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London

CONVERSATIONS

ON

ANATOMY, PHYSIOLOGY,

AND

SURGERY.

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CONVERSATIONS

ON

ANATOMY, PHYSIOLOGY,

AND

SURGERY.

BY

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"COLLOQUIA ANATOMICA;"
"COLLOQUIA DE MORBIS PRACTICA;"
"COLLOQUIA DE REBUS PRAECIPUIS CHEMIAE,
"PHARMACEUTICES, ATQUE BOTANICES."

SECOND EDITION,

MUCH IMPROVED.

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MDCCCXXXII.

TO THE

GENTLEMEN

ATTENDING THE

ANATOMICAL AND SURGICAL LECTURES,

THIS LITTLE WORK IS DEDICATED,

WITH MUCH RESPECT,

AND BEST WISHES,

BY THEIR MOST OBEDIENT SERVANT,

ARCHIBALD ROBERTSON, M. D.

PREFACE.

NOTWITHSTANDING the numerous Manuals of Anatomy in the hands of Anatomical and Surgical Students, it occurred to me that something of a concise and more practical form was still wanted. In consequence, I have employed my leisure hours in composing this small Treatise, in which I have endeavoured to give a correct Epitome of Anatomy, interspersed with Physiological and Surgical remarks, calculated to instruct those anxious of acquiring practical knowledge, and also to refresh the memory of Practitioners, who have little leisure to read voluminous works. The conversations are conducted in a manner deemed the best for conveying necessary information to my readers, and in a style familiar and plain.

The organic derangements of the different parts are shortly pointed out; and the diseases occa-

sioned by, or inducing them, are enumerated without entering into any particular description of them, which would have been foreign to my present purpose. These are generally placed after the Anatomical, Physiological, and Surgical descriptions of the different organs.

I have not scrupled to make repetitions, when they seemed to be requisite for impressing important facts upon the mind of my young readers. For their assistance also, I have frequently marked the accentuation of words most apt to be mispronounced, without any view of dictating to those advanced in their studies, and familiar with Anatomical phraseology.

It is presumed that this concise Treatise, besides being an agreeable and useful pocket companion to Anatomical and Surgical Students, will also be found well adapted to the purposes of those who read for general information.

The CONVERSATIONS on the PRINCIPLES and PRACTICE of SURGERY, will occupy another volume, which I intend to put into the hands of my young Professional Friends, as soon as my other avocations will permit me to do so.

PREFACE TO THE SECOND EDITION.

THE very favourable reception, which the former Edition of this work has met with from professional as well as general Readers, has induced the Author to reconsider the numerous subjects treated of with great care and attention. He has found it necessary to make many important alterations and additions, for the purpose of farther explaining, and illustrating some things, that had formerly escaped him. He therefore hopes that THIS SECOND EDITION will be found to be much improved, and more worthy of a careful perusal.

The Author regrets exceedingly, that he has not had leisure, before this time, to prepare the other Volume of CONVERSATIONS ON THE PRINCIPLES AND PRACTICE OF SURGERY for publication; but as it is in a state of great forwardness, it shall soon be laid before the public.

EDINBURGH,
January 1832.

CONVERSATIONS

ON

ANATOMY, PHYSIOLOGY,

AND

SURGERY.

Q. WHAT are the two parts of which the human body is generally said to be composed?

A. The solids and fluids.

Q. How are the solids divided?

A. Into hard and soft parts.

Q. What are denominated hard?

A. The bones, and cartilages.

Q. What soft?

A. The muscles, viscera, and all other parts.

Q. How are the fluids divided?

A. Into the chyle, blood, lymph, secretions, and excretions.

Q. By what are the bones bound together in the recent subject?

A. By ligaments and cartilages, and sometimes by concretion.

Q. By what in the skeleton?

A. By their own ligaments, and form what is called a *natural skeleton*; or by wires and plates, to form an *artificial skeleton*.

Q. How are the bones of the human skeleton generally divided?

A. Into those of the head, trunk, superior and inferior extremities.

OF THE BONES OF THE CRANIUM.

Q. Enumerate the *bones of the cranium?*

A. The *cranium* is composed of *eight bones*, the frontal, two parietal, two temporal, the occipital, sphenoidal, and ethmoidal; the two last are also common to the bones of the face.

Q. What connects them together?

A. *Sutures.*

Q. How many KINDS OF SUTURES are there?

A. Three: they are said to be *true*, when the edges of the bones are serrated and indented into each other; to be *false*, when the edge of the one bone overlaps that of the other; and *harmonic*, or *harmoniæ*, when the edges of the bones are simply applied to each other.

Q. What *sutures* are *true?*

A. The coronal, sagittal, and lambdoidal.

Q. What *sutures* are called *false?*

A. The temporal or squamous.

Q. What *sutures* are *harmonic?*

A. The harmonic sutures connect the bones of the face.

Q. What is the *situation* of the *coronal suture?*

A. It runs across between the frontal and parietal bones.

Q. How is the *sagittal suture* placed?

A. It is placed longitudinally on the summit, and connects the parietal bones to each other.

Q. How is the *lambdoidal suture* situated?

A. It commences at the posterior part of the parietal bones, stretches obliquely downwards on each side of the occipital bone, and connects it to the parietal.

Q. What is meant by the *additamenta* of the *lambdoidal suture?*

A. That part of the lambdoidal suture between the

occipital and temporal bones, is called *additamenta sutūrae lambdoidālis.*

Q. Describe the *temporal* or *squamous sutures?*

A. The squamous suture is semicircular, and connects the temporal bone on either side above to the parietal. The upper curved edge of the temporal slides above, and overlaps the edge of the parietal bone.

Q. What are the *additamenta* of the *squamous suture?*

A. Those parts of the squamous sutures between the under and back portions of the parietal, and the upper and back of the temporal bones, become serrated, and are sometimes termed *additamenta sutūrae squamōsae.*

Q. What *other sutures* are there besides those already mentioned?

A. The *ethmoidal, sphenoidal, transverse, zygomatic,* and *harmonic* sutures.

Q. What *advantages* are derived from the Sutures of the cranium?

A. Ossification in the foetus is more speedily completed in different bones, than if the cranium had been formed of one: the bones being at some distance from each other at birth, can be made to approach and overlap each other, to yield by their elasticity, and thus to accommodate the head of the child to the passage: the sutures also afford a firmer adhesion to the dura mater, and a free communication between the external and internal vessels, especially in young persons; and they frequently prevent a fracture from extending farther than the suture, with which it comes in contact.

OF THE FRONTAL BONE.

Q. Describe the situation of the frontal bone?

A. The *os frontis* forms the anterior part of the cranium, and the upper part of the face.

Q. Into how many *portions* is it divided?

A. Into a frontal and facial portion.

Q. What is its general form?

A. Its shape somewhat resembles a shell; its upper part is concave internally, and convex externally.

Q. What are the *processes* of the frontal bone?

A. At the inner side of the orbits are the two *internal angular*, between which is the *nasal* process: at the outer or temporal side of the orbits are the two *external angular*; between the internal and external angular processes, on either side, the two *superciliary ridges* extend, from which the two *orbitar processes* or *plates* run back, forming the upper part of the orbit: two *roundish eminences* are frequently observed above the internal ends of the superciliary ridges; and behind the external angular processes are the *temporal processes* or *ridge*.

Q. What parts are attached to the *internal angular* process?

A. The *corrugator supercilii*, and more internally the *cartilaginous pulley* of the *obliquus superior* muscle of the eye.

Q. What is attached to the *temporal ridge*?

A. A part of the *temporal muscle*, and of the *aponeurotic expansion* which covers it.

Q. What is contained under the *eminences* above the superciliary ridges?

A. They are immediately over the cavities, called *frontal sinuses*.

Q. How can frontal sinuses be formed in the solid bone?

A. The bones of the cranium are composed of an *external* and an *internal* hard *plate*, called *tables*; and when they are separated, the sinuses are formed between them.

Q. What connects these two tables?

A. *Cancelli*, or *diploë* of various thickness.

Q. What is the appearance of the *frontal bone internally*?

A. Its concave surface is furrowed and sinuated.

Q. What produces those *furrows* and *sinuosities*?

A. Branches of the *arteries* of the dura mater are si-

tuated in the furrows; and the *convolutions* of the anterior lobes of the brain lie in the sinuosities.

Q. What PROCESSES appear internally?

A. The *spine* in the middle of the under part of the bone extending upwards from the convex projections of the orbitar processes on either side.

Q. What parts are attached to the *frontal spine?*

A. The end of the *falx major.*

Q. What rests on the *projecting orbitar processes?*

A. The two anterior lobes of the brain.

Q. Describe the DEPRESSIONS of the frontal bone?

A. Behind the temporal end of the superciliary ridges, there is a *sinuosity* in the orbitar depressions; behind each internal angular process a *small pit;* the *temporal fossa; a fissure* between the orbitar processes; and the *frontal furrow* internally extending upwards from the spine.

Q. What is contained in the *temporal sinuosity?*

A. The *lachrymal gland.*

Q. What is attached to the *small pit* under each internal angular process?

A. The *cartilaginous pulley* of the superior oblique or trochlearis muscle.

Q. What occupies the *temporal fossa?*

A. Part of the *temporal muscle.*

Q. What is placed in the *fissure* between the orbitar processes?

A. The *cribriform plate* of the ethmoid bone.

Q. What occupies the *frontal furrow?*

A. The upper part of the *superior longitudinal sinus* of the dura mater.

Q. How many FORAMINA are found in the frontal bone?

A. Three on each side. The *foramen supra-orbitarium,* near the inner end of each superciliary ridge; the *foramen orbitarium internum anterius,* and *posterius,* between the orbitar plates of the frontal and ethmoidal bones, about half an inch distant from one another in

each orbit; and internally the *foramen coecum* in the middle, at the under part of the spine.

Q. What passes through the *foramen supra-orbitarium?*

A. The *frontal artery* and *nerve.*

Q. Whence does this *artery* arise?

A. The *frontal artery* is said to be a branch of the ophthalmic, but it is in reality a continuation of the trunk of the ophthalmic.

Q. Whence comes the *frontal nerve?*

A. It is a branch, or rather a continuation of the trunk, of the ophthalmic nerve, sent off from the fifth pair.

Q. What passes through the two *foramina orbitaria interna?*

A. Small *twigs* from the *ophthalmic nerve,* and small branches from the *ocular artery,* pass through them into the nose.

