway down the Thigh, in company with the Sciatic Nerve, in the hollow between the great Trochanter of the Thigh-bone and Tuber of the Ischium,—covered by the Gluteus Maximus Muscle.

It sends an Artery backwards, termed *A. Coccygea*; which creeps along the Sacro-Sciatic Ligaments furnishing Branches to the parts about the Os Coccygis, and others which ascend from it, and anastomose with some of the Lateral Sacral Arteries through the Holes in the back-part of the Os Sacrum.

The principal Branches of the Sciatic Artery, however, are dispersed upon the under part of the Gluteus Maximus Muscle, and upon those at the upper and back-part of the Thigh, where they communicate with the Obturator and Pudic Arteries.

Arteria Femoralis.

The *Femoral* or *Crural Artery*, the continuation of the External Iliac, passes out of the Abdomen between the Ligament of POUPART and Brim of the Pelvis.

At its first exit, it is situated superficially over the Ball of the Os Femoris, having the Flexors of the Thigh between it and the joint.

Farther down, it is lodged deep in a hollow at the upper and inner part of the Thigh, having the Rectus and Sartorius upon the outer, and the Adductores Femoris upon the inner side of it.

Here, it is covered by the Glands of the Groin, and by the general Aponeurosis and Fat; and from this part it descends at the inside of the Thigh turning gradually backwards till it reaches the Ham.

From the top of the Femoral Artery, a few small Branches are sent off to the Superficial Muscles and Inguinal Glands, and to the common Integuments at the upper part of the Thigh; also one or two others termed *Pudicæ Externæ*, to the External parts of Generation and Integuments of the inside of the Thigh.

About two Fingers-breadth below the Ligament of POUPART, the Femoral Artery divides, somewhat like the Common Iliac, into Anterior and Posterior parts:—

The former is the Femoral Artery strictly so called, the latter is termed *Profunda Femoris*.

Profunda Femoris.

The *Arteria Profunda*, also called *vasta*, *posterior*, or *Muscularis Femoris*, immediately at its origin from the Femoral Artery, gives off two large Branches, —the Circumflexa Interna, and Circumflexa Externa,—which run in opposite directions at the upper part of the thigh.

The *Circumflexa Interna*, though most frequently coming off from the beginning of the Profunda, often arises higher than it, from the top of the Femoral; and there are now and then two of them, one a little lower than the other.

It passes between the under end of the Psoas, and the Pestinalis Muscle, and afterwards turns round the inner part of the joint of the Thigh.

It sends off—

Large Branches to that portion of the Adductor Muscles which belongs to the upper part of the Thigh.

Small Branches to the Muscles in the vicinity of the Trochanters.

A *Branch* termed *Articularis Acetabulia* to the Capsular Ligament of the Joint.

A *Twig*, which enters the breach at the under and fore-part of the Acetabulum, to be dispersed upon the Ligamentum Rotundum, and the substance called *gland of the Joint*.

A considerable *Branch*, which anastomoses with the trunk of the Obturator Artery:—And

Smaller Branches, which communicate with the Arteria Sciatica.

Circumflexa Externa.—The Circumflexa Externa arises from the most part nearly opposite the former, but frequently a little lower.—Now and then this Artery has a double Origin, one of the Trunks coming off higher than the other.

It passes outwards between the upper ends of the Rectus, Tensor Vaginæ Femoris, and Vastus Externus Muscles, and over the Great Trochanter of the Os Femoris.

It sends Branches upwards to the under part of the Glutei and to other Muscles placed at the inferior and

back part of the Pelvis, which anastomose with those running down from the Arteria Sciatica.

Others which have more of a lateral direction, and are distributed upon the Muscles at the upper and back-part of the Thigh, and upon those more immediately about the Joint,—communicating with the Branches of the Circumflexa Interna.

The largest Branches descend between the Rectus Femoris aud Vastus Externus; one, longer than the rest, reaching almost as far as the outer part of the Knee.

The Profunda Femoris, having detached the Circumflex Arteries, sinks deep behind the Trunk of the A. Femoralis, and is situate upon the Adductor Muscles of the Thigh.

In its descent it is divided into principal Branches, termed *Rami Perforantus*, which after sending off small Branches to the Triceps Muscle, perforate it to be dispersed upon the Flexors on the back part of the Thigh.

The Perforantus come off in the following succession, viz.

The *Perforans Prima*, which arises near the small Trochanter, perforates the Triceps a little farther down and furnishes Branches to the Muscles in the upper and back-part of the Thigh.

It forms numerous Communications with the Circumflex Arteries, about the root of the Great Trochanter, and anastomoses in particular with the under end of the Sciatica.

The *Perforans Secunda* or *Magna*, which comes off some way below the former, and is the largest of the perforating Arteries.

It gives Branches to the Muscles in general about the middle of the back-part of the Thigh, particularly to the Flexors of the Leg; and communicates above with the Arteries of the Perforans Prima, and with the Circumflex Arteries.

Besides these, there is one, and sometimes two other perforating Branches, which are greatly inferior in size to the two former, and are lost upon the Flexors at the under and back-part of the Thigh; one Twig sent off from these sometimes forming a *Nutritia* or *Medullaris* of the Os Femoris.

The Femoral Artery, after giving off the Profunda Fe-

moris, passes down between the Vastus Internus and Insertion of the Triceps, giving only small Branches to the adjacent Muscles and Integuments.

About the middle of the inside of the Thigh, it is situated behind the Sartorius Muscle; and nearly two thirds down upon the Os Femoris, it perforates the Triceps, passing between that Muscle and the Bone, in its way to the Leg.

Having passed through the Triceps, it is found in the back-part of the Thigh, where it sends Branches, sometimes termed *Perforantus*, to the Flexors and Integuments, one Branch the principal *Medullaris*, to the substance of the Bone, and others to each of the Vasti Muscles, the Muscular Branches communicating above with Branches descending from superior parts of the Thigh. In this part of the thigh it lies close upon the Bone, and adheres firmly to it, till it reaches the Ham, where it is termed *A. Poplitea*.

Arteria Poplitea.

The *Arteria Poplitea* is lodged deep in the hollow between the Ham-strings, and between the Condyles of the Os Femoris, covered by its associate Vein and Nerve and generally by a great deal of Fat.

I gives off several Branches, termed *Articulares Superiors* and *Inferiors*, to the Joint of the Knee.

Four of these, situated, two above and two below the Joint, are more regular and constant than the rest, viz.

The *Articularus Superior Interna*, which turns round the Os Femoris, above the Inner Condyle, passes under the Semimembranosus and Semitendinosus; and, after perforating the Tendon of the Triceps Muscle, is dispersed upon the upper and inner part of the Knee, anastomosing above with Branches sent down from the Femoral Artery.

The *Articularis Superior Externa*, which arises nearly opposite the former, passes outwards between the Tendon of the Biceps and Body of the Os Femoris, immediately above its outer Condyle, and is lost upon the upper and outer part of the Knee; its Branches anastomosing with those of its fellow, and particularly with the long descending Branch of the Circumflexa Externa.

The *Articularis Inferior Interna*, which arises opposite the bending of the Joint, passes downwards, and then turns round the Tibia, immediately below its inner Condyle.

It sends Branches first to the back-part, then the inner side of the Knee; some of them insinuating by the Semilunar Cartilages into the inner part of the Joint.

It communicates above with the Branches of the Articularis Superior Interna.

The *Articularis Inferior Externa*, which comes off near the former, and passes first downwards, then outwards, between the External Lateral and the Capsular Ligament, to be dispersed upon the under and outer part of Knee and inner part of the Joint; communicating with its fellow of the opposite side, and above, with the Branches of the Articularis Superior Externa.

The other less constant Articular Branches are dispersed upon the Muscles a little above the Joint.

The Arteria Poplitea, having furnished Branches to the Joint of the Knee, gives others to the Muscles at the upper and back-part of the Leg, two of which termed *Surales*, more considerable than the rest, pass into the heads of the Gastrocnemius Externus.

The Trunk of the Artery passes afterwards between the heads of the external Gastrocnemius and commonly from two to three inches below the bending of the Knee, and at the under and outer edge of the Popliteus divides into two large Arteries, the *Tibialis Antica*, and *Tibialis Postica*.

Tibialis Antica—The Tibialis Antica passes directly through the upper end of the Interosseous Ligament to the fore-part of the Leg.

In its descent in the Leg, it adheres closely to the anterior surface of the Interosseous Ligament; and has the Tibialis Anticus on the inner side, and the Long Extensors of the Toes on the outer.

A little above the Ankle, it passes upon the outer and fore-part of the Tibia, and getting under the annular ligament aad extensor Pollicis, it goes along the convex surface of the Foot.

It supplies, in general, the Muscles and Integuments, which belong to the outer and forepart of the Foot, and ultimately passes into the deep Muscles of the Sole.

Its branches come off in the following order, viz.—

A *small Branch* sent off before the Trunk perforates the Interosseous Ligament, to be dispersed upon the parts near the Joint; the superior Twigs running in a retrograde direction.

The *Recurrens Anterior*, which arises from the Artery after it has perforated the Ligament, and is distributed upon the Muscles at the upper part of the Leg, and upon the Ligaments at the under part of the Knee, anastomosing there with the Inferior Articular Arteries.

Numerous Branches sent off in a lateral direction to the Muscles and integuments on the outer and fore-part of the Leg.

The *Molleoli Interna*, which comes off near the lower end of the Tibia, and is dispersed on the parts about the inner Ankle.

The *Malleoli Externa*, which arises a little lower than the former, and is distributed to the parts near the outer Ankle.

The *Arteria Tarsea*, which takes its origin a little anteriorly to the bending of the Ankle-joint, and is more considerable in size than the Malleolar Branches.

It passes obliquely outwards and forwards under the Extensor Brevis Digitorum, and sends Branches to the Joint of the Ankle, where it communicates with the Malleolar Arteries.

It supplies the greater part of the Muscles, Integuments, &c. on the upper and outer part of the Foot, and sends branches termed *Interossei*, to the Muscles between the Metatarsal bones of the small Toes,—which, however, are frequently derived from the Metatarsal artery.

The *Arteriæ Metatarsea*, which goes off about the middle of the Dorsum Pedis, and passes obliquely towards the root of the Little Toe, assisting the former artery in furnishing Branches to the upper part of the Foot and Toes, and sometimes, in part or entirely supplying the place of that artery.

The remaining part of the anterior Tibial artery afterwards advances between the Extensor of the great, and long Extensor of the small Toes, sending Twigs to the adjacent parts, and dividing, between the Metatarsal

Bones of the Great Toe and that next it, into a *Large Posterior* and a *Small Anterior Branch.*

The *Posterior Branch,* which may be considered as the continuation of the Trunk, sinks between the Metatarsal Bones of the two first Toes, and anastomoses with a deep Artery in the Sole.

The *Anterior Branch* runs forwards, under the name of *Dorsalis Pollicis,* to be dispersed upon the Great and Second Toes.

Tibialis postica.—The Tibialis Postica divides about a finger's breadth under the origin of the Tibialis Antica, into the Fibularis, and Tibialis Postica strictly so called.

The *Fibularis,* termed also *Peronea,* which is smaller than either of the Tibial Arteries, runs down at the inner side of the Fibula, for a considerable way along the Leg, and is situated, first under the Soleus, and then under the Flexor Longus Pollicis.

Its Branches are distributed to the Muscles at the outer part of the Leg in the neighbourhood of the Fibula,—a small Medullary Branch also penetrating the substance of that Bone.

A little above the interior Articulation of the Tibia and Fibula, it sends a Branch forwards, termed *Peronea Anterior,* which perforates the Interosseous Ligament, and is dispersed upon the fore part of the Ankle, where it anastomoses with the External Branch of the Tibialis Antica.

The continuation of the Trunk, sometimes termed *Peronea posterior,* descends behind the Malleolus Externus, to the outer and back-part of the Foot, anastomosing with the External Malleolar and Tarsal Branches of the Tibialis Antica.

The *Tibialis Postica,* properly so called, passes down at the back-part of the Tibia, and runs over the Tibialis Posticus and Flexor Digitorum, and under the Gastrocnemius Internus, in its descent through the Leg.

Behind the inner Ankle, it becomes more superficial, and has the Tibialis Posticus and Flexor Digitorum Longus on the inner, and the Flexor Longus Pollicis on the outer side of it.

From the Ankle, it runs in the Hollow of the Os Calcis, and behind the Abductor Pollicis, to the Sole of the Foot.

Its Branches supply the Muscles at the back and inner part of the Leg, and the different parts of the Sole; forming many Inosculations with the Branches of the anterior Tibial and the Fibular Artery.

In its course along the Leg, it gives off—

Numerous Branches, similar to those of the Tibialis Antica, to the surrounding Muscles:

The *Arteria Nutritia Tibiæ*, which begins a little below the upper end of the Trunk, descends for some way in the Leg, and gives Branches to the deep Muscles and Membranes near it, and one Branch termed *A. Medullaris*, which enters the Hole near the middle of the Bone.

Several Branches to the parts behind, and at the inner side of the Ankle and Heel, which communicate with others of the Anterior Tibial Artery.

The Trunk of the Artery divides in the Hollow of the Os Calcis, at the place where it is about to go behind the Abductor Pollicis, into two principal Plantar Branches, —the *Interna* and the *Externa*.

The Plantar Arteries run forwards under the Aponeurosis Plantaris, having the Flexors of the Toes between them.

The *Plantaris Interna* passes near the inner side of the Sole, between the Aponeurosis Plantaris and Abductor Pollicis.

It gives *Branches* which run in a retrogade direction to the back-part of the Ankle and adjacent parts at the Heel:

Several Branches from each side, which go forwards to the Muscles and Integuments, and other parts of the concave edge of the Sole.

At the root of the Great Toe, it sends a principal Branch to its inner side; it then passes under the Flexor Longus Pollicis, and after anastomosing with the Arcus Plantaris, gives off a large Branch which splits into two, —one to the outer side of the Great Toe, and the other to the adjacent side of the Toe next it.

The *Plantaris Externa*,—which may be considered as the continuation of the Trunk, being in general much larger than the Interna,—passes obliquely outwards between the Flexor Brevis Digitorum, and Flexor Accessorius, till it reaches the Base of the Metatarsal Bone of the Little Toe.

It is afterwards arched forwards between the Flexors of the Toes and Metatarsal Bones, the Trunk being continued to the root of the Great Toe, under the name of *Arcus plantaris*.

The External Plantar Artery sends off—

A *Considerable Branch*, first to the under, then to the outer part of the Heel, which communicates externally with Branches of the anterior Tibial and the Fibular Arteries :

Several Branches to the Flexor of the Toes, and to other parts in the outer portion of the Sole, which communicate, on the inner side, with the Branches of the Plantaris Interna, and at the outer with those of the anterior Tibial Artery.

The *Arcus Plantaris* gives out—

Several Branches to the deep Muscles of the Sole, particularly,

Rami Interossei to the Muscles between the Metatarsal Bones :

A *Branch* to the outer side of the little Toe :

Three large Digital Arteries, which are forked at the roots of the Toes, and run along the edges of these, in the manner the Digital Arteries do along the Fingers.