Q. What is transmitted through the *foramen coecum?*

A. *Small blood-vessels* pass through it into the substance of the bone, and frequently into the nose: here too the *superior longitudinal sinus* takes its origin.

Q. What is the state of the frontal bone in the FOETUS?

A. In the foetus, at full time, it is divided perpendicularly in the middle; at the upper and back part of the two pieces it is incomplete, and forms part of the *bregma* or *fontanella;* the *frontal sinuses,* and the *superciliary foramina,* are not yet formed.

Q. What *purposes* does the frontal bone serve?

A. It defends and supports the two anterior lobes of the brain; it forms a great part of the orbits; and it assists in forming the septum narium.

Q. What are its *connexions?*

A. The coronal suture connects it above to the parietal bones; the sphenoidal below to the sphenoid bone; and the transverse suture anteriorly to the bones of the face.

OF THE PARIETAL BONES.

Q. Describe the situation and form of the *parietal bones?*

A. They are situated on the lateral and superior parts of the cranium; are somewhat quadrangular; but their upper and fore sides are longer than those behind and below; their inferior side is a concave arch; their inferior and anterior angle is so acute, that it resembles a process.

Q. What is the external appearance of the parietal bone?

A. It is smooth and convex, and exhibits a transverse semicircular ridge.

Q. What is attached to that *ridge?*

A. Part of the origin of the *temporal muscle.*

Q. Has the parietal bone any *foramina?*

A. It has generally one, named *foramen parietale,* near its upper and back part.

Q. What vessels pass through it?

A. A *vein* from the integuments passes into the superior longitudinal sinus; and sometimes also a small branch of the temporal or occipital *artery* is sent through it to the falx and dura mater.

Q. Are there any *depressions* on its internal surface?

A. Yes; it is indented with furrows, which begin by a trunk at the inferior and anterior angle, and divide into many ramifications; there is a depression or groove along its upper edge; a fossa near its posterior and inferior angle; and several other irregular depressions in various parts of it.

Q. What forms the *furrows* proceeding from the inferior and anterior angle of the parietal bone?

A. The trunk and branches of the *meningeal artery,* which is sent off from the internal maxillary.

Q. What is contained in the *groove* under the sagittal suture?

A. When the parietal bones are placed together, the

longitudinal sinus occupies the groove formed in the bones.

Q. What is contained in the *fossa* near its inferior and posterior angle?

A. A part of the *lateral sinus.*

Q. What occupies the *numerous irregular depressions?*

A. The different convolutions and prominences of the brain.

Q. Have the parietal bones two *tables* and a *diploë* between them?

A. Yes; their tables and diploë are very complete and distinct.

Q. What is the *state* of the parietal bones *in the foetus* at full time?

A. Their sides are incomplete; they have no *foramen parietale;* and between them and the divided middle of the os frontis is an unossified space, filled by a strong ligamentous membrane, called the *bregma* or *fontanella.*

Q. Describe the *connexions* of the parietal bones?

A. They are connected above to each other by the sagittal suture; before to the frontal bone by the coronal suture; below to the temporal bone by the squamous suture; to the sphenoid bone by the sphenoidal suture; and behind to the occipital bone by the lambdoidal suture.

Q. What *purposes* do the parietal bones serve?

A. They form the superior and lateral parts of the cranium, support and protect the lateral lobes of the brain.

OF THE OCCIPITAL BONE.

Q. Where is the *occipital bone* situated?

A. In the posterior and inferior part of the cranium.

Q. What is its *figure?*

A. It is somewhat *rhomboidal,* with its upper angle rounded, its two lateral ones obtuse, its inferior one

flattened, and projecting forwards into the form of a wedge.

Q. What ELEVATIONS does the external surface of the occipital bone exhibit?

A. It has a superior and an inferior transverse ridge; a perpendicular spine crossing these; unequal edges of the foramen magnum; the two condyles situated one on each side of the great foramen, deepest at their internal parts, and running obliquely forwards and inwards.

Q. What forms the *superior transverse ridge?*

A. The two *muscles* named *trapezii;* and the origin of the *occipito-frontalis* are fixed to that spine.

Q. What produces the *inferior transverse ridge?*

A. The *recti postĭci,* and *oblĭqui superiores* are attached to it.

Q. What forms the *perpendicular spine?*

A. The muscles of the opposite sides leave a prominent ridge between them, which crosses the transverse in their middle, and forms the *crucial spine.*

Q. What are the EXTERNAL DEPRESSIONS of the occipital bone?

A. A considerable one between the middle of the superior and inferior transverse ridges; one laterally between the ridges and temporal bones; others between the inferior ridge and foramen magnum: a rough surface round the condyles; another rough surface between them and the mastoid processes of the temporal bones; and a semilunar notch on each side.

Q. What occupies the depression between the transverse ridges?

A. The insertion of the two *complexi muscles* towards the perpendicular spine; and of the *splenii* more laterally.

Q. What is situated in the depression betwen the inferior ridge and foramen magnum?

A. The insertion of the *recti minōres postĭci.*

Q. What is situated more laterally on the rough surface towards the mastoid processes?

A. The insertion of the two *recti majŏres postĭci.*

Q. What does the *semilunar notch* tend to form?

A. This notch forms part of the *forāmen lacĕrum posterius,* which is completed by the petrous portion of the temporal bone.

Q. Describe the position of the *two condyles?*

A. When the base of the cranium is turned uppermost, the condyles appear with their anterior ends converging, following the curve of the foramen magnum, terminate nearly in a line with its anterior part; while their posterior ends diverge a little as they follow the margin of the foramen magnum, and terminate a few lines behind its middle or transverse diameter.

Q. What is the *form of the condyles?*

A. Their surface is circular from the anterior to the posterior end, and oblique, in consequence of their inner sides next the foramen magnum being higher or deeper, and their lateral sides depressed in an inclined plane.

Q. What is the *use* of that *oblique surface* laterally?

A. To form a firm articulation with the *Atlas,* or first vertebra of the neck; and to prevent the head from sliding to either side.

Q. What *motions* does the head perform on its condyles?

A. The figure and positions of the condyles admit of motions forwards and backwards only.

Q. What performs the *rotatory motions* of the head?

A. The rotatory movement of the *atlas,* or first vertebra, upon the second, or *vertebra dentāta,* of the neck.

Q. By what are the motions of the head, when inclined from right to left, performed?

A. By means of the five lower cervical vertebrae.

Q. Describe the *elevations on the internal surface* of the occipital bone?

A. It exhibits a horizontal ridge, and a perpendicular ridge or spine, crossing the former in the middle at right angles.

Q. What DEPRESSIONS and GROOVES does its internal surface exhibit?

A. Four large depressions formed by the cruciform spine, which is grooved on its apex; a curved fossa on either side of the foramen magnum; the concavity of the cuneiform process; and a curved fossa on either side of it.

Q. What parts are situated in these great depressions?

A. Those two above the horizontal spine contain the two *posterior lobes* of the brain; and the two below that ridge, on either side of the perpendicular spine, contain the two *hemispheres of the cerebellum*.

Q. What parts are attached to the *cruciform spine?*

A. The posterior part of the *falx major* is attached to the portion of the perpendicular spine above the horizontal ridge; and the posterior and inferior part of the *falx minor* to that below it. The *tentorium cerebelli* is attached to the horizontal ridge.

Q. What forms the *grooves* or *furrows* on the top of those spines?

A. The posterior part of the *superior longitudinal sinus* is situated in the groove of the perpendicular spine above the horizontal; and the *occipital sinus* in that below it. The *lateral sinuses* occupy the groove on the horizontal ridge.

Q. How are the SINUSES *formed?*

A. By a duplicature of the *dura mater* in contact with the spines.

Q. What is lodged in the *curved fossae* at either side of the foramen magnum?

A. The lower ends of the *lateral sinuses* just before their exit from the cranium.

Q. Do the *lateral sinuses* go out of the cranium?

A. No; their name is changed as soon as they penetrate the *foramĭna lacĕra posteriōra*, into that of the *internal jugular veins*.

Q. What is situated on the *concavity of the cuneiform process?*

A. The *medulla oblongāta.*

Q. What parts occupy the *curved fossa* on either side of that concavity of the cuneiform process?

A. The *inferior petrosal sinuses.*

Q. How many FORAMINA do we find in the occipital bone?

A. Five; namely, the foramen magnum, the two anterior, and two posterior condyloid foramina.

Q. What parts pass through the *foramen magnum?*

A. The *medulla oblongata,* the *vertebral blood-vessels,* and the two *accessory nerves.*

Q. What pass through the two *anterior condyloid foramina?*

A. The *lingual,* or ninth pair of *nerves.*

Q. What do the two *posterior condyloid foramina* transmit?

A. *Veins,* either from the occiput, or vertebral veins to be emptied into the lateral sinuses.

Q. What are the *connexions* of the occipital bone?

A. It is joined above to the two parietal bones by the lambdoidal suture; to the temporal bones laterally by the additamenta sutūrae lambdoidālis; to the sphenoid bone below by ossification similar to that of epiphysis; and to the atlas, or first vertebra of the neck, by a double articulation with its condyles, named *ginglimus.*

Q. What *purposes* does the occipital bone serve?

A. It forms the posterior, and a good portion of the inferior part of the cranium; it supports and defends the two posterior lobes of the brain, the whole of the cerebellum, medulla oblongata, and part of the longitudinal, of the lateral; and the whole of the occipital sinuses.

Q. What is the *state* of this bone *in the infant* at full time?

A. It is composed of four pieces connected by cartilage; the first piece forms all the bone above the foramen magnum, other two are placed at the sides of the

foramen, and compose nearly the whole of the condyles, and the fourth piece makes the cuneiform process.

OF THE TEMPORAL BONES.

Q. Where is the temporal bone situated?

A. In the lower part of the side, and in the base, of the cranium.

Q. Into how many portions is it divided?

A. Into three, a squamous, a petrous, and a mammillary portion.

Q. Why are such names given to those portions?

A. The upper portion of the bone is thin and smooth, and, with its semicircular margin, overlaps the temporal bone, as a scale, hence its name *squamous*: that portion of it in the base of the cranium is very hard, hence the appellation *petrous*; and its external depending portion somewhat resembles the mamma, hence it is named *mastoid* or *mammillary*.