Between the Metatarsal Bones of the Great Toe and the one next it, the Plantar Arch anastomoses with the posterior or perforating Branch of the anterior Tibial Artery, forming a free communication between the Arteries of the upper and under side of the foot. Frequently it sends off here a Digital Artery, which forks and runs along the outer side of the Great Toe, and inner side of the Toe next it, so as to supply the place of one of the Branches of the Internal Plantar Artery.

At the roots of the Toes, the Interosseus Arteries of the upper part of the Foot, also form distinct anastomoses with the anterior extremities of the Trunks of the Digital Arteries.

VEINS.

The *Veins* of the *Inferior Extremities*, like those of the *Superior*, consist of a *Subcutaneous* and *Deep* set, and, like them also, are furnished with numerous Valves.

Subcutaneous Veins.—The Subcutaneous Veins are situated between the common Integuments and General Aponeurosis, and, in many parts, are entirely concealed by the Fat. They anastomose frequently with each other by large Branches, and have several communications also with the deep-seated Veins.

They form two principal Trunks, called *Saphæna Major* and *Saphæna Minor*;—the term *Saphæna* applied from the Vein being supposed to be always *visible*.

The *Saphæna Major* begins upon the upper side of the Foot, runs over the fore-part of the inner Ankle, and ascends in the Leg, at the inner edge of the Tibia.

From the Leg, it passes up by the inside of the Knee, and afterwards, from the inner to the upper and fore-part of the Thigh.

It is at first composed of Veins, derived from the upper and inner part of the Dorsum Pedis, which have frequent anastomoses with each other, and are of considerable size.

In its ascent it is joined by Branches from the Superficial parts of the Leg, and is frequently split into a Plexus some way below the Knee.

It receives Branches from the superficial parts of the Thigh, and small Twigs from the Inguinal Glands.

It terminates in the top of the Femoral Vein, nearly opposite to, or a little higher than, the origin of the Arteria Profunda.

The *Saphæna Minor* arises from the outer side of the Foot, and afterwards passes behind the Malleolus Externus.

From this, it ascends in the back-part of the Leg, upon the surface of the Gastrocnemius Externus, and goes into the Ham.

It is formed by the Veins of the upper and outer part of the Foot, and is joined to the Saphæna Major, over the Metatarsal Bones, by one or more Arches, which receive a Plexus of Branches into their lower or convex part.

It is joined by the superficial Veins of the outer and back-part of the Leg, which have frequent anastomoses with each other, and with the Branches of the Saphæna Major.

It terminates in the Vena Poplitea, and communicates

constantly by a small Branch with the Saphæna Major, a little above the Knee.

Deep Veins. The Deep Veins of the Leg, like those of the Fore-arm, run close at each side of their Arteries, and are double their number, but differ a little from the Radial and Ulnar Veins, in being proportionally larger.

The *Tibial* and *Fibular Veins* anastomose in some places with each other, and also communicate with the Subcutaneous Veins.

At the upper part of the Leg, they are united together, to form the Vena Poplitea, and the union is nearly at the same place where the corresponding arteries come off.

The *Vena Poplitea* adheres closely to the upper surface of the Artery, which it in a great measure conceals, and is commonly single, excepting a small Vein which sometimes accompanies and communicates with it.

The Popliteal Vein receives the Venæ Surales and Articulares, and the Saphæna Minor ; after which it forms the Femoral Vein.

The *Vena Femoralis* receives the Veins which correspond with the perforating Branches of the Femoral Artery, and passes in through the Triceps, where the Artery comes out.

In the middle of the Thigh, it lies deeper than the Artery, afterwards turning gradually to its inner side ; and at the upper part of the Thigh, it is joined by the Vena Profunda.

The *Vena Profunda* receives the Veins corresponding with the Branches of the Artery of that name, and is sometimes of a large size, being then in a great measure the continuation of the Vena Poplitea, a small Vein only in such cases accompanying the Trunk of the Femoral Artery.

Besides the Vena Profunda, the Femoral Vein takes in small Veins from the External parts of Generation, from the Inguinal Glands, and from the other superficial parts of the Groin :—and, in particular, it receives a Branch of considerable size, which descends from the Integuments of the fore-side of the Abdomen.

The Trunk of the Femoralis, having received the different Veins of the Inferior Extremity, passes into the Abdomen, behind POUPART's Ligament, being still situ-

ated at the inner side of the Artery,—after which it forms the Iliaca Externa.

The *Iliaca Externa* receives into its beginning the Epigastric, and Circumflex Vein of the Os Ilium, and sometimes the V. Obturatrix.

It is situated at the inside of the External Iliac Artery, and afterwards crosses behind it on the right, and behind the Internal Iliac Artery on the left side of the pelvis, to join the Trunk of the Hypogastric Vein.

The *Vena Hypogastrica*, or *Iliaca Interna*, is situated at the outer side of the Artery and receives the different Veins which correspond with the Branches of the Hypogastric Artery, and which are furnished with Valves where they are situated among the Fleshy parts of the Pelvis.

The External and Internal Iliacs unite and form the Common Iliacs, a little below the division of the corresponding Arteries.

The *Iliacæ Communes* ascend by the right side of their respective Arteries, and a little below the Bifurcation of the Aorta,—or upon the fore-part of the Fifth Lumbar Vertebra,—unite to form the Inferior Cava, situated, as formerly mentioned, at the right side of the Aorta.

The *Vena Cava Inferior*,—which is much larger than the Cava Superior, and greatly exceeds in size the descending *Aorta*,—receives, at its beginning, the Vena Sacra, and higher, the Venæ Lumbares, which, in the left side, pass behind the Trunk of the Aorta.

It likewise receives the Venæ Renales, and the Spermatic of the right side.

At length it takes in the Venæ Hepaticæ and Diaphragmaticæ, and perforating the Diaphragm at the root of the Liver, it terminates in the Right Auricle of the Heart.

PART VII.

OF THE NERVES IN GENERAL.

THE *Nerves* are firm, white Chords, which are generally considered as being directly continued from the Medullary Substance of the Brain and Spinal Marrow; —although instances have been frequently met with, where the Brain, and even the Spinal Marrow, have been found nearly obliterated in the Fœtus, and yet the Nerves retained their usual appearance.

They are composed of *Funicula* closely connected, and each of these again of smaller *Fibrillæ* which may be subdivided into parts so extremely minute, as almost to elude the naked Eye, but which may be readily seen by the assistance of the Microscope :—No Cavity, however, has been yet observed in them.

The *Medullary Part* of the Fibrillæ appears to be furnished with a Cineritious Substance derived from their Pia Mater; in proof of which, they are observed to be in general of a browner colour than the Medullary Substance of the Brain, and larger in their course than at their supposed origin.—Monro's *Observ. on Nerv. Syst.*

The Medullary Substance of the Fibrillæ is *pulpy* and tender, but rendered thicker and stronger by the coverings they receive from the Tunica Arachnoidea, and Pia Mater, while within the Bones, and more particularly by the additional covering given them by the Dura Mater upon their exit.

The Dura Mater, in its passage through the Base of the Cranium, and between the different Vertebræ, is connected by its External Surface to the Pericranium and Periostium; while the inner part of it, together with the Tunica Arachnoidea and Pia Mater, is continued along the Nerves.

The *Involucra*, or *Coverings*, inclose each of the Nerves in general, and likewise the several Fibrillæ of which they are composed, whereby their size, as well as strength, is greatly increased.

The Nerves, soon after leaving the Bones, have the Dura Mater so intimately connected with them, that it has been considered by some Authors, as degenerating into condensed Cellular Substance, notwithstanding it still retains the general appearance of the Dura Mater.

Upon examining the Nerves, especially the small ones in a living or recently dead animal, they are observed to have numerous *White Lines* placed transversely, or in a serpentine direction.—*Obs. on Nerv. Syst.* Tab. XIII.

When the Nerves are moderately stretched, this appearance becomes less evident; and when extended considerably, or when macerated in water, it vanishes entirely.

Prochasca (De Carne Musculiar) supposes these Serpentine Lines to be owing to a decussation of Vessels and Fibres of Cellular Substance straitening the Nerves.

Dr. Monro considers them as Folds or Joints, allowing the Nerves to accommodate themselves to the various states of Flexion and Extention.

The Nerves are supplied with *Arteries* from the neighbouring Blood-vessel, to which they send corresponding *Veins*.

These, however, are small, and difficult of injection, excepting in the large Nerves, where the Vessels are more considerable, and where, after a minute injection the Nerve receives the colour of the matter injected.

Upon dividing the Nerves, they are not found to possess much *contractility*; while the Arteries, upon being cut are observed to retract very considerably.

They are generally lodged in the common Cellular Substance and Fat, and in the Interstices of the Viscera and Muscles, where they are prevented from being compressed; though in several parts they are exposed to the hardness of Bones, or to the action of Muscles, over or through which they pass.

In their course through the different parts of the Body, they generally run as straight as is consistent with

the nature of the particular part over which they pass, and their own safety.

In their progress, they divide into *Branches*, which become gradually smaller, and which, though taken collectively, are inferior in size to the Trunks from which they issue.

The Branches generally run off at acute angles; but in several places they have a retrograde direction.

They have commonly the same kind of distribution in the opposite sides of the same Subject, and vary little in this respect in different Subjects.

In some parts of the Body, several Nerves unite together, and form a *Plexus* or *Net-work*; in others, they unite into a *Common Trunk*; and in many, by such an union, a hard knot, termed *Ganglion*, is formed.

When the *Plexuses*, or the *Common Trunks*, are minutely examined by slitting open their coverings, it is found, that their Fibrillæ are intermixed in such a manner, that each of the Nerves passing out from the Plexus, or from the Common Trunk, is composed of Fibrillæ from several, or from all the Nerves which entered it, in consequence of which, the Organs in general are furnished with Nerves from various sources. *Obs. on Nerv. Syst.*

The *Ganglia* differ from each other in size and Figure. They have thicker Coats and are more Vascular than the Nerves; and are larger than the whole of the Nerves, taken conjunctly, which enter into or go out from them.—They are supposed to serve as fresh sources of Nervous Influence.

They are composed of Nervous Fibrillæ, covered by something like a Cineritions Matter, and are so divided, multiplied, and intermixed, that each of the Nerves, passing out from a Ganglion is found to be composed of Fibrillæ derived from the greater part of the Nerves which enter it.—*Obs. on Nerv Syst.*

Where Nerves pass out from the side of a Ganglion, they are composed of Fibrillæ which come off in contrary directions;—the one set from the beginning, the other from the opposite extremity of the Ganglion.

The Nerves which go out from the different Ganglia have the same structure with those which enter them,

but are found, with only a few exceptions, to be rather larger.

In the Trunk of a Nerve, the Chords appear to run parallel to each other; but when macerated in water, so as to dissolve the Cellular Substance, or when otherwise accurately examined, they are seen evidently to intermix somewhat after the manner of the Fibrillæ in the Plexus, or in the Ganglia—*Obs. on Nerv. Syst.*

The Termination of the Nerves is soft, pulpy, and pellucid, as is distinctly seen in the Ratina of the Eye or Ear; the external Covering being entirely laid aside, while the Pia Mater, in particular, accompanies them throughout.

The Nerves preserve the motion of the Muscular Fibres.

They constitute the immediate Organs of Sensation, and convey Impressions made upon them to the Mind.

The manner in which these Impressions are produced, —whether by a Vibration communicated to the Nerves; or by a Liquid called *Nervous Fluid*, contained and moving in them;—or by an electric Matter common to them and many other substances; or in what manner that power acts, termed *Animal Electricity*, which has been lately discovered to take place in the Animal Kingdom, upon the application of certain Metals; is not yet understood.

DISTRIBUTION OF THE NERVES.

The *Nerves* are distinguished into two Classes; one arising from the Brain, termed *Cerebral*; the other from the Spinal Marrow, termed *Spinal Nerves*.

The Cerebral Nerves are generally reckoned *Nine* or *Ten Pairs* in number, beside a particular Pair which has the name of *Sympathetic*.

They pass through the Holes in the Base of the Cranium, and receive their respective names according to their order; or from their Functions; or from the parts on which they are dispersed, &c.

The Spinal Nerves consist of *Twenty-nine* or *Thirty Pairs*, which pass out between the different Vertebræ,

besides a Pair called *Accessory*, which enter the Cranium from the top of the Spinal Marrow, and afterwards pass out with one of the Cerebral Nerves.

Nerves which pass through the Base of the Cranium.

The *First Pair*, or *Olfactory Nerves*,—arise, on each side of the Brain, by three separate Striæ, from the Corpora Striata, at the under and back-part of the Anterior Lobes, near where the Carotid Arteries enter the *Fissures of* SYLVIUS.

They are more tender than the other Nerves, and also differ from them in not being composed of Fasciculi.

They run each in a furrow, upon the under Surface of the Anterior Lobes of the Brain, converging a little and becoming somewhat larger, till they reach the Cribriform Plate of the OEthmoid Bone.

Upon this Plate, each forms an *Oblong Bulb*, which, in colour, and consistence, resembles the Cortical part of the Brain, but is mixed with streaks of Medullary Matter.

From this Bulb, numerous Nervous Filaments are sent off, which pass through the Holes of the Cribriform Plate, and now become firm and strong like the other Nerves, by receiving a covering from the Dura Mater.

After entering the Nose, they divide into two Portions or Planes,—one passing on the Septum, the other upon the Ossa Turbinata, and other parts opposite to the Septum, and both running at first in Grooves of the Bones.

They form a beautiful Plexus, which is spread out upon that side of the Membrane of the Nose which is contiguous to the Bones, and may be traced a considerable way upon it in distinct Threads, which becoming gradually smaller, sink into the Membrane, and are supposed to terminate on the surface next the Cavity of the Nose, there constituting the Organ of Smell.

The *Second Pair*, or *Optic Nerves*,—which are of great size, arise from the Thalami Optici, and are connected in their passage to Tubercles at the root of the Infundibulem, which furnish them with an addition of Medullary Substance.

They are of a purer white than other Nerves, having less Cineritious Matter entering their composition, and

differ also in the Pia Mater furnishing to them with a general Covering, before it invests the several Fasciculi of which they are formed.

At the fore-part of the Sella Turcica, they unite, and have their Medullary Parts intimately intermixed.

From the union, they go obliquely outwards and forwards through the Foramina Optica into the Orbits; and advancing in the Orbits in a waving direction,—to prevent them from being over-stretched in the motions of the Eye,—they perforate the Balls, to be expanded into the Retinæ, which have been already described.

The *Third Pair*, or *Motores Oculorum*,—smaller than the Optic Nerves,— arise at the under, inner, and back-part of the Crura Cerebri, or between the Corpora Albicantia and Tuber Annulare, by numerous Threads which are soon collected into their respective Trunks.

They pass outwards, perforate the Dura Mater at the sides of the Posterior Clinoid Process, and running along the upper part of the Cavernous Sinus, at the outside of the Carotid Arteries, they get through the Foramina Lacera into the Orbits.

Upon entering the Orbits, they divide into several Branches, which supply the greater number of the Muscles of the Eye, in consequence of which the Nerves have obtained their particular name.

A Branch runs to each of the Muscles within the Orbit, excepting the Trochlearis and Abductor, and the Nerve likewise assists in forming a small Ganglion, termed *Ophthalmic*, from which Twigs are sent off to supply the Ball of the Eye.

The *Fourth Pair*, or *Pathetic*,—have their origin the highest of the Cerebral Nerves, and are the most slender of the Body, being generally formed of one Fasciculus only on each side.