Q. How many PROCESSES has the temporal bone?

A. Three very conspicuous, viz. the mastoid or mammillary, the zygomatic, and the styloid; and two less so, namely, the vaginal and auditory.

Q. Is the *mammillary process* solid?

A. No; it contains small cells, which communicate with each other, and also with the *tympănum* of the ear.

Q. What parts are attached to it?

A. The *sterno-mastoidēus* muscle is inserted into its anterior and lower part; and into its posterior rough surface the *trachēlo-mastoidēus*, and part of the *splenius* are inserted.

Q. What *use* can the communication of the mastoid cells with the tympanum of the ear serve?

A. It is supposed that sounds being reverberated and multiplied in those cells, are increased before they are applied to the internal ear, which is the immediate organ of hearing.

Q. What is the *situation* of the *zygomatic process*?

A. It arises at the under part of the squamous por-

tion, forming an arch; it projects forwards to join with the *os malae*.

Q. What parts lie under the *zygōma*?

A. The *temporal muscle*.

Q. What parts are attached to the *zygōma*?

A. The strong *aponeurōsis* of the temporal muscle is attached to its upper edge; and, from its under edge, a part of the *massēter* muscle arises.

Q. What is the situation of the *styloid process*?

A. It projects downwards from the under part of the petrous portion, with its base forming a curved ridge on the margin of the glenoid cavity, towards the root of the zygoma.

Q. What parts are attached to the *styloid process*?

A. It gives origin to three muscles, namely, the *stylo-glossus*, *stylo-hyoidēus*, and *stylo-pharyngēus*; and sometimes to a ligament of the *os hyoides*, and to another of the inferior maxilla.

Q. Where are the *vaginal* and *auditory processes* situated?

A. Around the base of the styloid process anteriorly, the *pars petrosa* rises into a rough curved ridge, named the *vaginal* process: the *rough semicircular ridge* extending from the base of the mastoid to that of the zygomatic, is called the *auditory* process.

Q. What *is attached* to the *vaginal* and *auditory processes*?

A. No particular part is attached to the vaginal; the *cartilage*, to which the membrāna tympăni is attached, adheres to the margin of the auditory process.

Q. Enumerate the *sinuosities* or DEPRESSIONS on the external surface of the temporal bone?

A. A groove or fossa at the inner and posterior part of the base of the mastoid process; the glenoid cavity surrounded by the bases of the zygoma, auditory, and vaginal processes; the glenoid fissure running across the cavity from the base of the styloid process of the sphenoid bone to the anterior part of the meatus auditorius externus; a depression between this fissure

and the base of the styloid process; the thimble-like cavity, or jugular fossa, at the inner side of the styloid process.

Q. What occupies the *groove* or *fossa* near the mastoid process?

A. The *digastric muscle* arises from it.

Q. What occupies the *glenoid cavity?*

A. The anterior part of it is lined with cartilage, and is filled with the *condyle* of the inferior maxilla to form a firm articulation.

Q. What is situated in the *glenoid fissure?*

A. Part of the *capsular ligament* of the articulation is attached to it; the *laxātor tympăni* muscle, and the nerve, named *chorda tympăni*, pass through it.

Q. What is lodged in the *depression* between that fissure and the styloid process?

A. Part of the *parotid gland*, and a cellular fatty substance.

Q. What occupies the *thimble-like cavity?*

A. The commencement of the *internal jugular vein*, which is bulged back and upwards into, and forms what is termed the *jugular diverticŭlum.*

Q. What things are observable on the INTERNAL SURFACE of the temporal bone?

A. It is very unequal, and exhibits various grooves; the petrous portion of large size projects inwards and forwards with a sharp ridge above, and with two flattened sides.

Q. What forms the *inequalities* and *grooves* on its inside?

A. The *convolutions* of the middle lobes of the brain lie in the depresssions; and the *arteries* of the dura mater are situated in the grooves.

Q. What is contained in the *petrous portion?*

A. The three *semicircular canals*, the *cochlea*, and *vestible*, which constitute the labyrinth.

Q. What is attached to the *ridge* of the petrous portion?

A. Part of the *tentorium cerebelli.*

Q. What parts are applied to its two flattish sides?

A. The lateral lobe of the brain is opposed to its anterior and exterior side; and the anterior part of the cerebellum to its posterior and inner side.

Q. Enumerate the *fossae* or *depressions* of the internal surface of the temporal bone?

A. They are two; a *groove* upon the ridge of the petrous portion; and a *tortuous fossa* at the root of its posterior side.

Q. What vessels are situated in these?

A. The *superior petrosal sinus* is situated in the groove of the ridge; and the *lateral sinus*, in the winding fossa.

Q. How many FORAMINA are in the external surface of the temporal bone?

A. Five; the meatus auditorius externus; foramen stylo-mastoideum between the styloid and mastoid processes; foramen carotĭcum at the inner and fore part of the jugular fossa; the osseous origin of the Eustachian tube between the glenoid fissure and the internal carotid artery; and the foramen mastoideum at the posterior part of the mastoid process.

Q. What *purposes* does the *meatus auditorius externus* serve?

A. It admits the undulating motions of the air to the *membrāna tympăni*, which vibrates and communicates the impulses to the organs of the internal ear, that the sensation of sound may be excited.

Q. What is transmitted by the *foramen stylo-mastoideum?*

A. The *portio dura* of the seventh pair of nerves.

Q. What does the *foramen caroticum* transmit?

A. The *internal carotid artery* enters the cranium; and the *great sympathetic nerve* passes out by it.

Q. What is the structure of the *Eustachian tube?*

A. The osseous portion of this tube is inconsiderable and irregular; it is partly cartilaginous and partly ligamentous, and widens towards the posterior part of the nostrils.

Q. What is the *use* of the *Eustachian tube?*

A. It forms a communication between the external air, and the air in the tympănum of the ear, that the membrana tympani may vibrate easily and freely.

Q. Is *this tube* the *medium* by which pain is communicated to the ear in some cases of inflammatory sore throat?

A. Yes; in sore throat the pain extends along it into the ear.

Q. What is the cause of both the voice and hearing being affected in *Catarrh?*

A. The sound of the voice is diminished by the *stuffing up* of the *foramina* entering into the *sinuses;* and the hearing is impaired by the *stuffing* of the *Eustachian tube,* in consequence of a slight inflammation and tumefaction of the internal membrane of the nostrils.

Q. What passes through the *foramen mastoideum?*

A. This foramen is sometimes awanting, sometimes in the course of the lamhdoidal suture, though commonly hehind the mastoid process; it transmits a *vein* from the integuments of the head to the lateral sinus; or sometimes a hranch of the *occipital artery* to he distributed on the hack part of the dura mater.

Q. How many *foramina* are in the internal surface of the temporal hone?

A. Three, and one common to it and the occipital bone.

Q. Describe these foramina?

A. The *meatus auditorius internus* in the posterior side of the petrous portion, heing large and proceeding outwardly, soon divides into several small holes, one of which, on the superior and anterior part of the meatus, larger and more conspicuous than the others, leads into the *aqueduct of Fallopius:* the *foramen innominatum* or *Vidianum* in the middle of the interior side of the petrous portion; the *orifice* of the *carotic canal* at the interior part of the apex of the petrous portion; and the *forāmen lacĕrum posterius,* common to the temporal and

occipital bones, is found at the middle and inferior part of the posterior side of the petrous portion.

Q. What parts *enter* the *meatus auditorius internus?*

A. The *seventh pair* of nerves, consisting of a *portio dura* and a *portio mollis;* and the *arteria auditoria interna.*

Q. What is the course of the *portio dura?*

A. It enters the *aquaeductus Fallopii* by the superior and anterior conspicuous foramen in the bottom of the meatus auditorius internus, and after a long passage in the bone, emerges by the *foramen stylo-mastoideum,* and is distributed upon the face and side of the head.

Q. What principal branches does the *portio dura receive* and *give off* while in the aqueduct?

A. Soon after its entrance into the aqueductus Fallopii, it receives a *small branch, reflected* from the second branch, or maxillaris superior, of the fifth pair of nerves; the portio dura passes on in the aqueduct about half an inch, and then *sends off* the *corda tympăni;* in its course it gives off small filaments to the mastoid cells, and stapedius muscle.

Q. What is the destination of the *portio mollis?*

A. The portio mollis, much larger than the portio dura, divides into two *fasciculi* of nearly equal size, one of which is distributed to the *cochlea;* and the other to the *vestible* and *semicircular canals.*

Q. What occupies the *foramen innominatum,* or, as it is sometimes called, *Vidianum?*

A. This foramen gives entrance to the *retrograde nerve,* from the second branch of the fifth pair, which joins the *portio dura* in the aqueduct of Fallopius.

Q. What does the *orifice* of the *carotic canal* transmit?

A. The *internal carotid artery.*

Q. Is the *carotic canal* a straight passage or what?

A. No; it is very tortuous: near the *foramen caroticum* it first runs directly upwards, then obliquely forwards, and then again forms a turn equal to a right angle, and runs horizontally for fully half an inch in the an-

terior part of the petrous portion ; and lastly, at its orifice the canal makes another turn at nearly a right angle upwards and obliquely forwards.

Q. What seems to be the *cause* of the carotic canal being *so tortuous?*

A. Those turnings and windings seem destined to diminish the force, or impetus, of the blood in the carotid artery before it enters the brain, lest it should injure its soft tender substance, and derange the functions of that important organ.

Q. What passes through the *foramen lacerum posterius?*

A. The lateral sinus of the brain, the *par vagum*, or eighth pair of nerves ; the *glosso-pharyngeus* or lingualis lateralis nerve ; and the *nervus accessorius* ad par octavum.

Q. Does the *lateral sinus* pass through this foramen ?

A. It enters into it, and terminates ; and the *internal jugular vein* begins within the *foramen lacerum posterius.*

Q. In what part of the foramen do the three nerves pass out ?

A. In its anterior part ; and they are frequently separated from the sinus bebind, by a process of the dura mater, which is sometimes ossified.

Q. What small bones are contained in the tympănum of the temporal bone ?

A. Four, commonly called *ossicula audītus*, the malleus, incus, os orbiculare, and stapes.

Q. Describe the malleus ?

A. It has a round head, small neck, and manubrium or bandle, and two small processes.

Q. Describe the incus ?

A. It bas a body and two crura of unequal length.

Q. Describe the os orbiculare ?

A. It is of a round form, and is the smallest bone of the body.

Q. Describe the stapes ?

A. It has a head, two crura of unequal length, and an oval base.

Q. How are these ossicula situated and connected with each other?

A. The handle of the malleus adheres to the membrana tympani, and its head rests on the body of the incus, to which it is articulated, and the short crus of the incus is extended backwards and bound by a ligament, its long one is turned downwards, and with its flattened point is joined to the os orbiculare, which also adheres to the head of the stapes, which itself is placed horizontally, and nearly at a right angle with the inferior crus of the incus; and the base of the stapes is articulated with the fenestra ovalis.

Q. Have they any muscles attached to them?

A. Yes; the *tensor tympani*, inserted into the handle of the malleus, tightens the membrana tympani: the *laxator tympani*, inserted into the long process of the malleus, draws it forwards and outwards, and relaxes that membrane; and the *stapedius*, inserted into the posterior part of the head of the stapes, draws it obliquely upwards and backwards, by which movement the membrana tympani is stretched and made tense.

Q. Mention the *connexions* of the temporal bone?

A. Its superior semicircular edge is connected to the parietal bone by the squamous suture; its posterior part to the same bone by the additamentum suturae squamosae, and to the occipital bone by the additamentum suturae lambdoidalis; its inferior anterior part to the sphenoid bone by the sphenoidal suture, and the zygoma to the os malae by the zygomatic suture.

Q. What are the *uses* of the temporal bone?

A. It supports and defends the middle lobes of the brain; affords attachment to part of the tentorium; a passage to important arteries and nerves; contains the chief organs of hearing; gives an articulating cavity to the lower jaw, and origin to various muscles already mentioned.

Q. What is the *state* of the temporal bone *in the foetus* at full time?

A. In the foetal temporal bone, the squamous portion is attached by a cartilaginous fissure to the petrous; there is no mastoid, or styloid process; there is an osseous ring instead of an external meatus.

OF THE SPHENOID BONE.

Q. In what part of the cranium is the sphenoid bone situated?

A. Transversely in the middle of its base.

Q. How is it divided?

A. Generally into a *body*, two *alae*, and two *pterygoid portions*.

Q. What is its *figure?*

A. It is very irregular; and has been compared to a *bat* with its wings extended.

Q. What *processes* do we see in, or connected with each ala or wing?

A. Four; the *temporal*, *orbitar*, *spinous*, and *styloid* processes.

Q. Describe the *situation* of these processes?

A. At the lateral or temporal extremity of the bone, is a broad hollowed process or plate, which is named the *temporal*; at the fore part of the temporal plate is the *orbitar plate* slightly concave; the lowest and back part of the wing, where it juts out sharp to meet the petrous portion of the temporal bone, is named the *spinous process*; from near the point of which the *styloid process* arises.

Q. What *external processes* arise from its body?

A. Three; the *two pterygoid*, and the *azygos* process.

Q. Describe the *situation* of these processes?

A. The two *pterygoid processes* are situated at the under and lateral part of the body, each is composed of an external and an internal plate, at the lower end of this is a *hook-like process*; the *azygos process* hangs be-

tween the pterygoid from the middle and fore part of the body.

Q. What *depressions* are in the external part of the sphenoid bone?

A. An arch between the temporal and spinous processes; between the base of the external pterygoid plate, and that of the temporal one, is a large depression; and between the pterygoid plates is the *fossa pterygoidea;* and farther back a smaller one at the root of the internal plate.

Q. What is situated in the hollow of the temporal plates?

A. A part of the *temporal muscle.*

Q. What does the *orbitar plate* form?

A. A portion of the exterior and posterior side of the orbit.

Q. What is *attached* to the *spinous* and *styloid* process?

A. The origin of the *circumflexus palāti* muscle.

Q. What occupies the arch?

A. It receives the *fore part* of the temporal bone.

Q. What is situated in the depression between the external pterygoid and temporal processes?

A. The origin of the *external pterygoid* muscle.

Q. What occupies the *fossa pterygoidea?*

A. The origin of the *internal pterygoid* muscle.

Q. What occupies the smaller depression at the root of the internal plate?

A. Part of the origin of the *circumflexus palāti* muscle.

Q. What is the use of the *hook-like process* of the internal pterygoid plate?

A. The *tendon* of the *circumflexus palati* plays round it as on a pulley.

Q. What is the *use* of the *internal pterygoid plate?*

A. To form the back part of the side of the nostril.

Q. What is the use of the *processus azygos?*

A. To form the back and upper part of the septum narium, to which the vomer is joined.

Q. What *processes* or *elevations* does the upper or inside of the sphenoid bone present ?

A. From the anterior part of its body *two clinoid processes* arise, which project laterally, and terminate in the spinous process on either side ; from the posterior part of its body a *posterior clinoid process* arises, frequently ending in two knobs ; from between the anterior clinoid a *pointed process* juts forward, called the *ethmoidal ;* and a *processus olivāris* rises a little behind them.

Q. Has the space within the clinoid processes any particular name ?

A. Yes ; it is called *Sella Turcica.*

Q. What gland is situated in the sella turcica?

A. The *pituitary gland,* which was anciently supposed to secrete the mucus of the nose.

Q. What purposes do these processes serve ?

A. They seem to be destined to give a connecting medium to other bones, to support the lobes of the brain, and to give a direction to its vessels. The *ethmoidal* process gives attachment to the *vomer.*

Q. Describe the *depressions* on the inside of this bone, and their uses ?

A. The *temporal fossae* on either side supporting a part of the middle lobes ; and a *fossa* between the anterior clinoid processes supporting part of the two anterior lobes of the brain : a *depression* before the processus olivāris in which the junction of the optic nerves lies ; and a *fossa* on each side of this process in which these nerves run in their course to the orbits ; the *fossa pituitaria* between the processus olivaris and the posterior clinoid process, in which the pituitary gland is situated ; and a *curved groove* on each side of the posterior clinoid process, in which the internal carotid arteries have their course.

Q. How many *foramina* has each side of the sphenoid bone ?

A. Six ; the foramen opticum, f. lacĕrum superius,

f. rotundum, f. ovāle, f. spināle, and the f. pterygoidēum.

Q. Describe the situation and use of the *foramen opticum?*

A. The foramen opticum is situated immediately below the anterior clinoid process, and gives a passage to the *optic nerve*, and *ophthalmic artery* into the orbit.

Q. What are the situation and use of the *foramen lacĕrum superius?*

A. The foramen lacerum superius, being a large fissure between the transverse spinous and orbitar processes, affords a passage to the *third, fourth, first branch* of the fifth, and *sixth, pairs* of *nerves*, and sometimes to the *arteria lachrymalis*, out into the orbit; and to the *ocular veins*, going inward to the cavernous sinus.

Q. Describe the situation and use of the *foramen rotundum?*

A. The foramen rotundum, situated a little behind the former, gives a passage to the *superior maxillary nerve*, being the second branch of the fifth pair.

Q. Describe the situation and use of the *foramen ovāle?*

A. The foramen ovale, larger, and situated posteriorly, and more externally than the last, gives a passage to the *inferior maxillary nerve*, being the third branch of the fifth pair, and commonly also to the *veins*, which accompany the principal arteries of the dura mater, out of the cranium.

Q. What situation and use has the *foramen spināle?*

A. The foramen spinale, situated a little to the exterior and back part of the former in the points of the spinous process, transmits the *arteria meningēa*, the principal artery of the dura mater, and sometimes *a vein*.

Q. Describe the situation and use of the *foramen pterygoidēum?*

A. The foramen pterygoideum or vidianum, situated at the root of the internal pterygoid process, transmits *two small branches of nerves* reflected from the superior maxillary.

Q. What is the *destination* of these two *reflected nerves?*

A. The *one* passes into the *carotic canal,* and joins the *plexus* of the *great sympathetic* there around the carotid artery; and the *other* enters the *foramen innominatum* of the petrous portion of the temporal bone, and joins the *portio dura* of the seventh pair in the aqueduct of Fallopius.

Q. Is the body of the *sphenoid bone* solid?

A. No; at the under and fore part of its body, the two *sphenoidal sinuses* are formed.

Q. Do they communicate?

A. No; there is an osseous septum or plate between them.

Q. Where is the passage into them situated?

A. At the upper and fore part of each sinus, a passage, or round hole, is situated, which leads to the posterior and superior part of the nostril, through the ethmoid cells.

Q. Are the *sphenoidal sinuses* and passage to them lined with a membrane?

A. Yes; with a membrane similar to that of the nostrils.

Q. Describe the *connexions* of the sphenoid bone?

A. Its *alae* are joined to the parietal bones above, to the frontal and two malar before, and to the two temporal behind; its *body* and *spinous processes* to the frontal and ethmoid before, and to the occipital behind; its *pterygoid processes* to the two palate, and two superior maxillary bones; and its *azygos process* is joined to the vomer, and nasal plate of the ethmoid bone.

Q. What is the *state* of the sphenoid bone *in the foetus?*

A. At full time this bone is pretty complete, its alae are connected by cartilage, which maceration destroys, and they separate from the body: it has no sinuses.

OF THE ETHMOID BONE.

Q. In what part of the cranium is this ethmoid, or cribriform, bone situated?

A. In the anterior and middle part of its base.

Q. What is its general figure?

A. Cubical.

Q. How is it generally divided?

A. Into the cribriform plate with its process, the nasal plate, the cells, and the two superior spongy bones.

Q. Describe the situation of the *cribriform plate* and its process?

A. It contains many foramina, and is situated horizontally in the base of the cranium, and from its upper or inner side the *crista galli* arises highest anteriorly.

Q. What is the situation of the *nasal plate*, and *ethmoid cells?*

A. The nasal plate extends downwards and forwards from the middle of the cribriform plate; and the *cells* are formed on either side of it by thin laminae of bone, the exterior of which forms the *orbitar plate*, or *os planum*.

Q. Where are the *ossa spongiosa superiōra* situated?

A. One on either side projecting downwards and inwards from the cells.

Q. What passes through the *foramina* of the *cribriform plate?*

A. The *olfactory*, or first pair of *nerves*.

Q. What is attached to the *crista galli?*

A. The anterior end of the *falx major*.

Q. What is the *use* of the *nasal plate?*

A. To form the *septum narium*.

Q. What is the *use* of the *ethmoid cells?*

A. Their use is considered the same as that of the frontal and sphenoidal sinuses, namely, to strengthen the voice by resounding the notes, and to increase the sense of smell by amplifying the surface, on which the olfactory nerves are distributed.