They arise by a single, and sometimes by a double root, behind the Testes, from the Medullary Expansion which lies over the passage of the Fourth Ventricle, and which unites the Processus and Testes to each other.

They afterwards turn round the Crura Ceribri, and perforate the Dura Mater at the edge of the Tentorium some way behind the entrance of the Third Pair.

They run afterwards along the Cavernous Sinuses, at the outer side of the Third Pair, then cross over the Pair,

and passing out of the Cranium through the Foramina Lacera, they go obliquely over the Muscles at the upper part of the Orbits, to be entirely dispersed upon the Pathetic or Trochlearis Muscles.

The *Fifth Pair*, or *Par Trigeminum*,—which are the largest Nerves of the Brain, arise, each by an anterior small, and a posterior large Portion, from the side of the Tuber Annulare, where the Crura Gerebelli join it.

They enter the Dura Mater a little below the Tentorium, over the points of the Partes Petrosæ of the Temporal Bones, and form a Plexus on each side, in which upwards of fifty Fasciculi have frequently been enumerated.

The Plexus sinks close by the outside of the Cavernous Sinus, concealed by a doubling of the Dura Mater and forms a Ganglion sometimes called *Gasserion* after *Gasser*, who, if not the Discoverer, was the first who illustrated it.

The Ganglion is of a semilunar form, and placed transversely with respect to the Trunk of the Nerves.

From the opposite and curved edge of the Ganglion, three large Branches come out: the first and Anterior, termed *Ophthalmic*,—the second and Middle, the *Superior Maxillary*, and the third and Posterior, the *Inferior Maxillary*.

The *First Branch* of the *Fifth Pair*,—at the side of the Sella Turcica, is situated lower than the Third Pair, and afterwards crosses over it, being previously connected by nervous Matter to the Trunk of the Fourth Pair.

It goes through the Foramen Locerum into the Orbit, and there dividesis into the following Branches, viz.

The *Supra-Orbitar*, which is the largest of the whole, being a continuation of the Ophthalmic.

It passes immediately under the Membrane which lines the upper part of the Orbit, and splits into two branches of unequal size,

The smaller Branch termed *Supratrochlearis*, runs under the Superciliary Ridge to the Upper Eye-lid and Forehead.

The larger passes through the Foramen Supra-Orbitarium,—or over the Superciliary Ridge when the Foramen is a wanting,—sends Branches to the Upper Eye-lid, and divides into several others, which run back partly

above, chiefly under the Frontal Muscle, to supply the fore and upper part of the head in general, while minute Fibres appear to penetrate the Bones.

The *Nasal Branch*, which runs obliquely over the Optic Nerve, where it detaches a Filament or two to the Eye, then under the Levator Muscles of the Eye-lid and Eye; and getting between the Abductor Oculi and Trochlearis, passes to the inside of the Orbit.

It sends a Branch, which after entering the Foramen Orbitarium Internum Anterius, re-enters the cavity of the Cranium, and gets upon the Cribriform Plate of the OEthmoid Bone.

From thence it passes down through one of the anterior Holes of this Plate, and sends Twigs to the membrane at the anterior part of the Nostril, while the Nerve descending at the fore-part of the Septum Narium, is dispersed upon the point, and Wing of the Nose.

The continuation of the Nasal Branch, now called *Infratrochlearis*, passes forwards to the inner Corner of the Eye, and is distributed upon the Lacrymal Sac and parts adjacent.

The *Lacrymal Branch*, which runs along the Abductor Oculi Muscle, sends Twigs to the Membranes and Fat near it, likewise one or two through the substance of the Cheek-bone, and one in particular to the Substance of the Lacrymal Gland, while another passes over the Gland, and vanishes in the neighbouring parts.

A *Branch* to the Ophthalmic Ganglion, which is sometimes sent off from the Nasal, at other times from the Ophthalmic Trunk.

The *Ophthalmic Ganglion*,—termed also *Lenticular*, from its shape, is formed by this Branch from the Fifth and by another from the Third Pair, and is commonly the smallest in the Body.

It is of an oblong form and compressed, is situated at the outside of the Optic Nerve a little before its entrance into the Orbit, and is concealed in Fat. Sometimes, though rarely, the Filaments which form it take their origin entirely from the Third Pair.

From the Ganglion, about a dozen of Filaments arise, termed *Ciliary Nerves*, collected into two Portions, which creep along the opposite sides of the Optic

Nerve, separated a little from each other and running in company with the Ciliary Arteries.

Besides the Ciliary Nerves from the Ganglion, one and sometimes two Filaments arise from the Ramus Nasalis, and pass along with the other Ciliary Branches.

The Ciliary Nerves, running with scarcely any division, reach the back-part of the Eye; and a little before the Insertion of the Optic Nerve, enter the Sclerotic Coat, pass obliquely through it, and about the middle of the Ball, appear upon the Surface of the Tunica Choroides.

Upon this Coat, they run flat, and in a parallel direction, sending very few evident Branches, either to it or to each other, till they reach the Ciliary Circle, where they divide into numerous minute Filaments.

Upon the Choroides, five or six are larger than the rest, some being so minute as almost to escape the naked Eye.

At the Ciliary Circle, each commonly divides into two Branches, which are covered by the Cellular Substance of the Circle: and these, at the root of the Iris, are subdivided into still smaller Branches, which run in a radiated and waving direction, the Ciliary Vessels being interposed.

Near the inner edge of the Pupil, they are united into Arches, from which very minute Twigs run to the interior margin of the Iris.

The Second Branch, or Superior Maxillary Nerve is larger than the Ophthalmic, and is principally dispersed upon the Parts belonging to the Upper Jaw, from which it has its name.

It goes through the Foramen Rotundum of the Sphenoid Bone, and at its exit divides into numerous Branches, viz.

The *Spheno-Palatine*, or *Lateral Nasal Nerve*, which sends a reflected Branch through the Foramen Pterygoideum of the Sphenoid Bone, to Join the Sympathetic Nerve in the Canalis Caroticus, and a Branch which enters the Foramen Innominatum of the Pars Petrosa, to join the Portio Dura of the Seventh Pair.

The Lateral Nasal Nerve goes afterwards into the Sphenopalatine Hole, to be dispersed upon the under

and back-part of the Septum, and opposite side of the Nose, and upon the Membrane of the Sphenoidal Sinus and Estachian Tube :—One Branch in particular, after passing along the Septum, goes through the Foramen Incisivum to the roof of the Mouth.

The *Palato Maxiliary*, or *Palatine Branch*, which descends through the Canal leading to the Foramen Palatinum Posterius ; and running near the Alveoli with corresponding Blood-Vessels, sends Branches to the Velum Palati and Roof of the Mouth, and Minute Filaments which penetrate into the Palate-place of the Superior Maxillary Bone.

Small Branches, which pass round the Upper Jaw, and vanish in the Cheek.

A *Twig*, which goes through the Hole in the Os Malæ, along with a Branch of the Ocular Artery, to the Face.

Small Filaments, which runs down into the back-part of the Superior Maxillary Bone, and supply the substance of the Upper Jaw, the large Dentes Molares, and Membrane lining the Antrum Maxillare.

The Second Part of the Fifth Pair, after sending off these different Branches, goes into the Canal under the Orbit, and forms the Infra-orbitar Nerve, which, while in the Canal, gives off Filaments passing through minute Conduits in the Upper Jaw, to the Antrum, to the Substance of the Bone, to the small Molares, Caninus, Incisores, and fore-teeth ; and sometimes a Twig, the companion of a small Branch of the Internal Maxillary Artery, to the Membrane lining the Orbit.

The Infra-Orbitar Nerve passes afterwards out of the Foramen Infra-Orbitarium, and divides into many large Branches, to be distributed upon the Cheek, Under-Eyelid, Upper Lip, and side of the Nose.

The *Third Branch*, or *Inferior Maxillary Nerve*, goes through the Foramen Ovale of the Sphenoid Bone, and supplies the parts belonging to the Under Jaw, and the Muscles situated between it and the Os Hyoides, by the following Branches, viz.

One, or sometimes two *Deep Temporal Branches*, to the inner part of the Temporal Muscle.

Branches, to the Masseter, Pterygoideus, and Buccinator Muscles.

A *Branch* which passes behind the Cervix of the Lower Jaw, and gives off Filaments to the Fore-part of the Ear, and afterwards accompanies the Temporal Artery upon the side of the Head, where it terminates.

A *Branch*, to the Buccinator Muscle and other parts of the Cheek.

A Nerve of considerable size, termed *Lingual* or *Gustatorius*, which passes between the Pterygoid Muscles, to the inner of which it gives some Filaments. It then sends off, from its under side, a Ganglion which transmits Nerves to the Inferior Maxillary Gland.

The Lingual Nerve also transmits several Branches to the Sublingual Gland, and to the Muscles of the Tongue.

It terminates, at length, near the Point of the Tongue by many Branches which belong chiefly to the Papillæ; in consequence of which this Branch is considered as the principal Nerve of the Organ of Taste.

The Trunk of the Inferior Maxillary Nerve, having parted with the Lingual Nerve, directs its course between the Pterygoid Muscles to the Posterior Foramen of the Inferior Maxillary Canal.

Before entering the Canal, it sends off a long and slender Branch, which is lodged at first in a Furrow of the Bone, and goes afterwards to be dispersed chiefly upon the Mylo-hyoideus Muscle and Subligual Gland.

The Trunk of the Nerve is afterwards conducted along the Canal of the Jaw under the Alveoli, where it distributes Filaments to the different Teeth of the corresponding side, and to the Substance of the Bone: and coming out of the Canal by the Anterior Maxillary Foramen, somewhat diminished in size, it scatters its remaining Branches upon the Chin and under Lip.

The *Sixth Pair*, or *Abducentes*, arise from the beginning of the Medulla Oblongata, at the part common to the Tuber Annulare and Corpora Pyramidalia, and are the smallest of the Cerebral Nerves, the Fourth Pair excepted.

They perforate the Dura Mater at the inner side of the entrance of the Fifth Pair, and run forwards within the Cells of the Cavernous Sinus; but so surrounded by Cellular Substance, as to seem to be protected from the Blood of that Receptacle.

While in the Sinus Cavernosi, they are situated between the Opthalmic Nerves and Carotid Arteries, upon the surface of the latter of which they send off two or three Filaments on each side of the Head, to assist in forming the Great Sympathetic Nerves.

The Trunks of the Sixth Pair afterwards go through the Foramina Lacrera, to be dispersed entirely upon the Abductor Muscles of the Eyes.

The *Seventh Pair* is composed, on each side, of two portions,—the *Nervus Auditorius, Nervus Acusticus*, or *Portio Mollis ;* and the *Communicans Faciei*, or *Portio Dura.*

The *Portio Mollis*, is the softest of the Nerves, excepting the Olfactory.

It arises by transverse Medullary Striæ from the Anterior part of the Fourth Ventricle, and is separated from its fellow of the opposite side only by the Crena of the Calamus Scriptorius.

The Striæ, turning round the Medulla Oblongata, apply themselves to the Tuber Annulare, from which they receive an addition of substance, and then get to the side of the Portio Dura.

The *Portio Dura*, sometimes also called *Sympathetic us Minor*, arises from that part of the Brain which is common to the Pons Varolii, Crura Cerebelli and me dulla Oblongata ; and at its origin, is situated upon the inner side of the Portio Mollis.

Between the origin of the Portio Dura and Trunk of the Portio Mollis, a small Nerve arises, termed by Wrisberg, *Portio Media inter P. Duram et P. Mollem.*

It comes off by minute Fibrillæ, which soon unite into a Trunk, from the posterior part of the Pons Varolii, or from the adjoining part of the Medulla Oblongata, and is an Accessory Nerve of the Portio Dura.

The Portio-Dura, considerably smaller than the P. Mollis, gets into the Meatus Auditorius Internus, and is there lodged in a kind of half-sheath, formed by that Nerve, to which it is connected by fine Cellular Substance ; the Dura Mater, which lines the Passage, giving here a general Covering to both Nerves.

Portio Mollis.—The Portio Mollis is formed of two Fasciculi, nearly of equal size, one of which belongs to

the Cochlea, the other to the Vestible and Semicircular Canals.

Each of these Fasciculi passes by numberless Fibrillæ through the Cribriform Plate in the bottom of the Meatus Auditorius Internus, to the inner parts of the Labyrinth.

The Fibrillæ destined for the Cochlea go through the Holes in the sides of the Modiolus.

Some pass between the Plates which form the Septa of the Gyri; others go through Holes between the Osseous Plates of the Lamina Spiralis; but by much the greatest number perforate the sides of the Modiolus, between the Septum of the Gyri and the Lamina Spiralis.

The larger Fibrillæ run upon the Membrane covering the Lamina Spiralis; while the smaller go from the Modiolus, between the Osseous Septa and on the inner sides of the Gyri, to be dispersed upon the Membrane lining them.

The remaining Fibrillæ perforate the Plate common to the Modiolus and Infundibulum, and vanish upon the last half-turn of the Lamina Spiralis and the Cupola of the Cochlea.

Upon the Osseous part of the Lamina Spiralis, the Nerves have the common appearance; but upon the Membranous Portion, they are of the colour of the Retina of the Eye.

In the whole of their course upon the Lamina Spiralis, they form a Real Retina; though the reticulated structure becomes much less apparent upon the outer part of the Lamina, and upon the continuation of the Membrane lining the Gyri,—the Nerves seeming to terminate in a semipellucid Pulpy Membrane resembling the Retina of the Eye.

The Membrane upon which the Nerves are expanded, is but slightly connected to the Periosteum which lines the inner side of the Cochlea, and which, though thin, may be readily perceived, being painted with Blood-vessels;—nor does it differ from the Periosteum lining the Tympanum.—See Dr. Monro's *Treatise upon the Ear*.

The Fasciculus which belongs to the Vestible, and Semicircular Canals, forms at first a Plexus, then a

Ganglíform Enlargement, previous to its entrance into the Labyrinth.

The Nerves which belong to the Vestible and Semicircular Canals pass through the Macula Cribrosa, or holes subdivided into smaller Holes by Cribriform Plates in the bottom of the Meatus Auditorius Internus.

Of these Branches, small Filaments pass through the Macula Cribrosa in the Inferior Fossula of the Meatus Auditorius Internus, to the Alveus Communis or Sacculus Vestibuli.

A small Branch goes through another Cribriform Hole in the Inferior Fossula, to the Ampulla of the Posterior Membranaceous Semicircular Canal.

A Branch larger than any of the former, enters the Posterior Hole in the upper Fossula of the Meatus Internus, to be dispersed upon the Ampullæ of the Superior and Exterior Membranaceous Canals.

The Nerves, after reaching the Sacculus Vestibuli and the different Ampullæ, are spread out upon them, as in the Cochlea, in the form of a Net-work, the Fibres of which, by degrees becoming pellucid, disappear upon the beginning of the Membranaceous Canals.

Portio Dura.—The Portio Dura separates from the Portio Mollis, at the bottom of the Meatus Auditorius, Internus, and enters the *Canalis* or *Aquæductus Fallopii*, by the anterior Hole in the upper Fossula at the bottom of the Meatus.

After getting into the Canal, it receives the retrograde Nerve from the second Branch of the Fifth Pair, which enters by the Foramen Innominatum on the fore-side of the Pars Petrosa.