Q. What are their communications?

A. The *ethmoid cells* communicate with each other, with the frontal sinuses, and with the nostrils.

Q. Are *these cells* frequently the *seat of disease?*

A. Yes; of Venereal Ulcers.

Q. What is the *use* of the *ossa spongiosa superiora?*

A. They afford a large surface on which the *olfactory nerves* are dispersed, and thus tend to augment the sense of smell.

Q. Are the *spongy bones* also the *seat of disease?*

A. Yes; *Polypi* often grow up on their surface.

Q. What covers all those ethmoid cells, and turbinated or spongy bones in the recent subject?

A. *A continuation of the mucous membrane* which lines the nostrils.

Q. Describe the *connexions* of the ethmoid bone?

A. The *cribriform plates* are connected with the orbitar plates of the frontal bone by the ethmoidal suture; with the sphenoid bone by the sphenoidal suture; *the orbitar plates,* or *ossa plana,* with the orbitar plates of the frontal bone by the transverse suture; *the posterior edge* of the nasal plate with the azygos process of the sphenoid bone; its *superior edge* with the nasal processes of the frontal and nasal bones; and its *anterior edge* with the middle cartilage of the nose.

Q. What is the *condition* of the ethmoid bone *in the foetus?*

A. It is divided into two portions by a cartilaginous partition, which, becoming afterwards ossified, forms the nasal plate and crista galli.

Remarks.

Q. Is the *diploë* interposed between the external and internal tables, or plates, of all parts of the bones?

A. No; at the frontal and sphenoidal sinuses there is no diploë; in various other parts of the occipital, and squamous portions of the temporal bones, the two tables are so closely compressed, and so thin, as to be somewhat diaphanous in advanced age, and to contain no evident diploë.

Q. Does this inequality of thickness in the bones of the cranium render the *Operation of Trephining* more hazardous?

A. Yes; opposite to the posterior lobes of the brain in the occipital, and to the middle lobes in the squamous portion of the temporal bones, their substance is much thinner, which the surgeon ought to keep in mind while operating in these parts.

Q. On what parts of the parietal bone is the *application of the trephine dangerous?*

A. The *meningeal artery* lies often deep in a groove at the anterior and inferior angle of the parietal bone, and is in danger of being divided by the trephine applied near that corner; the other parts of this bone admit of its application.

Q. On what other parts of the cranium is the *application of the trephine dangerous?*

A. It cannot be applied with safety on the *course* of the *superior longitudinal* or *lateral sinuses.*

Q. What cases require the operation of the trephine?

A. A *depressed portion* of bone, or a *collection of pus,* or *extravasated blood,* in consequence of an injury.

Q. How is a *fracture* of the bone distinguished from a *suture?*

A. The situation of the sutures is well known; and a fracture, though near one or more sutures, is accompanied with a roughness in its edges, which the surgeon can discover by a probe, or his finger.

Q. Are there not some *small bones* sometimes in the course of the lambdoidal suture, and how could they be distinguished from broken pieces of bone?

A. *Ossa triquetra,* or *Wormiana,* as they are called, are often situated in the lambdoidal suture, but in that case the sutures feel smooth, while the edges of a fracture are rough, and often ragged to the touch.

Q. Is the *application of the trephine* necessary in every case of fracture, or when?

A. No; not in every case; in those only where there

is a portion of bone evidently depressed, and in consequence of which symptoms of compression of the brain supervene.

Q. What are the *symptoms of a compressed brain?*

A. Vomiting, drowsiness, or insensibility, dilated pupil, slow pulse; stertorous breathing, and involuntary discharge of urine and faeces.

Q. Does a *depressed portion* of the cranium then always require the operation?

A. No; a depression may be attended with no bad symptoms, such as those just mentioned, and then any operation is quite unnecessary.

Q. May not the injury applied to the cranium be sufficient to *rupture some arteries* of the dura mater, and perhaps to produce a long fracture without depression of bone?

A. Yes; and in that case the symptoms already enumerated, which indicate compression of the brain, appear and increase in aggravation.

Q. Is the *application of the trephine* necessary in every case where *pus* or *extravasation* has taken place?

A. Yes; if the symptoms become urgent we have no alternative.

Q. How could the *precise part* where the pus is collected, or where the rupture of the vessels has happened, be ascertained?

A. It is difficult and often impossible to ascertain the situation of the matter collected, or the fluid effused; because it may be collected in a part of the brain far from the ruptured vessel, or the seat of the injury received.

Q. What *rule* must direct the surgeon in such cases, where the urgency of symptoms demands his interference?

A. He must apply the trephine a *little below* that part where marks of external violence are most evident; or if no violence be apparent, at a *depending part* on the side seemingly affected.

Q. In a case of a fractured and depressed portion of

bone, which requires an operation, is the *trephine* to be applied *to the fractured and depressed part* only, or where?

A. Yes; if the depressed portion is firm enough to bear the force necessary for the rotation of the trephine; if not, the trephine should be placed partly on the solid bone, capable of bearing the force, and partly on the fractured portion.

Q. What *object* has the surgeon in view by this *operation?*

A. To make an opening in the cranium sufficient to introduce an instrument *to elevate* the depressed portion of bone.

Q. Would *Mr Hey's saw,* in a number of cases, not answer this purpose better than the trephine?

A. Yes; and in such cases, the saw should be preferred.

Q. If the *extravasated fluid,* after removing a portion of bone with the trephine or saw, be found under the dura mater, what is to be done?

A. It has been evacuated by *puncturing the dura mater;* but it is a dangerous practice, and nothing can justify the perforating of the dura mater, but the urgent and fatal aspect of the symptoms.

OF THE BONES OF THE FACE.

Q. How are the bones of the face divided?

A. Into those of the upper and lower maxilla.

Q. What bones are contained in the *superior maxilla?*

A. It contains six *pairs* of bones and the *vomer,* besides the teeth.

Q. What bones does the *inferior maxilla* consist of?

A. Of one, together with the teeth.

OF THE OSSA NASI.

Q. Where is the *os nasi* situated?

A. In the upper part of the nose.

Q. What is its *figure?*

A. Oblong, rather thin, bent backwards, convex externally with its fellow forming an arcb, and broadest at its inferior extremity.

Q. Has the os nasi any *processes?*

A. One, tbe *spinous* process.

Q. Has it any *foramina?*

A. One or two generally.

Q. What do tbey transmit?

A. *Blood-vessels* to the substance of the bone, or into the internal membrane of the nostrils.

Q. What are the *connexions* of the nasal bone?

A. Its thick ragged upper end is joined to the frontal bone by the transverse suture; its thick anterior edge to its fellow by tbe nasal suture; its lower end to the cartilaginous part of the nose, and its spinous process to the nasal lamella of the ethmoid bone.

Q. Is it complete *in the foetus?*

A. It is proportionally shorter and thinner, but pretty complete.

Q. What is the *use* of the ossa nasi taken together?

A. Tbey cover and defend the root of the nose.

OF THE OSSA UNGUIS, OR LACHRYMALIA.

Q. What is tbe *situation* of the *os lachrymale?*

A. At tbe inner and anterior part of the orbit, and covering the ethmoid cells.

Q. What is its *figure?*

A. Irregular and thin, having two depressions externally, and a ridge between them; and internally or posteriorly having a groove between two convexities.

Q. What do the external *depressions* form?

A. Tbe posterior forms part of the orbit; the anterior depression, being a deep groove or fossa larger above, lodges part of the *lachrymal sac* and *duct*.

Q. What is the use of the middle ridge?

A. It forms the proper boundary of the orbit.

Q. What do the groove and convexities internally form?

A. They correspond to the ethmoid cells, to which they are contiguous.

Q. What are the *connexions* of the os lachrymale?

A. It is connected above to the frontal, behind to the os planum of the ethmoid bone by the transverse suture; before and below to the maxillary bone by the lachrymal suture.

Q. What are the *uses* of this bone?

A. It composes part of the orbit, lodges a part of the lachrymal sac and duct, and covers part of the ethmoid cells.

Q. Is the os lachrymale complete in the *foetus?*

A. Yes, fully formed.

Q. Is the os lachrymale ever subject to a *surgical operation?*

A. Yes; in the *Fistula Lachrymalis,* when the nasal duct, which conveys the tears from the eye to the back part of the nostrils, is obstructed, a perforation is made in this bone, and an artificial duct formed.

OF THE OSSA MALARUM.

Q. What is the situation of the *os malae?*

A. In the outer part of the cheek, forming the prominence.

Q. What is its *figure?*

A. Somewhat square, with four acute angles.

Q. What appearance has its external and internal surfaces?

A. It is convex and smooth externally, and posteriorly or internally hollow.

Q. What *processes* has it?

A. Five; the *superior orbitar,* forming part of the outside of the orbit; the *inferior orbitary,* forming its lower edge; the *maxillary,* having a broad and rough surface, by which it is joined to the superior maxilla; the *zygomatic,* joining the temporal bone; and the *in-*

ternal orbitar plate, forming the outer and fore part of the orbit.

Q. What *muscles* are attached to its external surface?

A. The *massēter* arises from the space between the maxillary and zygomatic processes below; the *zygomaticus major*, and *minor*, from that near the zygomatic process; part of the origin of the *massēter*, and of the insertion of the *temporal aponeurōsis*, are attached to the under edge of the *zygoma*.

Q. What is lodged in its posterior hollow behind the zygomatic process?

A. Part of the *temporal muscle*.

Q. Describe the *connexions* of the malar bone?

A. It is joined by its superior and internal orbitary processes to the frontal and sphenoid bones; by the edge of its internal and inferior orbitar processes, and inner side, to the os maxillare; and by its zygomatic process to the zygoma of the temporal bone.

Q. Is the *os malae* perfect *in the foetus* at full time?

A. Yes; it is fully ossified.

OF THE OSSA MAXILLARIA SUPERIORA.

Q. Where is the superior maxillary bone situated?

A. In the anterior part of the upper jaw, and side of the nose.

Q. What is its *figure* and size?

A. Its figure is irregular, and its size the largest of the bones of the face.

Q. How many *elevations* or *processes* has it?

A. Seven; the *nasal*, making part of the side of the nose; the *orbitar*, forming part of the orbit; the *malar*, joining the os malae, and forming part of the prominence of the cheek; the *bulbous* behind, forming the back boundary of the antrum; the *alveolar*, in which the teeth are fixed; the *palatine*, forming part of the roof of the mouth; and the *spinous process*, rising to form part of the septum narium.