It sends Twigs through the Foramina in the sides of the Aqueduct, to the Mastoid Cells and to the Muscle of the Stapes.

A little before its exit from the Aqueduct in the Adult, but at the outer end of it in the Fœtus, it gives off a reflected Branch, termed *Chorda Tympani*, which passes between the long Processes of the Malleus and Incus, and over the Membrana Tympani.

The Chorda Tympani, goes afterwards in a Fissure at the outside of the Eustachian Tube, and joins the Lin-

gual Branch of the Fifth Pair, soon after that Nerve has got out of the Cranium.

In its passage, it supplies the Muscles of the Malleus and the Membranes, &c. of the Tympanum.

The Portio Dura afterwards passes out of the Acqueduct by the Foramen Stylo-mastoideum, and is at first lodged deep, being situated in a hollow behind the Parotid Gland.

Here it gives a small Occipital Branch, which sends Twigs to the back-part of the Ear, and terminates in the Oblique Muscles of the Head.

It sends a Branch to the Digastric, and another to the Stylo-hyoid Muscle; gives off a Filament which joins the Auricular Branch of the Inferior Maxillary Nerve, and goes to the fore-part of the Ear; and is connected by another small Filament at the under part of the Ear; with Branches of the Sympathetic Nerve which run along the External Carotid Artery.

It also furnishes Filaments to the Carotid Gland, and then perforates it, dividing into large Branches, which join, separate, and rejoin, different times, on the side of the Face.

This Plexus is expanded in such a manner as to constitute what has been called by some the *Pes Anserinus*, and is divided into the following sets of Branches, viz.

The *Temporal Branches*, which ascend upon the side of the Head, to be distributed upon the Temple; some running over, others under the Branches of the Temporal Artery, and forming several joinings with the Frontal Branches of the first part of the Fifth Pair of Nerves:

The *Superior Facial Branches*, which are dispersed upon the Orbicularis Oculi Muscle, and the parts in general about the outer angle of the Eye, communicating in various places above and below the Orbit, with the first and second Branches of the Fifth Pair.

The *Middle Facial Branch*, or the *Great Facial Nerve*, which runs across the Masseter Muscle, and divides into many Branches, to be dispersed upon the Cheek, and side of the Nose and Lips.

They are connected with the Branches of the Superior Facial, and near the corner of the Mouth, with others of the second and third parts of the Fifth Pair.

They have likewise some communications with the deep Branches of those two Nerves which pass outwards between the Masseter and Buccinator Muscles.

The *Inferior Facial Branches*, which proceed along the side of the under Jaw, to be dispersed upon the parts covering it, and upon the Under Lip; and connect themselves with some of the Middle Facial Branches, and with others belonging to the third part of the Fifth Pair.

The *Descending*, or *Subcutaneous Cervical Branches*, some of which run forwards under the Lower Jaw, and others downwards, near the External Jugular Vein, to the Superficial Muscles, and to the Integuments at the side of the upper-part of the Neck, where they form communications with the Inferior Facial Branches, and with different Branches of the Upper Spinal Cervical Nerves.

The *Eighth Pair* arises from the Medulla Oblongata, at the sides of the Bases of the Corpora Olivaria, and consist in each side, of the Nervus Glosso-pharyngeus, and Pars Vaga.

The *Glosso-Pharyngeus* is the smaller of the two, being only a little superior in size to the Nerves of the Fourth Pair.

The *Pars Vaga* comes off immediately under the former, and is composed of several separated Fasciculi, which are soon collected into a single Cord.

The two Nerves, passing outwards, go through the Base of the Cranium, immediately before the end of the Lateral Sinus, by the Hole common to the Occipital and Temporal Bone, and are separated from each other and from the Sinus by small Processes of the Dura Mater.

The *Glosso-Pharyngeus*, termed also *Lingualis Lateralis*, upon its exit from the Cranium, sends a Branch backwards, which joins the Digastric Branch of the Portio Dura.

A little lower, it gives off Branches, which, with others from the Pharyngeal Branch of the Eighth Pair, and from the Great Sympathetic Nerve form a Plexus which embraces the Internal Carotid Artery, and afterwards sends Branches along the Carotis Communis to the Heart.

Still lower, it gives Branches which communicate with others belonging to the Pharyngeal Nerve, and go to the upper part of the Pharynx and to the Stylo-Pharyngeus Muscle.

The Glosso-Pharyngeus, after sending a Twig or two to the Tonsil, to the upper part of the Pharynx, and Membrane of the Epiglottis, divides, into many Branches, which run partly to the margin, and partly to the middle of the root of the Tongue, supplying, especially the Papillæ Majores and the parts in their neighbourhood.

The *Pars Vaga*,—upon emerging from the Cranium, frequently becomes a little increased in diameter for about an inch downwards; forming what some authors have termed its *Gangliform Enlargement*.

It descends in the Neck at the outer and back-part of the common Carotid Artery, to which it is closely united, being included along with it in the same common sheath of Cellular Substance.

At the upper part of the Neck, it transmits a Branch to the Pharynx; and immediately afterwards, a large one to the Larynx; and near the top of the Thorax, it sends a Filament, and sometimes two, to the Heart.

The *Pharyngeus*—chiefly formed by the Pars Vaga, but partly also by a Branch from the Accessorius, is afterwards joined by Branches from the Glosso-Pharyngeus, and descends obliquely over the Internal Carotid Artery.

Near the origin of the Artery, it sends Filaments which join others from the upper part of the Great Sympathetic, and creep along the common Carotid, to be united with the Carotid Artery.

Upon the middle of the Pharynx, it expands into a Gangliform Plexus, from which many small Branches are sent out, to be distributed upon the three Constrictors of the corresponding side of the Pharynx; one or two Filaments uniting above with the Glosso-Pharyngeus, and others below with the Laryngeus Superior.

The *Laryngeus Superior*,—descends obliquely forwards between the Carotid Arteries and Pharynx; and behind the origin of the Carotids, is divided into a large Internal or Superior, and a small External or Inferior Branch.

The *Internal Branch* passes forwards between the Os

Hyoides and Superior Cornu of the Thyroid Cartilage.

It divides into numerous Branches, some of which go to the Arytenoid Gland, and to the Oblique and Transverse Arytenoid Muscles, and others to the Glandular Membrane of the Epiglottis; while the greater number and the largest of these Branches are dispersed upon the Glandular Membrane lining the upper portion of the Larynx and parts adjacent.

The *External Branch*,—which SCARPA considers as more properly termed *Pharyngo Laryngeus*,—is originally composed of a Branch from the Internal Laryngeal, and another from the Great Sympathetic; and is connected by a Filament to the Pharyngeal, and sometimes also by one to the Internal Laryngeal Nerve.

It imparts Twigs to the Middle and Lower Constrictors of the Pharynx, and afterwards terminates in the Thyroid Gland and inner part of the Larynx.

The *Filament*, sent from the Pars Vaga at the bottom of the Neck, joins the Great Cardiac Branch of the Sympathetic Nerve in the upper part of the Thorax, to be dispersed upon the Heart.

The *Ninth Pair*,—frequently termed *Linguales*, and sometimes *Linguales Medii*,—arise from the under and lateral parts of the Corpora Pyramidalia, on the fore-side of the Medulla Oblongata, by numerous Filaments which are collected into Fasciculi.

They pass out at the Superior Condyloid Foramina of the Occipital Bone, after which they adhere, for some way, to the Eighth Pair, by Cellular Substance.

A little below the Cranium, each of the Trunks of this Pair of Nerves is conjoined by a cross Branch with the Sub-occipital Nerve, or with an Arch which connects that Nerve and the First Cervical together.

The Trunk then descends between the Internal Jugular Vein and Internal Carotid Artery, and at the root of the Occipital Artery crosses over both Carotids to its place of destination.

Where it begins to cross over the Carotids, it sends down a Branch of considerable size, termed *Descendens Noni*.

The *Descendens Noni* passes down a certain length along with the Common Carotid Artery, and in its course, furnishes Branches to the upper ends of the

Omo-hyoid and Sterno-thyroid Muscles, after which it unites with Branches from the first and second, and with small Filaments from the second and third Cervical Nerves, forming an Arch, from which long and slender twigs go to the under portions of the Sterno-thyroid, and to the Omo-hyoid and Sterno-hyoid Muscles.

The Ninth Pair passes afterwards behind the Facial Trunk and Temporal Veins, or the Trunk formed by these, and over the root of the Facial Artery,—sending a Nervous Twig to the Hyo-thyroid Muscle.

Upon the Hyo-glossus Muscle, the Trunk of the Nerve is spread into a great number of Branches which go to the middle of the Tongue, and terminate chiefly into its Fleshy parts; a Twig extending as far as the Genio-hyoid Muscle, and two or sometimes only one Filament anastomosing with the Lingual Branch of the Fifth Pair.

The *Great Sympathetic Nerve*,—obtaining its name from its numerous connections with most of the other Nerves of the Body,—is either formed originally by the reflected Branch from the second and Fifth Pair, and by one or two and sometimes three small Filaments, sent down from the Sixth Pair while in the Cavernous Sinus; or, according to the opinion of some Authors, the Sympathetic sends off these small Nerves to join the Fifth and Sixth Pairs.

Upon the Surface of the Internal Carotid Artery, while in the Carotic Canal, the Branches of the Fifth and Sixth Pairs and Great Sympathetic making this connection, are pulpy and tender, and form a Plexus which surrounds the Carotid, and from which the Trunk of the Sympathetic is most frequently considered as being sent out.

After escaping from the Carotic Canal, the Trunk, which is of small size, is closely connected for a short space, with the Trunks of the Eighth and Ninth Pairs; and, separating from these, it expands into a large Ganglion,—termed *Ganglion Curvicale Superius*,—of a long oval form, and situated opposite to the second Cervical Vertebra.

From this Ganglion, the Nerve comes out very little increased in size,—and descends on the anterior Vertebral Muscles of the Neck,—behind the Eighth Pair of

Nerves, with which, and with the Carotid Artery, it is connected by a Sheath of Cellular Substance.

At the under part of the Neck, nearly where the Inferior Laryngeal Artery turns over towards the Larynx, the Sympathetic forms another Ganglion, termed by some authors *Cervicale Medium* and by the others *Cervicale Inferius*.

The Ganglion Medium is somewhat similar in shape and size to the Ganglion Superius ; though it varies considerably in these respects in different Subjects.

From this Ganglion, principal Branches are sent down, one of which, larger than the rest, and considered as the continuation of the Trunk, turns outwards between the Inferior Laryngeal and Vertebral Arteries to another Ganglion.

This Third Ganglion,—is placed at the head of the first Rib, and is termed by some Authors *Ganglion Cervicale Inferius*, or *Imum*, while others consider it as the first of the Thoracic Ganglia.

The Cervical part of the Great Sympathetic is connected with other Nerves, and dispersed upon different parts by the following Branches, viz.

One or two short, but thick Branches, which connect the beginning of the Superior Ganglion with the root of the Suboccipital Nerve :

One or two Pulpy Nerves, which run forwards behind the Internal Carotid Artery, and divides into many others. These, together with Filaments from the Glossopharyngeus, form a Plexus which sends Branches to the Gangliform Expansion of the Pharyngeus, and afterwards embraces the External Carotid Artery, sending Plexuses of Filaments along its different Branches :

One or two other soft Nerves, going behind the Internal Carotid, and with a Branch of the Laryngeus Internus of the Eighth Pair, forming the Laryngeus Externus :

Thick short Roots connecting the First, or Conjugation of the First and Second Cervicals, with the superior Ganglion of the Sympathetic Nerve.

From the Superior Ganglion also, are sent off small Branches, which uniting with Filaments from the Laryngeus Superior, form the *Ramus Cardiacus Supremus*, or *Superficialis Cordis*.

The *Superficial Cardiac Nerve* of the Sympathetic, in the Right Side, divides into two Branches at the bottom of the Neck, which send a Filament or two along the Inferior Laryngeal Artery to the Thyroid Gland and afterwards unite with the Superficial Cardic Nerve of the Eighth Pair before the Subclavian Artery, and with the Laryngeal Nerve behind it.—In the left side, it terminates in the Cardiac Plexus of Nerves.

From the Second, Third, and Fourth Cervical Nerves, an equal number of Cords descend behind the Scaleni and Rectus Major Muscle, to the middle Ganglion of the Great Sympathetic.

From the opposite side of the Ganglion, Branches are sent down, which join and form the *Nervous Magnus Profundus*; others are fixed to the Superficial Cardiac and to the Recurrent of the Eighth Pair;—the rest go partly over and partly behind the Subclavian Artery, to the Inferior Cervical, and to the first Thoracic Ganglion.

Nervi Accessorii ad Par Octavum.—The accessory Nerves arise by small Filaments from the lateral Parts of the Medulla Oblongata and upper portion of the Spinal Marrow.

The Filaments from the Spinal Marrow come off between the anterior and posterior Bundles of the Cervical Nerves,—the first of them frequently extending as far as the space between the Sixth and Seventh Pairs.

The different Filaments unite by degrees into their respective Trunks, and often have connections while within the Dura Mater, with one or two Bundles of the uppermost Spinal Nerves.

The Trunk of the Nerve passes out on each side of the Cranium, in company with the Nerve of the eighth Pair; but forms no part of that Nerve, being included in its own peculiar Sheath received from the Dura Mater.

After perforating the Cranium, it separates from the Eighth, and descends obliquely outwards through the Sterno-mastoid Muscle to the Shoulder.

At its exit, it sends off a Branch, termed by some *Ramus Minor*, (the Trunk itself being then called *Ramus Major*), which assists in forming the Pharyngeal Nerve; and gives another, smaller than the former, to be connected to the Pars Vaga of the Eighth Pair.

At the fore-part of the Sterno-mastoid Muscle, it is

joined by an Arch to the Suboccipital, and frequently by another to the First Cervical Nerve.

In its passage through the Sterno-mastoideus, it sends several Branches to the substance of that Muscle, and terminates at length in the Trapezius.

SPINAL MARROW,

AND ORIGIN OF THE SPINAL NERVES,

THE *Spinal Marrow* is the continuation of the Medulla Oblongata, and obtains its name from being contained in the Osseous Canal of the Spine.

It is invested by the same Membranes which cover the Brain, and has an additional partial Involucrum from the Ligamentous Membrane which lines the Bodies of the Vertebræ, and which has been already taken notice of in the description of the Ligaments.

On the inner side of the Ligamentous Lining, the Dura Mater is situated, which passes out of the Cranium by the Foramen Magnum Occipitis, and forms a Cylindrical sheath which loosely envelopes the Spinal Marrow, and extends as far as the Os Sacrum.

It is more elastic than the Dura Mater of the Brain, and thereby admits more readily of the different motions of the Spine.

At its egress from the Cranium, it is intimately connected to the beginning of the above mentioned common Ligamentous Lining, and is also united with the Pericranium at the edge of the Foramen Magnum of the Occipital Bone.

Below the First Vertebra of the Neck this intimate connection between the Dura Mater and inner Ligament of the Vertebra is discontinued; a *Cellular Fatty*, and *Slimy Substance*, which surrounds the Dura Mater throughout the rest of the Canal, being interposed between the Membrane and the Ligament.