Q. What *muscle* arises from the bulbous process?

A. A part of the *pterygoidēus externus.*

Q. What is attached to the *orbitar process?*

A. A portion of the *orbicularis oculi,* but chiefly from its nasal process; and the *obliquus inferior,* arise from it.

Q. How many *depressions* are in the os maxillare superius?

A. Seven; one behind the malar process; a second at the under and fore part of the malar process; a third in the under arch of the palate; a fourth the semicircular notch above the palatine plate; a fifth the alveolar arch; a sixth the lachrymal fossa in the nasal process; and a seventh, the canal in the orbitar plate.

Q. What occupies the *temporal depression* behind the malar process?

A. The under part of the *temporal muscle* plays in it.

Q. What occupies the *second depression* between the malar and alveolar processes?

A. The origin of the *levator angŭli oris,* and part of the *levator labii superioris alaeque nasi;* and a *branch* of the fifth pair *of nerves* embedded in fat.

Q. What occupies the third, or *palatine depression?*

A. It forms a part of, and enlarges the cavity of the mouth.

Q. What occupies the fourth, or *nasal depression?*

A. The cavity of the nostril.

Q. Where is the *alveolar process,* or arch, situated?

A. Along the inferior margin of the maxilla.

Q. What is the *structure* of the alveoli?

A. The bone is soft and spongy, having holes, or depressions, corresponding in size to the fangs, or roots, of the teeth.

Q. Why is it porous and spongy?

A. To give a firmer insertion to the teeth, and adhesion to the membrane reflected from the gums, and a passage to blood-vessels into the substance of the bone.

Q. What occupies the *lachrymal fossa?*

A. This fossa, together with that of the os lachry-

male, or unguis, forms a *canal*, which is occupied by the *lachrymal duct*.

Q. What does the *canal in the orbitar plate* contain?

A. The *superior maxillary nerve*, and a *branch* of the *internal maxillary artery*.

Q. How many *foramina* has the os maxillare superius?

A. Five; three proper to it, namely, the foramen infra-orbitarium, foramen incisīvum, and the opening into the antrum maxillare; and two common to it with other bones, viz. the spheno-maxillary fissure, and the palatine foramen.

Q. Describe the *situation* and *use* of the *foramen infra-orbitarium*?

A. The foramen infra-orbitarium situated just below the orbit, is the opening of the canal in the orbitar plate, and transmits the *superior maxillary nerve*, being the second branch of the fifth pair; and *infra-orbitar artery*, being a branch of the internal maxillary, to be distributed upon the face.

Q. Describe the *situation* and *use* of the *foramen incisīvum*, or *palatīnum anterius*, as it is sometimes called?

A. It is situated in the mesial line behind the inner *incisores*, common to both the palate bones below, but separates above into two holes, each of which opens into its respective nostril, just at the side of the septum narium: it forms *a communication* for small blood-vessels and nerves passing between the membranes of the mouth and nose.

Q. Describe the *situation* of the *antrum maxillare*, or *Highmorianum*, and its orifice?

A. It occupies the whole inner part of the bone under the orbitar plate, and above the dentes molares, and before the tuberosity; its *orifice* is large in the separate bone; but in the connected state of the bones, it is about the size of a crow's quill, and is situated between the os spongiosum superius and inferius in the nostril.

Q. Is this *antrum lined* with a membrane?

A. Yes; with the same membrane as that of the nostrils, but a little thinner.

Q. Describe the *situation* and *use* of the *spheno-maxillary fissure?*

A. This fissure, composed partly by this bone, and partly by the malar and sphenoid, situated in the outer and under part of the orbit, transmits small branches of *arteries*, *veins*, and *nerves*, to the adjacent parts; lodges fat for lubricating the globe of the eye, and part of the temporal muscle.

Q. Describe the *situation* and *use* of the *foramen palatinum?*

A. It is situated at the inner side of the back part of the tuberosity; and is formed by a fossa in the superior maxillary, and a corresponding one in the os palati; it transmits a *branch* of the *superior maxillary nerve*, and of an *artery* to be distributed in the substance of the bone, and to the palate.

Q. Describe the *connexions* of the superior maxillary bone?

A. It is connected above to the frontal bone by the transverse suture; to the os unguis by the lachrymal suture; to the os nasi by the lateral nasal suture; to the os malae by the internal and external orbitar sutures; to the os planum by the ethmoidal suture; to its fellow below by the longitudinal palatine suture; and to its fellow between the nose and mouth by the mystachial suture.

Q. What is the *state* of the os maxillare superius *in the foetus* at full time?

A. It has no tuberosity, scarcely any maxillary sinus, and only six alveolar processes.

Q. What is the *use* of the *maxillary sinuses?*

A. They serve to give strength and tone to the voice.

Q. Is ever any *surgical operation* necessary upon these sinuses?

A. Yes; they are subject to inflammation and suppuration; and when the openings into the nostrils are

obstructed, the pus or matter collected must be evacuated by a surgical operation.

Q. How is that *operation* to be performed?

A. It may be done various ways; but to extract one of the dentes molares immediately under the sinus, in which the fluid is contained, and to make a perforation into the sinus with a trocar, is the best method; for by this the fluid can be thoroughly evacuated.

OF THE OSSA PALATI.

Q. What is the *situation* of the *palate bone?*

A. In the posterior part of the arch of the palate, between the pterygoid processes and the superior maxillary bones.

Q. What is its *figure?*

A. It is very irregular, though generally considered a kind of oblong square.

Q. Into how many *portions* is it commonly divided?

A. Into four; namely, its palatine, pterygoid, nasal, and orbitary portions, which are named processes.

Q. Describe the *palatine portion?*

A. This seems the base or body of the bone, is concave above and below, and completes the arch of the palate and the bottom of the nostrils; its inner edge is raised into a *spinous process*, which with its fellow of the opposite side forms a *groove;* its posterior edge is *pointed* internally, where it joins its fellow; its anterior edge is unequal and ragged, and firmly joined to the palatine process of the maxillary bone.

Q. Describe the *pterygoid portion?*

A. This is the lower and posterior part of the bone, of a triangular shape, with its base below, and becoming smaller as it ascends: its posterior part has *three fossae*, the two lateral receive the ends of the two *pterygoid plates* of the sphenoid bone; the middle fossa makes part of the *fossa pterygoidea;* its anterior aspect is irregularly concave, receiving the back part of the tuberosity of the os maxillare.

Q. Describe its *nasal portion?*

A. It is very thin and brittle, is situated on the side of the nose; its internal surface is a little concave; it rises up from the external and upper edge of the palatine portion and from the narrow extremity of the pterygoid process, forms a considerable part of the side of the maxillary sinus, and closes the space between the sphenoid and maxillary bones; across the middle of its inner surface there is a *ridge* correspondiug to that of the maxillary bone.

Q. Describe the *orbitar portion* of the os palati?

A. It rises from the upper and back part of the nasal plate, and is divided from it by a *notch*, which forms part of the foramen spheno-palatinum; it forms a small part of the bottom of the orbit behind the os planum and maxillare; it has its anterior and lateral part contiguous to the maxillary sinus, and more posteriorly it covers the ethmoid cells; it also closes the sphenoidal sinus, except at its upper and fore part a hole is left.

Q. What is attached to the *posterior arch* of the palate bone?

A. The *velum pendŭlum pālati.*

Q. What is attached to the *posterior point* formed by the junction of the two palate bones?

A. The muscle named *azўgos uvŭlae.*

Q. What is lodged in the *groove* formed by the spinous processes?

A. The under edge of the *vomer.*

Q. What purpose does the *transverse ridge* on the inner surface of the nasal plate serve?

A. The back part of the inferior spongy bone rests upon it.

Q. What are the *connexions* of the *os palati?*

A. Its *palatine plate* is connected to the os maxillare by the transverse palatine suture; its *nasal* and *orbitar processes,* to the same bone by the palato-maxillary suture; its *pterygoid* and back part of the *nasal process,* to the sphenoid bone by the sphenoidal suture; its *trans-*

verse ridge of the nasal plate, to the *os spongiosum inferius*.

Q. What *purposes* does the os palati serve?

A. It forms part of the palate, of the nostril, of the orbit, of the fossa pterygoidea, of the side of the maxillary, ethmoidal, and spenoidal sinuses.

Q. What is the *state* of this bone *in the foetus?*

A. It is very complete; its nasal plate is thicker than in the adult; no cells are attached to its orbitar process.

Q. Why are the *eyes* often affected in cases of *ulcerated palate?*

A. The palate, by means of the os palati and its vessels and nerves, has a direct communication with the orbit, and thus affects the eyes through sympathy.

OF THE OSSA SPONGIOSA INFERIORA.

Q. What is the situation of the *os spongiosum inferius?*

A. In the lateral and under part of the nostril, adhering to the transverse ridge of the maxillary and palate bones.

Q. Describe its *processes?*

A. The inferior spongy bone lies horizontally with its convex surface towards the septum; from its upper edge *two processes* arise, the *anterior* ascending forms part of the *lachrymal groove;* and the *posterior*, descending in the form of a hook, makes part of the side of the *maxillary sinus*.

Q. What *purposes* do the *spongy* or *turbinated bones* serve in the nostrils?

A. They afford a large surface, on which the mucous membrane is expanded, in whose substance the olfactory nerves are dispersed, and the organ of smell greatly strengthened; they also cover a part of the antra maxillaria, and assist in forming the under part of the *lachrymal ducts*.

Q. What is their *state in the foetus?*

A. They are almost complete.

OF THE VOMER.

Q. Where is the *vomer* situated?

A. In the lower and back part of the septum narium.

Q. What is its *figure?*

A. It is compared to a plough-share.

Q. Describe the *vomer?*

A. Its sides are flat and smooth, its superior and posterior edge appears oblique at the back of the nostrils; is thick and grooved to receive the azygos process of the sphenoid bone, and the *nasal plate* of the ethmoid; its inferior edge is received into the *groove* formed by the *spinous process* of the palate and maxillary bones; its posterior part unconnected with any other bone is over the fauces; and its anterior edge is *furrowed* for receiving the *middle cartilage* of the nose.

Q. What are the *connexions* of the vomer?

A. It is connected above to the sphenoid and ethmoid bones, and to the middle cartilage of the nose; below to the maxillary and palate bones.

Q. What are the *uses* of the vomer?

A. It divides the nostrils, supports the other bones of the nose, and enlarges their internal surface for increasing the organ of smell.

OF THE INFERIOR MAXILLA.

Q. Where is the inferior maxilla situated?

A. In the lower part of the face.

Q. How is it commonly divided?

A. Into seven parts, the *chin*, between the two anterior foramina; the *sides*, between these and the angles; the two *angles;* and the two *rami* arising from them.

Q. What *processes* has the inferior maxilla?

A. Five; the two *condyloid*, two *coronoid*, and the *alveolar* processes.

Q. Are there not others?

A. Yes, of less consideration: such as a protuberance externally, and another internally, extending from the base of the coronoid process on either side to the chin; the transverse ridge in the middle of the chin, called *symphȳsis menti*, and some small eminences on either side of it, both on the out and inside of the bone.

Q. Describe the situation and use of the *condyloid processes?*

A. They are placed at the two extremities of the rami; they have an oblong *head*, situated obliquely transverse, supported by a *cervix;* they are covered with cartilage, and adapted to the *glenoid cavity* of the temporal bone, with which on either side they form an articulation.

Q. Describe the situation and use of the *coronoid processes?*

A. They project upwards, about an inch anterior to the condyloid; are thin, and give attachment to strong muscles.

Q. Describe the situation and use of the *alveolar processes?*

A. They extend along the upper edge of the bone, from the base of the one coronoid process to that of the other; are broadest behind, and serve to give insertion to the teeth.

Q. What purposes do the other eminences serve?

A. They give insertion and origin to various muscles.

Q. What secures the head of the condyle in the glenoid cavity?

A. A strong *capsular ligament*, attached to the cervix, and to the margin of the cavity; and also the different muscles contiguous to it.

Q. What *muscles* are attached to the anterior part of the *condyloid process?*

A. The *pterygoidēus externus* is inserted into the fore part of the condyloid process, from the base of the coronoid upwards, and partly into the capsular ligament.

Q. What *muscles* are attached to the *coronoid process?*

A. The *tendon* of the *temporal muscle* is inserted around it.

Q. What *muscles* are attached to the external and internal parts of the *angles?*

A. The *massēter* is inserted into the external, and the *pterygoidēus internus* into the internal side of the angles.

Q. What *muscles* are attached to the *longitudinal ridges* from the base of the coronoid process to the chin?

A. The *buccinātor* partly arises from the outer, and the *mylo-hyoidēus* from the inner ridge, together with the membrane of the gums.

Q. What *muscles* are attached to the *chin?*

A. On either side of the symphysis externally, the *levator*, and *depressor labii inferioris*, the *depressor anguli oris*, and the *digastrĭcus*, arise; internally near the symphysis the *fraenum linguae*, the *genio-hyoidēus*, and the *genio-hyo-glossus*.

Q. How many *foramina* are in the inferior maxilla?

A. Four; two in the external aspect, called *foramina menti;* and the two *foramina maxillaria posteriora;* one on each side on the internal aspect, in the centre between the angle and the extremities of the condyloid and coronoid processes.

Q. What purpose does the *posterior maxillary foramen* on either side serve?

A. It receives the trunk of the *inferior maxillary nerve*, which is the third branch of the fifth pair; and the *inferior maxillary artery*, which is a branch of the internal maxillary, and its *vein*.

Q. What purposes do the *foramina menti* serve?

A. The *nerve* and *artery* just mentioned, as entering the posterior maxillary foramen, run forwards in the *maxillary canal*, and ultimately emerge from it by the *foramen menti*, on either side, to be distributed on the chin.

Q. What happens while the artery and nerve are passing along that canal?

A. They give off *branches* to the *teeth*, and substance of the bone.

Q. Are there any *grooves* observable in the inferior maxilla?

A. Yes; a *large one* between the condyloid process and the foramen maxillare posterius; and a *less one* from this foramen directed forwards.

Q. What forms and occupies these *grooves*?

A. The *trunks* of the *artery* and *nerve* entering the canal form the *larger*; and the *lingual branch* sent off from the *inferior maxillary nerve*, just where it enters the canal, forms the *smaller groove*, in its course forwards to the tongue.

Q. What is the *state* of the inferior maxilla *in the foetus?*

A. It is composed of two pieces, joined in the middle by cartilage, which becomes ossified in after life, and forms the *symphysis menti*.

OF THE TEETH.

Q. How many teeth are inserted into each jaw in the adult?

A. Sixteen.

Q. How are the teeth classed?

A. Into *incisōres*, *canīni* or *cuspidati*, and *molares* which include the *bicuspĭdes*.

Q. How many of each class are in each jaw?

A. Four *incisores* in front; on either side of these, a *caninus* or *cuspidatus*, two *bicuspĭdes*, and three *molares*.

Q. What is the division of each tooth?

A. Into a body or *corōna* above the gum, a *cervix* at the socket, and *fangs* or *roots* fixed in the jaw-bone.

Q. What substances compose the teeth?

A. One very hard, on the cortical or external surface of the corōna or body, called *enamel*; another softer and similar to common bone towards the centre of the corona, and in the cervix and roots.

Q. Has each tooth any *foramen?*

A. Yes; in the point of its roots a *hole* receives its *nerves* and *blood-vessels*.

Q. Are the *fangs* surrounded by a membrane?

A. Yes; a *vascular membrane*, reflected from the gums, covers the roots of the teeth, lines their sockets, and answers the purposes of a periosteum.

Q. Has each class a certain number of roots?

A. Yes; the *incisōres* and *canīni* have a single root, and also the two *bicuspĭdes* of the lower jaw; while the *bicuspides* of the upper have generally two, and the *large molares* three or four roots.

Q. What is the *state* of the teeth *in the foetus* at full time?

A. There are in each piece of the inferior maxilla, and in each side of the superior, two incisores, one cuspidatus, and two molares, in the form of shells within the jaw, or under the gums.

Q. Does any membrane surround the foetal teeth?

A. Yes; each tooth is included in a *capsule*, which is connected with the gums.

Q. When do the teeth appear above the gums?

A. About the sixth or seventh month after birth.

Q. How long is it before all the ten teeth in each jaw are cut?

A. They are generally all through the gums within the first two years of age.

Q. When do these *temporary*, or *deciduous teeth* loosen and come out?

A. About the seventh or eighth year of age.

Q. What is the cause of their coming out?

A. The *second* or *permanent teeth* lying concealed in the maxillae, increase in size and firmness, shoot up on the roots of the deciduous, which, by their irritation, are absorbed, and the bodies of the teeth, of course, fall out; while the permanent ones grow up, and occupy their place.

Q. What seems to be the *cause of a second set* of teeth being provided?

A. The temporary ones are adapted to the size of

the maxillary bones in the infantile state; and when the jaws shoot out and grow larger, these teeth become too small; *another larger set* is therefore provided, suited to the increased size of the jaws, and destined to be permanent.

OF THE OS HYOIDES.

Q. Where is the *os hyoides* situated?

A. Horizontally, between the root of the tongue and the larynx.

Q. What is its *figure?*

A. It has been compared to the Greek letter upsilon *υ*.

Q. How is the os hyoides divided?

A. Into a *body* and *two cornua*.

Q. Describe the *body* of it?

A. It is convex before, concave behind, and pretty broad in the middle.

Q. Describe its *cornua?*

A. They extend backwards and upwards from either side of its body, with their two plain surfaces slanting downwards and outwards; *each cornu* becoming smaller, ends in a *round tubercle*.

Q. Where are its *appendices* situated?

A. An appendix projects upwards from the articulation of the cornu with the body on each side.

Q. To what parts are the cornua attached?

A. Their *round tubercles* are connected with, and, as it were, rest upon the upper cornu of the *thyroid cartilage*.

Q. What are the *connexions* of its appendices?

A. From each appendix a *ligament* ascends to the *styloid process* of the temporal bone.

Q. Are these attachments sufficient to keep the bone in its situation?

A. Yes; assisted by the various muscles attached to it.

Q. What *muscles* are attached to the *body* of the os hyoides?

A. The *sterno-hyoideus*, part of the *thyro-hyoideus*, *omo-hyoideus*, *genio-hyoideus*, part of the *genio-hyo-glossus*, are inserted into it on either side.

Q. What *muscles* are attached to its *cornua?*

A. The origin of the *hyo-glossus*, and the insertion of the *stylo-hyoideus*, on each side.

Q. Is the *os hyoides* attached to other parts?

A. It is attached to the root of the tongue, epiglottis, and thyroid cartilage, by ligaments and membranes.

Q. What is the *use* of the os hyoides?

A. It serves as a lever for the muscles acting upon the tongue, larynx, and fauces.

Q. What is its *state in the fœtus?*

A. It is mostly all in a cartilaginous state.

BONES OF THE TRUNK.

Q. How are the bones of the trunk generally divided?

A. Into those of the *spine*, those of the *thorax*, and those of the *pelvis*.

OF THE SPINE.

Q. Of what bones is the spine composed?

A. Of *vertĕbrae*, denominated *true* and *false*.

Q. What vertĕbrae are *true?*

A. The cervical, dorsal, and lumbar, in all twenty-four.

Q. What vertebrae are *false?*

A. Those of the *os sacrum*, and *os coccȳgis*.

Q. In what does the distinction of true and false vertebrae consist?

A The vertebrae are said to be *true*, when they move upon each other; to be *false*, when they adhere to each other, and do not move.

Q. How many parts does a true vertebrae consist of?

A. A *body*, and *seven processes*.

Q. Describe the *body*?

A. It is of a spongy texture, has a horizontal upper and under surface a little hollowed; is convex anteriorly, forming a ring of a firmer and harder structure than the internal substance of the bone; a little concave posteriorly, to form a large, somewhat triangular hole, with the two projections, on which the processes are constructed.

Q. Why are the upper and under surfaces hollowed?

A. To receive the *inter-vertebral substance*, which is of a cartilago-ligamentous nature, and allows the vertebrae to move, as upon ball and socket.

Q. What occupies the *large hole* at the back of the bodies of the vertebrae?

A. The *spinal marrow*, its vessels, and involŭcra.

Q. Are the bodies of the vertebrae of the same size?

A. In the adult the bodies of the lumbar vertebrae are by far the largest, and they diminish in size as they ascend; the dorsal are less, and the cervical vertebrae have scarcely any body.