The Dura Mater is only in contact with the Tunica Arachnoidea, and this only in contact with the Pia Mater, and lying so loosely over it as to be separated from it with facility through the whole length of the Spine.

The Spinal Marrow, like the Brain, consists of a cortical and Medullary Substance, but differs in this res-

pect, that the Cineritious Matter is placed within the other.

Upon the Surface of the Spinal Marrow, while lying in its natural situation, many transverse Wrinkles or Folds are observed, which allow it to be extended in the motion of the Vertebræ.

It is a little flattened on its anterior and posterior Surfaces, and is larger near the under part of the Neck, and at the top of the Loins, where the great Nerves of the Extremities are sent off, than in the other parts of the Spine.

It is divided into two lateral Portions or Cords, which are separated from each other externally by an anterior and posterior Fissure continued from the Medulla Oblongata; and each of the lateral Portions is in some measure subdivided by a superficial Furrow into a larger anterior and small posterior Cord.

The lateral Portions are firmly united together by fine Cellular Substance, but may be separated from each other before as well as behind,—without lacerating either,—to near their middle, where they are connected by a Layer of Cineritious Matter which passed from the one Cord into the other.

When the Medulla Spinalis is divided transversely, the Cineritious Substance is observed to have a Cruciform appearance, corresponding with the Chords of which it is composed.

The Body of the Spinal Marrow descends as far as the Second Vertebra of the Lions, and terminates there by a Conical point, which is concealed by Fasciculi of Nerves.

Each of the lateral portions of the Spinal Marrow sends off from its anterior and posterior parts, flat Fasciculi of Nervous Filaments, which are placed opposite their fellows on the other side.

Several of the Fasciculi of the Cervical Nerves detach Filaments to those immediately above or below them; and the same thing is occasionally observed of some of the Bundles of Dorsal Nerves.

The anterior and posterior Fasciculi perforate the Dura Mater, from the inner part of which each Fasciculus is furnished with a proper Sheath, and is conti-

nued within it, the Sheaths connected by Cellular Substance only, till they get between the Vertebræ.

Between the anterior and posterior Fasciculi or Spinal Nerves, and between the Tunica Arachnoidea and Pia Mater, a small Ligamentous Cord termed *Ligamentum Denticulatum*, is situated, which is attached to the Dura Mater, were that Membrane comes out from the Cranium and accompanies the Spinal Marrow to its inferior extremity.

It adheres by Cellular Substance to the Pia Mater, and sends off from its opposite side small Chords, in the form of *Denticuli*, which carry the Tunica Arachnoidea along with them, and running more or less in a tranverse direction, are fixed, each by minute Fibres to the Dura Mater, in the Interstices of the Fasciculi.

The Ligamentum Denticulatum of the opposite sides incorporate with the Pia Mater at the Inferior extremity, or Conical point of the Spinal Marrow, and form a Ligamentous Filament which perforates the under end of the Dura Mater, and is fixed by small Fibres to the Membranes covering the Os Coccygis, in the manner the Denticuli are fixed to the Dura Mater.

It was termed by some Authors *Ligamentum Piæ Matris*. It was considered by the Antients as the *Fortieth Pair* of Nerves, and was also called *Nervus Imparus Sacrus*.

It assists in preventing the Spinal Marrow and the origin of the Nerves from being overstretched.

Having got between the Vertebræ, each of the posterior Bundles forms a Ganglion, from the opposite end of which a Nerve comes out, and is immediately joined by the anterior Bundle, thus constituting the beginning of the Trunks of the Spinal Nerves.

The Nervous Cords sent out from the Spinal Marrow after receiving their coverings from the Dura Mater, becomes considerably larger than the Fasciculi which form them; as has been already observed in the general description of the Nerves.

As soon as the Spinal Nerves emerge from between the Vertebræ, each sends Branches backwards to the Muscles near the Spine, and others forwards to join the Great Sympathetic Nerve, while the Trunk is continued outwards to its place of destination.

The Spinal Nerves are distinguished on each side, by numbers, according to the Bones under which they pass: *Thirty Pairs* are most commonly enumerated.—One going under the Head, and termed *Suboccipital*;—Seven passing under the Vertebræ of the Neck;—Twelve under the Dorsal;—Five under the Lumbar Vertebræ; and—Five under the pieces which originally composed the Os Sacrum.

The Fasciculi which form the Cervical Nerves are short, running nearly in a straight direction from their origin to the Intervertebral Holes. Those which form the Dorsal Nerves are longer than the former, and run more obliquely downwards, and those which form the Lumbar and Sacral Nerves are very long and run still more obliquely downwards, till at length the undermost of them become nearly longitudinal.

The size of the Fasciculi corresponds with that of the Nerves which they go to form.—The Fasciculi of the four lowest Cervical and first Dorsal, are large and broad, giving origin to the Great Nerves which supply the Superior Extremity.—Those of the Back are much more slender, while the Fasciculi of the Loins and the two upper Sacral ones are of great size, to form the very large Nerves which run to the Lower Extremity.

The Lumbar and Sacral Fasciculi, while included in the Dura Mater, form a Bundle of Cords, termed *Cauda Equina*, from the resemblance it has to the Tail of a horse; especially when the Fibrillæ of the Nerves are unravelled by separating them from each other.

The Fasciculi perforate the Dura Mater, nearly opposite to the parts where they pass through the Vertebræ,—of course the Nerves of the inferior parts of the Spinal Marrow emerge from the Spine, considerably lower than their different origins.

Blood-vessels of the Spinal Marrow.—The Arteries of the Spinal Marrow consist of Anterior and Posterior Spinal Arteries, and of many additional Branches communicating with others from the adjacent Vessels.

The *Anterior Spinal Arteries* arise, one on each side from the Vertebrals, near where these join to form the Basilar Artery.

Upon the beginning of the Spinal Marrow, they generally unite into a common Trunk, which descends in that depression on the Anterior Surface of the Medul

la, whereby it is distinguished into two Lateral Portions,—and the Artery continues nearly of the same size throughout, in consequence of additions it receives from the neighbouring Arteries.

In the Neck, it communicates with the Vertebral Thyroid, and Cervical Arteries, by Branches which pass through the same Holes with the Nerves.

In the Back, it receives Branches from the Intercostal, and in the Loins from the Lumbar Arteries; all of which also go through the Intervertebral Holes.

It terminates at the under end of the Spinal Marrow; the Cauda Equina being supplied by Branches from the Internal Iliac Artery, which enter through the anterior and posterior Holes of the Os Sacrum.

The *Posterior Spinal Arteries*,—arise commonly from the inferior Arteries of the Cerebellum, and frequently from the Trunks of the Vertebral Arteries within the Cranium.

They are equal in length to the former Artery, but considerably inferior to it in size, and continue separate through the whole of their course.

They have constantly a Serpentine appearance, and form frequent Inosculations with each other, and with Arteries, the Branches of which communicate with the Anterior Spinal Artery.

The Arteries of the Spinal Marrow are divided into minute Branches, which are dispersed upon its substance, upon the Membranes which inclose it, and also upon the substance of the Vertebræ and upon the origins of the Nerves.

The *Veins* of the Spinal Marrow accompany their Arteries, and afterwards terminate in the Sinus Venosi of the Spine.

The *Sinus Venosi* consist of one on each side, which runs exterior to the Dura Mater, being chiefly lodged in the Ligamentous Membrane which lines the fore and lateral parts of the Vertebral Canal.

They extend from the Foramen Magnum of the Occipital Bone, to the under end of the Os Sacrum, and are so irregular on their surface, and so much divided and subdivided within by the opening of Veins, as in many parts to have the appearance of Cells.

At the different Vertebræ, they are conjoined by cross

Branches, which have a Semilunar form, like the Surface of the Bones which surround them.

They communicate at their Superior Extremity with the Occipital and Lateral Sinuses, and send numberless Branches outwards, which open into the Veins the Arteries of which anastomose with those of the Spinal Marrow.

Nerves of the Neck and Superior Extremity.

Nervus Accessorius.—The Accessory Nerve belongs in some respects to this Class of Nerves;—but having part of its origin within the Head, and from its passing out with one of the Cerebral Nerves, it has been already described along with these.

Suboccipital Nerves.—These were formerly called *Tenth Pair of the Head*, and by many at present are termed *First of the Neck.*

They arise, on each side, from the beginning of the Spinal Marrow, by an Anterior and Posterior Fasciculus, like the rest of the Spinal Nerves; and, like these also, they have their Ganglia where they pass out between the Bones.

They perforate the Dura Mater immediately under the entrance of the Vertebral Arteries, and pass forwards under them, and over the transverse Processes of the Atlas.

They afterwards appear in the fore-part of the Neck and are each connected above by an Arch to the root of of the Ninth Pair, and below by a similar Arch to the First Cervical Nerve.

Anteriorly, they are joined by one or two short Branches to the upper Ganglia of the Great Sympathetic Nerve.

They afterwards divide into Branches, which are distributed upon the Recti and obliqui Capitis, and upon some of the deep Extensor Muscles of the Head.

The *First Cervical Nerve*,—comes out, on each side between the Atlas and Second Vertebra of the Neck, and immediately splits into two parts; the first of which passes forwards under the transverse Process of the Atlas, and is joined by an Arch with the Nervus Accessorius, and by Branches with the ninth Pair: It is also

connected by a soft Gangliform pellucid root with the upper Ganglion of the Sympathetic Nerve, sending a Branch downwards, to be fixed to the second Cervical Nerve, and also small Branches of the Muscles connected with the fore-part of the Vertebræ.

The other, which is the principal part goes backwards, and, after sending Branches to the Extensor Muscles of the Head and Neck, perforates these, and forms the *Proper Occipital Nerve.*

The *Occipital Nerve* ascends upon the Head with the Artery of that name, and terminates upon the Muscles and Integuments on the upper and back part of the Head; some of its Filaments anastomosing with others belonging to the first Branch of the Fifth, and Portio Dura of the Seventh Pair.

The *Second Cervical Nerve,*—after escaping from between the Bones, gives off a Branch, which perforates the Muscles connected to the fore and lateral parts of the Vertebræ, and joins the middle Ganglion of the Sympathetic Nerve,

It sends another *Branch* of considerable size downwards to the Trunk of the Third Pair.

It sends several Branches to the Sterno-mastoid Muscle, behind which it is connected by an *Arch,* and still farther out by a Filament, with the Nervus Accessorius.

It is afterwards divided into *several Branches,* one of which passes downwards some way upon the External Jugular Vein, and, together with a Branch from the First Cervical, forms an Arch with the Descendens of the Ninth Pair.

It gives off a small root which is united with others in the formation of the Diaphragmatic Nerve.

A *Large Branch* comes out from it behind the Sterno-Mastoideus, which, turning over this Muscle, sends off the following Nerves, viz.

The *Inferior Cutaneous Nerve of the Neck,* which passes forwards to the parts under the Lower Jaw.

The *Middle Cutaneous Nerve,* which runs towards the angle of the Jaw.

The *Great Posterior Auricular Nerve,* which furnishes an anterior Branch to the under part of the Ear, and a posterior Branch dividing into many others which go to the back-part of the Ear and Temple.

The Cutaneous and Auricular Nerves are dispersed upon the Platysma Myoides, Integuments of the side of the Neck and Head, the Parotid Gland, and External Ear; and have several Communications with the Portio-Dura of the Seventh Pair.

The remainder of the Second Cervical is distributed upon the Levator Scapulæ, and the Extensor Muscles of the Neck and Head.

The *Third Cervical Nerve*, after emerging from between the Vertebræ, sends down a *Branch* to the Trunk of the Fourth Cervical, and another *Branch* which forms the principal root of the Diaphragmatic Nerve.

A *Third Branch* perforates the Muscles on the side of the Vertebraæ, and joins the middle Ganglion of the sympathetic Nerve.

A *Small Filament* connects a third Cervical with the Descendens of the Ninth Pair.

The Nerve is afterwards divided into External and Internal Branches.

The *External Branches* form Anastomoses with the Nervus Accessorius, near the upper part of the Scapula; while the Interior after furnishing Twigs to the Jugular Glands are dispersed by several large Branches upon the Muscles and Integuments at the under part of the Neck, and upper part of the Shoulder.

The *Fourth Cervical*, sends a Branch behind the Muscles situated on the fore and lateral parts of the Cervical Vertebræ, to the middle Ganglion of the Sympathetic Nerve.

It is connected by one, and sometimes by two Filaments to the Diaphragmatic Nerve.

It gives Twigs to the Jugular Glands and deep Muscles of the Neck, and at the outer edge of the anterior Scalenus, joins the Fifth Cervical Nerve.

The *Fifth Cervical*.—is united with the Fourth into a Common Trunk, which, after running a little farther out, joins the Sixth Cervical Nerve.

The *Sixth Cervical*,—joins the Seventh behind the Clavicle; and to the Seventh, the First Dorsal Nerve is added over the First Rib.

The Four Inferior Cervicals and First Dorsal Nerve are of great size,—especially the three intermediate Nerves.

They pass out between the Scalenus Anticus and Medius,—and afterwards run between the Subclavian Muscle and First Rib, at the outer side of the Subclavian Artery, to the Axilla.

In the Axilla, they separate, unite, and separate again, forming an irregular Plexus, termed *Axillary* or *Brachial*, —which surrounds the Axillary Artery.

The *Axillary Plexus* sends Branches to the Subscapularis, Teres Major, and Latissimus Dorsi, and furnish the External Thoracic Nerves which accompany the Blood-vessels of that name to the Pectoral Muscles and Integuments.

The Plexus afterwards divides into Nerves, most of which are of great size, to supply the Superior Extremity.—They are as follow.

The *Scapularis*,—which commonly arises from the combination of the Fourth and Fifth Pairs, and extending outwards, runs through the Semilunar Arch in the upper edge of the Scapula, afterwards descending between the root of the Spine and Head of the Scapula.

It furnishes Branches to the Supra-Spinatus, and is afterwards consumed upon the Infra-Spinatus Muscle.

The *Articularis*,—which arises like the former Nerve, from the Trunk common to the Fourth and Fifth Cervicals.

It sinks deep in the Axilla, and getting between the under edge of the Subscapularis, and Insertions of the Teres Major and Latissimus Dorsi, it follows the course of the Posterior Articular Artery round the Body of the Os Humeri, immediately below the Articulation.

It sends Branches to the Teres Minor, and some Twigs to the Ligament of the Joint; but is chiefly dispersed upon the Deltoid Muscle.

The *Nervus Cutaneus*,—which arises from the Trunk Common to the last Cervical and Fifth Dorsal Nerve; but is chiefly formed by Fibrillæ from the latter.

It runs down at the inner and fore-part of the Arm, near the Radial Nerve.

It sometimes gives a *small Branch* to the upper part of the Coraco-brachialis and Biceps; and, farther down, it gives others to the Integuments and Coats of the Blood-vessels.

About the middle of the Arm, it splits into two Branches, an Internal and External.

The *Internal Branch*, which is rather the smaller of the two, passes before the Basilic Vein to the inner part of the Elbow, where it divides into Branches, two of which, larger than the rest turn obliquely over the Heads of the Flexors of the Hand, to be dispersed upon the inner and back-part of the Fore-arm.

The *External Branch* divides into several others, behind the Median Basilic Vein, which descend on the anterior and Ulnar side of the Fore-arm, as far as the Wrist.

They pass partly over and partly under the Subcutaneous Vessels; furnishing Twigs to these, and vanishing in the Integuments.

Besides the Nervus Cutaneus, there is another termed *Cutaneus Minor Internus* of WRISBERG, which, like the rest of the Nerves of the Superior Extremity, takes origin from the Axillary Plexus; but is more particularly connected with the Ulnar Nerve.—It is considerably inferior in size to the Nervus Cutaneus.

It soon separates from the Ulnar, running afterwards between it and the inner side of the Arm.

A little below the Axilla, it splits into two Branches;

The smaller, turning to the posterior part of the arm is divided into Filaments which are chiefly dispersed upon the Triceps and its Integuments.

The larger Branch descends at the inner edge of the Triceps, and vanished upon the under end of that Muscle and Skin of the Elbow.

The *Musculo-Cutaneus*, called also *Perforans Caserii*, —which consists of Fibrillæ from almost all the Nerves entering the Plexus.

The Cord formed by these perforates, obliquely, the upper part of the Coraco-brachialis to which it gives Branches.

It afterwards passes between the Biceps and Branchialis Internus, furnishing Branches to both.

At the Elbow, it gets to the outside of the Tendon of the Biceps, and runs behind the Median Cephalic Vein.

From thence it descends in the Fore-arm, between the Supinator Longus and Integuments; furnishing

Branches to the latter, as far as the root of the Thumb and back of the Hand.

The *Spiral*, or *Spiral Muscular Nerve*,—which is apparently formed of all the Nerves entering into the Axillary Plexus, and when the Sheaths of the Nerves are slit open, is found to be composed of Fibrillæ from each of the Trunks, excepting from that of the First Dorsal.

It is rather larger than any other Nerve of the Superior Extremity, and is distinguished by its Spiral Direction.

It is at first situated between the Axillary Artery and the Ulnar Nerve, and passes obliquely downwards between the two Heads of the Triceps Extensor Cubiti, and afterwards behind the Os Humeri, to the outside of the Elbow.

From thence it proceeds among the Muscles of the Radial side of the Fore-arm, as far as the hand.

While passing behind the Os Humeri, it gives several Branches of considerable size to the different Heads of the Triceps; some of them accompanying the Branches of the Arteria Spiralis, and terminating on the Heads of the Extensors of the Hand.

Immediately behind the body of the Os Humeri, it transmits a Subcutaneous Branch, which is distributed upon the Muscles and Integuments on the Posterior part of the Fore-arm, anastomosing at last with the Nerves on the back-part of the Hand.

The Trunk of the Nerve having arrived at the Elbow, is lodged in a Fissure between the Brachialis Internus and Radial Extensors of the Carpus, and there gives off other Branches to the Extensor of the Hand, and to the Supinator Muscles.

At the Head of the Radius, the Trunk of the Nerve divides into two nearly equal Branches,—the *Superficialis* and *Profundus*.

The *Superficialis*, continued almost straight from the Trunk, immediately transmits a Branch to the Extensores Radiales and Supinator Longus, and then descends at the inner edge of this Muscle along with the Radial Artery.

A little below the middle of the Radius, it crosses between the Tendon of the Supinator and Extensores Radiales, and is subdivided into a Volar and Dorsal Branch.

The Volar Branch, after sending Twigs to the Annular Ligament, is distributed to the Muscles and Integuments of the Thumb.

The *Dorsal Branch* is again subdivided into numerous other Branches, some of which go to the Muscles in the interval of the Metacarpal Bones of the Thumb and Fore-finger, a few Filaments being distributed to the Annular Linament, while principal Branches run one along each side of the Fore and Mid-finger, and likewise along the Radial side of the Ring-finger.

The *Ramus Profundus*, after sending several Branches to the Extensores Radiales and Supinator Brevis, perforates the latter, and gets to the back-part of the Fore-arm.

After quitting the Supinator, it descends under the Extensor Primi Internodii Pollicis and Extensor Digitorum to the back of the Hand.

In this course, it sends Branches to the different Extensors of the Thumb and Fingers, and at length degenerates into a slender Branch, which, at the Wrist, adheres closely to the Annular Ligament, where it has a Gangliform appearance, and is dispersed partly upon the Membranes on the back of the Metacarpus.

The *Median* or *Radial Nerve*,—which comes from the middle and lower part of the Plexus, is formed by Fasciculi from all the Nerves which enter the Plexus, and is nearly of a similar size with the Spiral Nerve.

It descends in the Arm along the anterior surface of the Humeral Artery, to which, and to the Deep Veins, it adheres firmly by the Cellular Substance.

In this course, it does not give off any considerable Branches ;—twigs, however, are sent from it to the Coats of the adjacent vessels.

At the bending of the Elbow, it slips over the Tendon of the Brachialis Internus, and perforates the back-part of the Pronator Teres Muscle.

It afterwards passes down between the Flexor Radialis and the Musculus Sublimis, and goes in the middle of the interval of the Radial and Ulnar Artery in its way to the Hand.

When it approaches the Fore-arm, it transmits Branches to the Pronator Teres and Integuments near that Muscle.

In the Flexure of the Arm, it furnishes Branches to the Pronator, Flexor Radialis, and Flexor Sublimis, and an Interosseous Branch which, in some subjects, receives an addition from the Spiral Nerve.

The *Interosseous Nerve* gives Branches to the Flexor Longus Pollicis, and to the Flexor Profundus Digitorum, descends upon the Interosseous Ligament with the Vessels of that name, and terminates in the Pronator Quadratus.

Near the Hand, it sends a Branch dividing into others which supply the Muscles and Integuments forming the Ball of the Thumb.

The Trunk of the Nerve having given Branches to the Fore-arm, passes under the Annular Ligament of the Wrist, where it divides into Branches which are situated behind the Aponeurosis Palmaris, and Superficial Arch of the Arteries.

The principal Branches in the Palm come off in three divisions, from which seven Nerves of considerable size are distributed to the Thumb and Fingers. Of these, two go to the Thumb, and one to the Radial side of the Fore-finger; the rest come off from two forked Trunks, near the Head of the Metacarpal Bones, and supply the adjacent sides of the Fore and Middle, and of the middle and Ring-finger.

These Branches send Twigs through the Aponeurosis, to the Integuments of the Palm, and others to the Musculi Lumbricales; after which they accompany the Arteries sent out from the Superficial Palmar Arch, bestowing Twigs to the adjacent parts of the Fingers, at the points of which they terminate by numerous Fibres.

The *Ulnar Nerve*,—which, like the former, is of great size, comes off chiefly from the last Cervical and First Dorsal Nerve.

It extends along the inside of the Triceps, frequently perforating some of its Fleshy Fibres, and near the Elbow, slants a little backwards, to get into a Groove between the inner Condyle of the Os Humeri and Olecranon of the Ulna.

From thence it passes to the Fore-arm, where, after perforating the Heads of the Flexor Muscles, it joins the Ulnar Artery a little below its origin, and accom-

panies that vessel,—running behind it all the way to the Hand.

Under the Axilla, it sometimes receives a Branch from the Spiral Nerve; and from this connection, or from the Trunk of the Ulnar Nerve itself, a Subcutaneous Branch is sent off, which runs between the Triceps and Integuments, furnishing Branches to the latter for a considerable way along the Fore-arm.

Near the under end of the Os Humeri, a Twig or two commonly go to the inner edge of the Triceps.

Under the bending of the Elbow, a Branch is given out to be distributed upon the Belly of the Flexor Ulnaris.

Immediately below the former, another Branch is produced, which is dispersed upon the Flexor Profundus Digitorum.

About the middle of the Fore-arm, a Filament is transmitted which adheres to the Ulnar Artery, furnishing small Twigs to the Coats and Sheath of the Artery, and terminating in the corresponding parts of the Wrist and Integuments of the Palm.

Near the end of the Ulna, a considerable Branch, termed *Dorsalis*, is sent out, which turning between the Flexor Ulnaris and Ulna, is directed to the back-part of the Hand.

The *Dorsal Nerve* sends Branches to the Integuments of the Wrist and Metacarpus, which have various anastomoses with others of the Spiral Nerve.

It sends off a Branch which proceeds along the Ulnar side of the Little Finger;—and at the Heads of the Metacarpal Bones, another splitting into two Branches which run along the adjacent sides of the Auricular and Ring-fingers.

The Trunk of the Nerve passes with the corresponding Artery over the Annular Ligament into the Palm, where, like the Radial Nerve, it is covered with the Aponeurosis Palmaris.

In the Palm, it divides into Superficial and Deep Branches; the former destined chiefly for the Fingers, the latter for the deep region of the Hand.

The *Superficial Palmar* Nerves sends—

Branches to the short Muscles of the Little Finger:

A Branch to the Volar-Ulnar side of the Little Finger:—and—

Another, which is soon spilt into two smaller Branches; one to the Radial side of the Little Finger, the other to the Ulnar side of the Ring-finger.

The *Deep Palmar Nerve* sinks in between the Abductor and Flexor Parvus Digiti Minimi, or perforates the Head of the latter, and forms an Arch which accompanies the Deep Arch of the Arteries under the Tendon of the Flexors, and the Lumbricales Muscles.

The Deep Nerve gives—

A Branch to the Abductor Minimi Digity, and one to each of the Interossei:

A Twig to each of the Lumbricales, which enters from behind:

Branches to the Flexor Brevis and Abductor Pollicis.

The Nerve terminates at length by several short Branches upon the Abductor Indicis Muscle.

The Nerves on the Palm and corresponding parts of the Fingers, like the Arteries, are much larger than those of the opposite side of the Hand.

The Digital Nerves send off many lateral Branches to the Integuments and other parts of the Fingers, and terminate, each, by a Brush of Fibres, at the Apices of the Fingers.

Between the Branches of the Radial and Ulnar Nerve, different Anastomoses are frequently found; and the same may be observed between the Nerves of the Palmar and Dorsal side of the Fingers.

Intercosto-Humerales.—Besides the Nerves of the Superior Extremity sent from the Brachial Plexus, there are others belonging to it, which take their origin from the Intercostal Nerves, and which may therefore be termed *Intercosto-Humerales.*

The *Intercosto Humeral Nerves*,—consist of a Branch from the Second, and of another from the Third Intercostal Nerves, both of which pass out at the Fore and Lateral parts of the Thorax, the one under the Second, and the other under the Third Rib.

The first Nerve is joined by a small Branch with the Cutaneous Nerve, or with the *Cutaneous Internus* of WRISBERG, and is afterwards dispersed by numerous Filaments upon the Axillary Glands, and upon the Integuments of the Axilla and of the inner part of the Arm.

The Second Nerve is connected by one or more Bran-

ches with the First, and sends some Twigs to the Axillary Glands ; but is chiefly distributed upon the Integuments of the back-part of the Arm, which it supplies with many Branches, some of them extending as far as the Elbow.

NERVES.

WITHIN THE THORAX.

The *Nerves*, in each side of the Thorax, consist of the *Phrenic*, the *Pars Vaga* of the Eighth Pair, the *Great Sympathetic*, and the *Intercostals* ; all of which are covered and concealed by the Pleura, till they are disposed by dissection.

The *Phrenic* or *Diaphragmatic Nerve*, has a small Filament from the Second Cervical : but is chiefly formed by a Branch from the Third, and by one, and sometimes by two, from the fourth Cervical Nerve.

It decends in the Neck, along the outer and fore-part of the Scalenus Anticus Muscle, and enters the Thorax behind the anterior extremity of the First Rib, between the Subclavian Artery and corresponding Vein.

In the Thorax it runs down over the root of the Lungs, and then passes along the Pericardium, to which it adheres closely in its way to the Diaphragm.

The Right Phrenic has nearly a straight direction opposite to the Superior Cava and Right Auricle ; while the left makes a considerable Curve near its under end, corresponding with that part of the Pericardium which covers the point of the Heart.

Upon the Surface of the Diaphragm, the Trunk is divided into several Branches, which are distributed in a radiated form upon the fleshy sides of that Muscle.

Pars Vaga—The Pars Vaga, upon approaching the Thorax, sends a Filament, and sometimes two, termed *Cardiac Nerves*, which join the Cardiac Branch of the Great Sympathetic, as already observed.

It enters the Thorax between the Subclavian Vein and Artery, and after giving off the Recurrent Nerve, passes behind the root of the Lungs.

Recurrent Nerve.—The Recurrent,—is reflected upwards, behind the Subclavian Artery in the right, and behind the Arch of the Aorta in the left side of the Thorax; in consequence of which, the left nerve is the longer of the two. It afterwads ascends in the Neck, adhering to the posterior and lateral part of the Trachea, in its way to the Larynx.

It is connected, near its origin, by one or two Branches of considerable size, with the adjacent Ganglia of the Great Sympathetic Nerve, and from the opposite side of its root, sends other considerable Branches to join those of the Eighth Pair, in the formation of the Anterior Pulmonary Plexus of Nerves.

Near the Subclavian artery, it is connected by different Filaments to the Superficial and deep Cardiac Branches of the Sympathetic Nerve.

In its ascent in the Neck, it transmits Pencils of Filaments, which penetrate the Trachea, and are dispersed upon its Internal Membrane.

Behind the Thyroid Gland, it sends off minute Fibres to the beginning of the Esophagus and bottom of the Pharynx and small Twigs to the Gland itself.

Upon the inner side of the Thyroid Cartilage, it furnishes a Branch which constitutes a remarkable Anastomosis with another from the Internal Laryngeal Nerve.

At the back-part of the Larynx, it is divided into many Fibrillæ, which are distributed to the different Muscles fixed to the Arytenoid Cartilage of the corresponding side.

It has also some connections, smaller than the one already mentioned, with Branches of the Internal Laryngeal Nerve, and sends minute Fibrillæ to the Internal Membrane of the Larynx; from which circumstance the Recurrent Nerves are considered as the principal Instruments of the Organ of Voice.

The Pars Vaga, having transmitted the recurrent

Nerve, gives off filaments which form connection with Branches arising from the root of the Recurrent of the same and of the opposite side.

They anastomose also by small Fibrillæ with the Cardiac Branch of the Sympathetic, and then pass to the fore-part of the Bronchi, where they constitute what is termed the *Anterior Pulmonary Plexus of Nerves.*

The *Anterior Pulmonary Plexus*, thus formed by Branches from the Eighth Pair, with the assistance of others from the Recurrent and Sympathetic Nerves,—extends across the Great Branches of the Pulmonary Artery, and after transmitting small Filaments to the Pericardium and to the Great Cardiac Nerve, furnishes many minute Fibrillæ, which accompany the Ramifications of the Bronchi and Pulmonary Blood-vessels in the Substance of the Lungs.

From the Pars Vaga, a little below the origin of the Recurrent and likewise from the root of the Recurrent itself, Nerves are sent off, which form a Plexus, to be dispersed partly upon the Fleshy-glandular Substance of the Trachea, and partly embracing the OEsophagus, and forming upon it the *small OEsophageal Plexus.*

Behind the root of the Lungs, about six or seven Nerves of different sizes are sent off in a tranverse direction, which are termed *Posterior Pulmonary Plexus*, although they have few connections with each other.

The Posterior Pulmonary Nerves, like the Anterior follow the Branches of the Bronchi and blood-vessels in the Substance of the Lungs, and becomming gradually smaller, send off minute Twigs, which penetrate the Air-Vessels, and are ultimately dispersed upon the Internal Membrane.

After giving out the Pulmonary Nerves, the Pars Vaga is split into Chords termed *Great OEsophageal Plexus*, which surrounds the OEsophagus, sends Filaments into its Substance, and is joined by Funiculi of the Pars Vaga of the opposite side.—It goes afterwards through the Diaphragm, to be distributed upon the Vicera of the Abdomen.

From the Ganglia of the Great Sympathetic Nerve, at the bottom of the Neck and top of the Thorax, the principal *Cardiac Nerves* are produced; which are dsipersed upon the Heart; while the continuation of the

Trunk of the Sympathetic descends in the Thorax at the side of the Vertebræ.

The *Cardiac Nerves* of the *Right Side* consist of the *Cardiacus Magnus Profundus*, and *Cardiacus Minor*, the latter of which is termed by SCAPRA CARDIACUS *Aortæ Superficialis*.

The *Cardiacus Magnus Profundus*.—is principally formed by Branches from the Second Cervical Ganglion of the Sympathetic, and afterwards receives one or two Filaments from the Cardiacus Supremus, together with the Superficial Cardiac and other Branches of the Eighth Pair, as formerly described.

The Trunk, arising in this manner from different sources, passes between the Superior Cava and ascending Aorta to the Posterior Surface of the latter, and joins the Cardiac Branches of the Left Side.

By the addition of the Left Cardiac Nerves, a Plexus is formed, termed *Plexus Cardiacus Magnusof Haller*, from which is sent out a long Ganglion of a soft consistence, described by *Wrisberg* under the name of *Ganglion Cardiacum*.

From the Cardiac Ganglion, the following Branches are given off, viz.

A Branch which, after transmitting Filaments to the Anterior Pulmonary Plexus of the Eighth Pair, passes behind the Right division of the Pulmonary Artery to the Left Coronary Plexus of the Heart.

One or two Filaments, which unite with others sent from the Anterior Pulmonary Plexus of the Eighth Pair, and go before the Right Branch of the Pulmonary Artery to the Base of the Heart.

Branches of considerable size, passing partly over the right side of the Aorta, and partly between it and the Pulmonary Artery to the Anterior Coronary Plexus.

Small Branches which unite with others coming from the Trunk of the Great Cardiac Nerve, and pass over the Aorta to the Anterior Coronary Plexus.

The *Nervus Cardiacus Minor* arises from the undermost Cervical Ganglion, creeps over the Arteria Innominata and Aorta, and terminates in a Plexus formed by the Cardiac Nerves on the left side of the Aorta Ascendens.

The *Left Cardiac Nerves* are, the *Cardiacus Superficialis*, and the *Cardiacus Magnus Profundus*.

The *Cardiacus Superficialis* arises from the upper part of the Sympathetic Nerve, as formerly noticed, and passes behind the Arch of the Aorta to the Plexus Cardiacus Magnus.

The *Cardiacus Magnus Profundus Sinister*, the upper portion of which is smaller than that of the right side, arises by numerous roots from the middle, and from the lowest Ganglion of the Sympathetic Nerve.

It passes across the Arch of the Aorta, and, after receiving the Cardiac Branch of the Eighth Pair, joins the Great Cardiac of the right side, to assist in forming the Cardiac Plexus.

From the Cardiac Plexus, a Recticulum of Nerves extends upwards on the left side of the ascending Aorta which receives the Cardiacus Minor, and a Filament or two from the Cardiacus Magnus of the right side, passing over the Aorta.

From this Recticulum, the Anterior or Right Coronary Plexus is produced, which passes between the Pulmonary Artery and Aorta, and afterwards follows the course of the Trunk and Branches of the Right Coronary Artery, along with which it is dispersed upon the corresponding side of the Heart.

The Great Cardiac Plexus, after sending a Filament or two to the Lungs, gives off Nerves which unite, and form the *Trunk* of the Great Deep Cardiac Nerve of the left side, which has a soft Gangliform appearance, and passes along the corresponding side of the Pulmonary Artery.

Upon the Surface of this Artery, the Trunk soon divides into Branches, which, after sending Filaments across it to the Right Coronary Plexus, gives origin to the Coronary Plexus of the left side, which attends the Trunk and Branches of the Left Coronary Artery.

In the Left or Posterior Coronary Plexus, the Nerves are larger than in the Right, corresponding with the Parts they have to supply; and, in both, they have repeated connections with each other on the surface of the Heart.

In general, the Nerves run close to the Arteries;

some of them being continued as far as the Apex, while others penetrate the substance of the Heart.

The Great Sympathetic, having sent Nerves to the Heart, consists of an Anterior and posterior part, the former going over, and the latter under the Subclavian Artery.

Behind this Artery, the two parts unite into a Trunk, which descends in the Thorax over the Heads of the Ribs.

At the Head of each Rib, it forms a small Ganglion of an irregular shape, which unites behind with each of the Intercostal Nerves, generally by two, and sometimes by three short Branches.

From several of the Dorsal Ganglia of this Nerve, Filaments are detached obliquely over the Vertebræ to the Coats of the Aorta

From the Sixth, Seventh, and Eighth Dorsal Ganglia,—and frequently from a Ganglion above or below these,—Branches arise, which descend obliquely upon the sides of the Vertebræ, and unite into a Trunk, termed *Nervus Splanchnicus*,—which perforates the Appendix of the Diaphragm, and goes to the Viscera of the Abdomen, from which circumstance the Nerve obtains its name.

Besides the Nervus Splanchnicus, another, termed *Splanchnicus Secundarius*, or *Accessorius*, is generally observed, which arises from one or two of the Dorsal Ganglia, below the organs of the Splanchnicus,—near its termination,—or runs separate from it into the Abdomen.

The *Intercostal*, or *Costal*, or *Dorsal Nerves*,—after escaping from the Vertebræ,—run in the Furrows at the lower edges of the Ribs, in company with the Intercostal Blood-vessels, and proceed to the anterior part of the Thorax, between the two Layers of Intercostal Muscles.

Immediately after getting out from between the Vertebræ, each is connected, as already noticed, by short Branches to the Sympathetic Nerve.

Opposite to this connection, they give principal Branches backwards, to the Muscles lying near the Spine, and serving for the erection of the Trunk of the Body.

Through the rest of their course, they give Branches to the Intercostal Muscles, to the Muscles and integu-

ments of the Thorax, and also those of the Abdomen, and becoming gradually smaller, they at last vanish in the fore-part of the Body.

The Six upper Intercostals send Branches to the numerous Muscles, and to the Integuments covering the back-part of the Thorax, to the Serratus Magnus, and to the upper part of the Abdominal Muscles; while the remains of them, passing out between the Ribs at the edge of the Sternum. are reflected along with Branches of the Internal Mammary Blood-vessels, to be dispersed by small Filaments upon the Mamma, and likewise upon the Muscles and Integuments next the edge of the Sternum.

The Trunk of the First Intercostal enters the composition of the Axillary Plexus;—a Branch of it, however runs along the edge of the first Rib, in the manner the other intercostals run along their respective Ribs.

Two principal Branches,—one from the second, and the other from the third Intercostal,—are occupied in forming the Intercosto-humeral Nerves, already described; while a considerable Branch from the Fourth is reflected over the edge of the Latissimus Dorsi to the Integuments of the back-part of the Thorax.

The Six lower Intercostals, after supplying the adjacent Muscles and Integuments of the Thorax, continue their course obliquely forwards, and are dispersed upon the different Muscles and Integuments of the Abdomen;—the Twelfth, running from the last Rib along the under end of the Abdomen, sends Filaments which extend as far as the Skin of the Pelvis and Thigh.

NERVES

OF THE CHYLOPOIETIC AND ASSISTANT CHYLOPOIETIC VISCERA.

THE *Nerves* of the Chylopoietic and Assistant Chylopoietic Viscera, are formed by *Branches*, of the *Par Vagum*, and the *Rami Splanchnici* of the *Great Sympathetic Pair*.

The *Pars Vaga* of the *Left Side*,—descending from the Great OEsophageal Plexus of the Eighth Pair, creeps along the fore-part of the Cardia, detaches Filaments to the Left Hepatic Plexus, and divides into many Branches which are distributed to the upper and left portion of the Stomach.

The *Right Pars Vaga* passes upon the posterior part of the Cardia, and splits into two Fasciculi, one of which goes to the Root of the Hepatic Plexus, and to the Cœliac Ganglion, while the other, which is the principal one, is dispersed by numerous Branches upon the under and left portion of the Stomach.

The Nerves of the two Fasciculi have several connections with each other, about the Cardia and along the small Curvature of the Stomach, and form a Plexus, by some Authors termed *Coronary*, from which Branches extend along the small Curvature as far as the Pylorus.

The *Ramus Splanchnicus* and *Splanchnicus Secundarius* have their origins from the Sympathetics, and perforate the upper and Lateral part of the inferior Muscle of the Diaphragm,—as already mentioned in the Description of the Nerves of the Thorax.

After entering the Abdomen, they expand their Fibres and unite with the lateral part of the Great Semilunar Ganglion.

The *Semilunar Ganglion*, is formed by the Rami Splanch-

nici of the Right and Left Sympathetics, with the addition of the Branches from the Eighth Pair.

It is of a long curved shade, with the convex edge undermost, and is composed of many smaller Ganglia, termed *Cæliac*, which are of different size and of irregular forms.

The *Cæliac Ganglia* are placed over the Aorta, about the Roots of the Cœliac and Superior Mesenteric Arteries, and extend some way upon the Fleshy Pillars of the Diaphragm.

From the Cœliac Ganglia innumerable Nerves issue on all sides, forming a Plexus, termed by some Authors *Solar*, which extends along the Trunks and Branches of the Cœliac and Superior Mesenteric Arteries.

The Nerves upon these Arteries are so intermixed with each other and with Cellular Substance, as to form confused Webs; the name of Plexus, however, is still retained, and the particular name of each Plexus is derived from the Artery which it surrounds, or the Viscus to which it belongs.

The *Hepatic Plexus* —after giving Twigs to the Renal Glands, sends Filaments to the Diaphragm, which accompany the Diaphragmatic Arteries, and anastomoses with Branches of the Phrenic Nerves.

It afterwards divides into Right and Left Plexuses, corresponding with the Right and Left Branches of the Hepatic Artery, or with the Right and Left Trunks when such are present.

The Left Hepatic Plexus furnishes several Branches to the Stomach, which intermixes with those of the Eighth Pair, upon the small Curvature.

The Right Hepatic Plexus imparts Branches to the corresponding part of the Pancreas, to the small end of the Stomach and beginning of the Duodenum, and gives origin to the Right Gastro-epiploic Plexus, which attends the Artery of the same name, distributing its Filaments to the Great Curvature of the Stomach, and to the Omentum Majus.

The Hepatic Plexuses surround the Hepatic Artery and Vena Portæ, and after sending several Filaments to the Biliary Ducts and Gall-Bladder, follow the Branches of the Blood-vessels through the substance of the Liver.

The *Splenic Plexus*, composed of several small Fila-

ments, surrounds the Splenic Artery, gives Twigs to the Pancreas, and then accompanies the Vessels into the Spleen.

The *Superior Mesenteric Plexus*, forms a Vagina, which surrounds, and in a great part conceals the Trunk of the corresponding Artery.

From this Plexus, numberless Filaments are produced, —many of them Extremely minute,—which run through the Mesentery, partly with the Blood-vessels, and partly at a distance from them; and which, after supplying the Coats of the Vessels and Mesenteric Glands, are distributed to the small Intestines in general, and to the right portion of the Colon.

The Nerves of the Colon are, in proportion to the part they have to supply, larger than those of the small Intestines, and in several places form Arches, which are situated at the sides of the Arteries.

The Cœliac Ganglia send down, along the Aorta, a Vagina similar to that surrounding the Superior Mesenteric Artery, which is joined by other Nerves from the Trunk of the Sympathetic continued along the Lumbar Vertebræ.

From the Aortic Vagina or Plexus, a process is sent off, termed *Inferior Mesentery Plexus*, which surrounds the Trunk of the Inferior Mesenteric Artery, and follows it to the left portion of the Colon, and to the Rectum;—the Nervous Filaments forming Arches in several places as in the Superior Mesenteric Plexus.

The Aortic Plexus receiving fresh supplies from the Trunks of the Sympathetics, sends down a Plexus, commonly termed *Hypogastric*, which passes over the end of the Aorta, and, upon the last Lumbar Vertebra, splits into right and left portions, which descend to the Viscera contained in the Pelvis.

NERVES

OF THE ORGANS OF URINE AND GENERATION.

THE *Nerves* of the Organs of Urine and Generation, consist of the *Renal* and *Hypogastric Plexus*, and of the *Spermatic* and *Pudic Branches*.

The *Renal Plexus* is composed of Nerves sent from the Cœliac Ganglia joined by some others derived from one or two of the Ganglia, of the Sympathetic Nerve in the bottom of the Thorax.

It is interspersed, at its beginning, with small Ganglia, termed Renal, and is afterwards divided into Anterior and Posterior Plexuses, which extend along the corresponding Surfaces of the Renal Artery to the Substance of the Kidney.

From the Renal Plexus, small nervous Twigs ascend to the Renal Gland, which is furnished with others from the Cœliac Ganglia and Root of the Hepatic Plexus.

The Renal Plexus also sends down Filaments to supply the upper portion of the Ureter;—the under receiving Nerves from the Hypogastric Plexus.

The *Hypogastric Plexus*, the origin and course of which have been already mentioned, is connected by different Nerves to the adjacent Trunks of the Great Sympathetic and Sacral Nerves, and sends many Filaments to the Rectum, Bladder, and Spermatic Vessels in the Male; and to the Rectum, Bladder, Uterus, and Vagina in the Female.—The Nerves of the Uterus are proportionally small. They pass into its substance at the Cervix, and follow the course of the Blood-vessels.

Spermatic Nerves.—The Spermatic Nerves are very minute—They consist of a Superior or Internal, and of an Inferior or External set of Capillary Branches.

The former are derived from the Renal and Aortic

Plexus, and accompany the Spermatic Blood-vessels in their course through the Abdomen, and afterwards to the Testicle.

The latter are sent off from a Branch of the Second Lumbar Nerve, which running behind the Tendon of the External Oblique Muscle, near POUPART'S *Ligament*, detaches a Filament, which in the Male, goes to the Spermatic Cord, and more particularly to the Cremaster Muscle ; and in the Female, is reflected along the Ligamentum Rotundum to the Uterus.

Nervi Pudici.—The Nervi Pudici arise in two Fasciculi,—a *Superior* and *Inferior*—which are formed by Fibrillæ from all the Cords entering the composition of the Sciatic Nerve.

The Superior Fasciculus is formed more particularly, by Threads from the two under Lumbar and two upper Sacral Nerves ;—the inferior is composed of a small Cord from the Second, and a large one from the Third Sacral.

The Fasciculi pass through the under part of the Notch of the Os Ilium, and afterwards between the Sacro sciatic Ligaments, and follow the Pudic Blood-vessels, anastomosing in some places with each other by oblique Branches.

They send off many Branches to the Muscles and other parts about the Anus and Peritoneum, and then pass forwards to supply the different parts of the Penis.

On the Penis, the Nerves follow the course of the Arteries, the Superior Fasciculus constituting the Nervus Dorsalis, and the Inferior giving Branches to the under part of the Penis.

The *Nervus Dorsalis* which is the most considerable of the Penis, runs forwards between the corresponding Artery and Vena Magna, expanding into many Branches which after supplying the Corpus Cavernosum and Teguments of the corresponding side, terminate in the Substance of the Glands.

NERVES

OF THE

LOINS, PELVIS, AND INFERIOR EXTREMITY.

The *Nerves* of the Loins, Pelvis, and Inferior Extremity, consist of the continuation or Inferior portion of the Sympathetic, and of the Trunks and Branches of the *Lumbar* and *Sacral* Nerves.

The *Sympathetic Nerve*, after reaching the Abdomen, makes a sweep forwards upon the anterior and lateral part of the Lumbar Vertebræ, between the Tendinous Crura of the Diaphragm and the Psoas Muscle.

It afterwards descends into the Pelvis, nearly of the same size as in the superior parts of the Body, and passes over the Surface of the Os Sacrum, at the inner side of the Great Sacral Foramina.

Towards the lower part of the Pelvis, it becomes considerably smaller, and at last finishes its course upon the susface of the Os Concygis, where it unites into an Arch with its fellow of the opposite side.

In the Loins, it forms Ganglia, similar to those in the Thorax, each of which is connected behind, by two or three long slender Branches, to the roots of the Lumbar Nerves, and before by other slender Nerves to the Aortic Plexus.

In the Pelvis also, it forms Ganglia which are connected to the Sacral Nerves on one side, and to the Great Sympathetic on the other, by cross Branches.

Filaments are sent off in the Pelvis, from the Sympathetic to the Muscles and Membranes about the Os Coccygis, and to the Intestinum Rectum.

Lumbar Nerves.

The *Five Lumbar Nerves*, immediately after emerging from the Bones, communicate with each other, and

with the Sympathetic Nerve, and send large Branches backwards to the Muscles and Integuments on the posterior part of the Loins.

By their connections with each other, they compose a Plexus termed *Lumbar*, which is situated behind the Psoas Muscle, and sends Branches outwards to the Quadratus Lumborum, and to the Flexors of the Thigh.

The *First Lumbar Nerve* is connected by a small Branch to the Twelfth Dorsal, and by its Trunk to the Second Lumbar.

It gives Twigs to the Quadratus, and a principal Branch which passes over that Muscle towards the Spine of the Os Ilium, where it sends Nerves to the Integuments of the Pelvis, to the upper and outer part of the Thigh, to the under end of the Abdominal Muscles, and to the Integuments of the Pubes.

The *Second Lumbar* perforates the Psoas, to which it gives Branches, and afterwards runs into the Third.

From the Second Lumbar, the *Spermaticus Externus* is sent off, which perforates the under part of the Transverse and Internal Oblique Muscles, near the anterior end of the Spine, or Crest of the Ilium.

It goes next under the Tendon of the External Olique at the inner side of POUPART'S Ligament, and passing through the Abdominal Ring, is distributed to the Scrotum and to the Spermatic Cord in the Male.

In the Female, it sends a Branch to the Labia, and another reflected along the Digamentum Rotundum, to the Uterus; and in both Sexes, it gives Branches also to the Integuments and Glands of the Groin.

Another Branch, smaller than the former, arises also from the Second Lumbar, and passing between the Psoas Muscle and Vertebræ, constitute the Cutaneous Medius of the Thigh.

The *Cutaneous Medius* descends in the fore-part of the Thigh, opposite to the inner edge of the Rectus Muscle, and supplies the Integuments near it as far as the Knee,—one Branch of it anastomosing with another of the Cutaneus Anterior.

Branches of the Second, Third, and Fourth Lumbars, form a Nerve of considerable size, called *Obturator*, which passes between the External and Internal Iliac Blood-vessels, and along the side of the Pelvis.

The *Obturator Nerve* accompanies the Blood-vessels, of the same name, through the upper part of the Obturator Muscles and Ligament, and having furnished Branches to the Obturator and Pectineous Muscles, it divides into Anterior and Posterior Fasciculus; the former dispersed upon the two small Adductors and Gracilis, the latter upon the Great Adductor of the Thigh.

The principal parts of the Trunks of the four upper Lumbar Nerves, especially of the *Third* and *Fourth*, unite and form a Nerve of great size, termed *Crural*, or *Anterior Crural*.

The *Crural Nerve*, after bestowing Branches upon the Iliacus Internus, passes behind, then at the outside of the Psoas Muscle, to get to the Thigh.

In its course from the Abdomen, and at the upper part of the Thigh, it is situated at the outside of the Femoral Artery, which lies between it and the corresponding Vein.

Behind POUPART's Ligament, it is divided into many Branches, which are distributed to the Muscles and Integuments on the fore and lateral parts of the Thigh,—one Branch in particular descending upon the Leg.

The Branches are as follow:

The *Cutaneous Anterior*,—more internal than the Cutaneous Medius, which crosses over the middle of the Sartorius Muscle, and after supplying the adjacent Integuments, terminates in the Skin and Cellular Substance, at the fore and inner part of the Knee.

The *Cutaneus Internus*,—still more internal than the former,—which passes between the Sartorius and Triceps, and, after giving Filaments to the Integuments at the inside of the Thigh, terminates in those at the under and fore part of the Knee.

The Deep Branches of the Crural Nerve, which are considerably larger than the Superficial, go to the Pectineus and Triceps, to the Sartorius and Gracilis, and to the Four Extensors of the Leg, and furnish Twigs to the Femoral Blood-vessels also.

The Branch to the Leg, termed *Saphenus*, descends between the Sartorius and Triceps, and afterwards behind the Tendon of the former, to the inner side of the Tibia.

Under the Knee, it gives off a Branch, named FISCH-

ER, *Saphenus Minor*, which goes down a little behind the Saphenus, and, furnishing Filaments to the Integuments of the inner and back-part of the Leg, terminates behind the Malleolus Internus, on the Integuments of the Foot.

The Trunk of the Saphenus attends the Vena Saphena Major, sending many Nervous Threads obliquely forwards to the Integuments on the inner and fore-part of the Leg, and is at length consumed upon the Skin and Cellular Substance of the upper and inner part of the Foot.

The remaining part of the Fourth Lumbar Nerve unites with the *Fifth* into a Trunk which descends into the Pelvis.

Sacral Nerves.

The *Sacral Nerves* consist of small *Posterior*, and large *Anterior* Trunks.

The *Posterior Sacral Nerves* pass out by the Holes in the back-part of the Os Sacrum, and anastomose with each other, and with some of the Branches of the Gluteal Nerves.

They send out a few tender Fibrillæ, which are dispersed upon the Muscles covering the back-part of the Os Sacrum, and upon the Glutei Muscles and their Integuments.

Anterior Sacral Nerves.—Of the Anterior Sacrals,—the two uppermost are the largest: The rest suddenly diminish in size, the last being the smallest of the Spinal Nerves.

They go through the Holes in the fore-part of the Os Sacrum, and, soon after their exit, are united with each other, and with Branches of the Sympathetic Nerve.

The First, Second, and Third Sacrals, join into a Trunk, which receives the common one sent down from the Fourth and Fifth Lumbars, and forms a Plexus which sends out the *Sciatic*, the largest Nerve of the Body.

The roots of the Sciatic Nerve, give origin to the Fasciculi which compose the Pudic Nerve, formerly described, and also to the Gluteal Nerves which are dispersed upon the Muscles of the Hips.

The *Gluteal Nerves* run in two Fasciculi,—a Superior

arising immediately from the Trunk formed by the two last Lumbars, and—an Inferior, coming off from the two last Lumbars and first Sacrals.

The *Superior Fasciculus* goes through the upper part of the Notch of the Os Ilium, to be dispersed upon the two smaller Glutei Muscles.

The *Inferior* Fasciculus passes through the under part of the same Notch, and below the Pyriform Muscle, to be distributed upon the Gluteus Maximus and Integuments.

The *Fourth Sacral* sends Filaments of the Hypogastric Plexus, others to the Muscles and Ligaments of the Os Coccygis; the rest pass outwards to the Muscles and Integuments about the Anus.

The *Fifth*, which is scarcely above the size of a Filament, after giving Twigs to the Coccygeus Muscle, perforates the Sacro-sciatic Ligaments, and terminates in the Muscles and Integuments of the Anus.

Sciatic Nerve.—The Sciatic or Ischiatic Nerve,—passes obliquely through the Notch of the Ilium, under the Pyriform Muscle. It goes afterwards over the other short Rotator Muscles, and is placed between the Tuber Ischii and Trochanter Major, where it is covered by the Giuteus Maximus.

After leaving the Pelvis, it descends in the back-part of the Thigh, first upon the Long Flexors and Adductor Magnus, and then between the latter and Os Femoris to the Ham, where it obtains the name of *Popliteus*.

In this course, it gives out the following Branches, which supply the Muscles and Integuments on the back-part of the Thigh, viz.

Twigs to the Rotators of the Thigh, which come off from it after its passage through the Sciatic Notch.

The *Cutaneous Posterior Superior*, which arises within the Pelvis, and passing out with the Sciatic, is divided into Branches, some of which are reflected to the Scrotum in the Male, and to the posterior parts in the Labia in the Female, and, in both, to the Skin about the Anus and Perineum.—The principal Branches of this Nerve pass downwards, supplying the Integuments of the back part of the Thigh, as far as the bending of the Knee.

A *Branch* to the long Head of the Biceps.

Two small Nerves, the one termed *Cutaneus Internus Superior*, which comes off near the upper part of the Thigh, and vanishes in the Skin, a little farther down; the other termed *Cutaneus Internus Inferior*, which arises from the former, goes down the posterior part of the Thigh, and then descending upon the inner Head of the Gastrocnemius Externus, terminates in the Integuments of the Calf of the Leg.

A *Large Common Trunk*, and sometimes, instead of it, *separate Branches*, which arise near the middle of the Thigh, and are distributed to the Adductor Magnus, Semimembranosus, Biceps, and Semitendinosus.

Nervus Popliteus.—The Popliteal Nerve is situated between the Ham-strings, and between the Skin and Popliteal Blood-vessels.

A little above the bending of the Knee, it is divided into a small External, and a large Internal Branch; the former named *Fibular*, and the latter *Tibial Nerve*.

The Tibial and Fibular Nerves adhere, for some way, by Cellular Substance, and even the Trunk of the Sciatic may be split into these two Nerves for a considerable way up the Thigh.

The *Fibular*,—termed also *Peroneal Nerve*,—sends off, at its beginning, the *Cutaneus Externus*, which is a small Branch giving Twigs to the under end of the Biceps, and which, after running down on the outer Head of the Gastrocnemius, disappears in the Integuments of the same side of the Leg.

Over the outer Condyle of the Os Femoris, it gives off another *Cutaneus Branch*, which goes over the Gastrocnemius Muscle, and, after anastomosing with a Branch of the Tibialis, goes along the outer part of the Leg, and terminates in the Integuments of the side of the Foot.

The Fibular Nerve afterwards passes over the Head of the Fibula, and divides into *Superficial* and *Deep Branches*, which supply the Muscles and Integuments of the outer and fore-part of the Leg.

The *Superficial Fibular* crosses over the Fibula, immediately under its articulation, and perforating the Peroneus Longus, and going over the Brevis, it gives Branches to both, and afterwards becomes Subcutaneous, about the middle of the outer parts of the Leg.

It sends Branches to the Matatarsus, to the Extensor Digitorum Brevis, and others, which, after anastomosing upon the upper part of the Foot, furnish Dorsal Branches to both, and afterwards becomes Subcutaneous, about the middle of the outer parts of the Leg.

It sends Branches to the Metatarsus, to the Extensor Digitorum Brevis, and others, which, after anastomosing upon the upper part of the Foot, furnish Dorsal Branches to the larger Toes.

The *Deep Fibular Nerve* crosses over the Fibula immediately above the former, and divides into several Branches, viz.

A *Reflected Branch* to the soft parts of the Joint:
A *Branch* to the Perioneus Longus:
A *Branch* to the Tibialis Anticus:
Branches to the Extensor Pollicis, and Extensor Digitorum Longus:
Filaments which creep along the Periosteum of the Tibia, and others which adhere to the Coats of the Tibial Artery.

The longest Branch of the Nerve accompanies the Anterior Tibial Artery, and divides upon the Foot into Branches, which have some connections with each other, and supply the Extensor Digitorum Brevis.—Some Filaments continued from the Branches run to the Musculi Interossei, while others of more considerable size go to some of the innermost Toes, one Twig sinking with a Branch of the Anterior Tibial Artery to the Deep Muscles of the Sole.

The *Tibial Nerve* passes between the Heads of the Gastrocnemius Muscle, and after perforating the origin of the Soleus, descends between it and the Flexor Digitorum Longus, upon the Posterior Tibial Artery, to the under part of the Leg; in which course it sends off the following Nerves, viz.

The *Communicans Tibiæ*,—which accompanies the Vena Saphæna Minor in the back-part of the Leg, and to the outer part of the Foot.

Behind the Belly of the Gastrocnemius, the Communicans sends a Branch to be consumed in the Fat; and a little lower, it anastomoses with the communicating Branch of the Fibular Nerve.

The under part of this Nerve is dispersed upon the

Integuments of the outer Ankle and Adjacent side of the Foot, some Branches passing as far as the Dorsal side of two or three of the smaller Toes.

Branches to both Heads of the Gastrocnemius, to the Plantaris, and to the Soleus.

Near the middle of the Leg, it sends Branches to the Tibialis Posticus, to the Flexor Digitorum and Flexor Pollicis,

One or two *Cutaneus Branches*, dispersed upon the Skin at the under and inner part of the Leg.

Near the Ankle a *Branch* which passes behind the Tendo Achillis, principally to the Integuments of the outer and back part of the Foot.

The Tibial Nerve passes afterwards between the Arteries and Os Calcis into the Sole.

In the hollow of the Os Calcis, after detaching Branches to the parts adjacent, it divides into *Internal* and *External Plantar Nerves*, which are nearly of equal size.

The *Internal Plantar Nerve* runs near the inner side of the Sole, sends Filaments to the Abductor Pollicis, Flexor Digitorum Brevis, and Flexor Digitorum Accessorius, and Twigs to the Lumbricales.

It afterwards gives out four large Branches splitting into others, which run with the Arteries along the Plantar sides of the three first Toes, and inner side of the fourth Toe,—in the manner the Radial Nerve runs along the corresponding Fingers.

The *External Plantar Nerve*, sends Branches to the Heel, and passes with the Artery of the same name to near the outer edge of the Sole, where it splits into three Principal Branches.

The two first run to the adjacent sides of the fourth and fifth Toes, and outer side of the Little Toe, the inner one often anastomosing with a corresponding Branch of the Internal Plantar.

The third forms an Arch corresponding with that of the External Plantar Artery, furnishes Branches to the short Muscles of the Little Toe, to the Interossei, Lumbricales, and Transversalis, and terminates in the short Muscles of the Great Toe.

The Plantar Digital Nerves send Filaments, and upon the Toes anastomose with each other, and with the Dorsal Digital Nerves,—as the Palmar Digital Nerves do in the Hand.

INDEX TO

FYFE'S ANATOMY.

VOLUME SECOND.

FINIS.