Q. Why do the vertebrae increase in size as they descend?

A. The vertebral column sustains the weight of the superior parts of the body; and as the weight of the head is only to be sustained by the *cervical vertebrae*, their body is inconsiderable; as the dorsal bear the weight of the head, neck, and superior extremities, their bodies are much larger; and as the lumbar bear the weight of all the upper parts, their bodies are the largest and strongest of all.

Q. Do the size of the processes follow the same rule?

A. Yes; the processes become more distinct, and more strongly marked as they descend.

Q. Describe the *situation* of the *seven processes*?

A. Each vertebra, except the first and second, has two articulating or oblique processes above, and two below, placed upon the sides of the arch; two trans-

verse processes, the one projecting to the right, and the other to the left from the sides of the arch between the oblique processes; and a spinous process projecting backwards.

OF THE CERVICAL VERTEBRAE.

Q. What are the marks of a cervical vertebra?

A. Their body is small, solid, and flattened before, to make way for the oesophăgus, and also a little flattened behind; the superior surface is a little concave hy the lateral portions rising, and the inferior proportionally convex from side to side, and concave a little from before to behind; their transverse processes are perforated.

Q. How are their *articulating surfaces* placed?

A. Very obliquely; the two upper face obliquely backwards and upwards; while the two inferior face obliquely forwards and downwards.

Q. Describe their *transverse processes?*

A. They are very short; each is *perforated* perpendicularly, and from the hole to the extremity is grooved on the upper side; has a bifurcated termination.

Q. Describe the *spinous process* of the cervical vertebrae?

A. It is placed horizontally backwards, is short, and forked at the extremity.

Q. Why are the *surfaces* of the cervical vertebrae *hollowed* both laterally and from before backward?

A. To admit of free motion; they can move on each other, as on ball and socket, for their inter-vertebral cartilages are thick and strong.

Q. Why are their transverse processes *perforated?*

A. These perforations form a canal for the passage of the *vertebral artery* and *vein* on either side.

Q. What purpose does the *groove* on the upper part of the transverse processes serve?

A. It receives and protects the *cervical nerves,* which pass out from the spinal marrow.

Q. In what things does the first vertebra, named the ATLAS, differ from the rest?

A. Instead of a body, the *atlas* has an anterior arch with two thick lateral portions, on the upper and under surfaces of which the articulating processes are placed; in the anterior part of its convexity a roundish protuberance, with a cavity on either side, appears: instead of a spinous process, an osseous semicircle is described.

Q. How are the *articulating processes* of the *atlas* placed?

A. The *superior* are oval and hollow, and more horizontal than the rest; they rise considerably on their external margin, and are thus firmly articulated with the *condyles* of the occipital bone: the *inferior* are concave and round, slanting from within outwards and downwards, forming a secure socket for the convex surface of the inferior vertebra.

Q. Has the *atlas* any *perforations?*

A. Yes; it has a *hole*, which easily admits a common writing quill, in each transverse process, which is very long.

Q. Has it any *fossae* or *notches?*

A. Yes; under the outer and back projecting part of the superior oblique processes there is a curved *groove* or *fossa* on either side: there is another one more shallow at the posterior part of the inferior oblique processes.

Q. What *vessels* are transmitted by the hole in the transverse processes, and lodged in the groove?

A. The *vertebral artery* passing up, and a *vein* arising from the spinal marrow, its membrane, and deep-seated parts of the neck, descending on either side, occupy the *foramen*, and also the *groove;* but this groove contains also the *tenth pair of nerves* in its passage out from the spinal marrow.

Q. What does the *notch* between the inferior oblique and the transverse process transmit?

A. This notch, together with another similar one in

the second vertebra, forms a *hole* through which the *first pair of cervical nerves* on either side is transmitted.

Q. Are the *transverse processes* of the *atlas* longer than those of the other cervical vertebrae, and for what purpose?

A. Yes; they are longer, in order to give the muscles attached to them greater power in performing the rotatory motions of the head, by their acting with a longer lever.

Q. What *motions of the head* are performed upon the *atlas?*

A. The condyles of the occipital bone are so obliquely articulated with the atlas, that *motions* of the head *forwards* and *backwards* can only be performed.

Q. What motions of the head are performed between the atlas and second cervical vertebra?

A. The inferior articular processes of the atlas being concave, receive the convex articular surfaces of the second vertebra, and perform *rotatory* and other *motions* of the head in every direction.

Q. Are not some rough protuberances and depressions observable on the fore part of the atlas?

A. Yes; on the posterior part of the anterior arch on each side of the *circular notch*, formed by the *processus dentātus* of the second vertebra, a small rough sinuosity is observable, where ligaments are attached for securing that process in its place; still more laterally is a small rough protuberance and depression, for the insertion of the *transverse ligament*.

Q. What *muscles* are attached to the anterior part of the *atlas?*

A. The *musculi longi colli* are inserted into the tubercle on the convexity of the anterior arch; and the *recti interni minōres* arise from the small cavities on either side of it.

Q. What are attached to the convex part of the posterior arch of the atlas?

A. On the upper and back part of the middle of this arch are two depressions, from which the *recti postīci*

minōres arise; on its lower part are two other sinuosities, in which *ligaments* are fixed for connecting this with the inferior vertebra.

Q. What is the *course* of the *vertebral arteries* before they enter the cranium?

A. These arteries ascend in the canal formed by the holes in the transverse processes of the cervical vertebrae almost in a straight line, until they reach the third; when they form *various windings* in passing the third, second, and first vertebrae, and then turn suddenly and run horizontally round the condyloid articulations into the *foramen magnum*.

Q. Why do they form *such windings?*

A. That the *impetus of the blood* in them may be diminished, before it enters the tender substance of the brain.

Q. What parts are peculiar to the second, or *vertebra dentata?*

A. It has a perpendicular *tooth-like process* arising from its body; its superior articulating processes almost horizontal, circular, and slightly convex, adapted to perform rotatory motion; its transverse processes very slightly grooved, and not forked.

Q. What is observable on the *dentoid process?*

A. Its fore part is convex and covered with cartilage in the recent subject, where the atlas turns upon it; its back part is also round and smooth, where it moves upon the transverse ligament.

Q. Does the *processus dentatus* exhibit any marks of the attachment of ligaments?

A. Yes; on either side of it the *lateral ligament* arises, and goes obliquely transverse to be inserted into the atlas and occipital bone; and from its apex the *perpendicular ligament* arises, and goes to be inserted into the occipital bone at the margin of the foramen magnum.

Q. Is any thing worthy of observation in the *spinous process* of the *vertebra dentata?*

A. It is short, strong, forked, and turned much

downwards, so as not to impede the rotatory motions of the atlas.

Q. Are any *muscles* attached to it?

A. Yes; The *recti capitis postĭci majŏres*, and the *obliqui capitis inferiores*, arise from its spinous process.

Q. What is the *state* of the vertebra dentata *at birth?*

A. It consists of four pieces, three of which are common to all the vertebrae, viz. the body and two lateral pieces for the articulating processes; the fourth, the processus dentatus, joined by cartilage to the body, is peculiar to this vertebra.

Q. Is the seventh or last cervical vertebra like the others?

A. It retains some characteristic marks of the cervical, and assumes others of the dorsal vertebrae.

Q. What are these *characteristic marks?*

A. Its transverse processes are *perforated*, and sometimes a cross spiculum of bone separates the vein, which is small, from the vertebral artery. It agrees with the dorsal in having *no bifurcation* at the extremities of its transverse and spinous processes; in having the superior and inferior surfaces of its body less hollow; its articular processes more perpendicular, and its spinous process larger and slanting more downwards.

Q. What is the *form* of the cervical vertebrae when put together?

A. It is pyramidal with the apex towards the head.

Q. What is the figure of the canal, for the reception of the spinal marrow, formed by the holes of the cervical vertebrae?

A. It is semicircular, with the diameter or flat side anterior.

OF THE DORSAL VERTEBRAE.

Q. How many dorsal vertebrae are there?

A. Twelve.

Q. In what do the dorsal vertebrae differ from the cervical?

A. The dorsal want holes in the transverse processes, and have four lateral depressions, two above and two below, at the edges of the superior and inferior surfaces, for the articulation of the ribs.

Q. What are the *peculiarities* of their body?

A. They are flatter at the sides, more hollow behind, and larger; their *articular processes* are *almost perpendicular*, the upper ones slanting forwards, and the under ones backwards; their superior and inferior surfaces are horizontal.

Q. What are their *spinous* processes?

A. They are thick at the roots, and become long and slender as they descend obliquely over each other; are sharp above, and gently hollowed below.

Q. Describe their *transverse* processes?

A. They are long in the upper and middle part of the back, but become shorter near the under part; they project obliquely backwards and downwards, and enlarge at the extremities, which are *hollowed* and *articulated* with the *tubercles* of the ribs.

Q. Have the *first* and *twelfth*, or last, *dorsal vertebrae* any thing peculiar?

A. The *first* is hollowed in its upper surface, and flat in its under one; has an entire pit above, and a half one or notch below on each side, for the heads of the first and second ribs: the *twelfth* has an entire pit below, and a half one above, for the same purpose; it has no articular surface on its transverse processes.

Q. Have the dorsal vertebrae any *lateral notches?*

A. Yes; two on each side, the same as the cervical, between the articular process and body above and below; and when the vertebrae are applied to each other, the notches immediately above and those below form round holes, through which *nerves* pass out from the *spinal marrow*.

Q. What is the form of the *spinal hole* in the dorsal vertebrae?

A. It becomes rounder and narrower as it descends

from the first to the tenth vertebra, and again becomes flatter in the two last.

Q. Do the articular and spinous processes of the dorsal vertebrae admit of much motion?

A. No; the motions are very confined, being chiefly flexion and extension of the trunk.

Q. What is the form of the *inter-vertebral substances?*

A. They are generally thin, but thinnest anteriorly, to enlarge the cavity of the thorax by the curvature of the spine.

OF THE LUMBAR VERTEBRAE.

Q. Describe the bodies of the *five lumbar vertebrae?*

A. They are the largest and broadest of all the vertebrae, increasing as they descend, particularly in breadth; are a little contracted in the middle, and have prominent edges at their concave, superior, and inferior surfaces.

Q. Describe their *transverse processes?*

A. They are flat before and behind, are long, slender, and almost erect, to allow free motion, and to give attachment to large muscles.

Q. Describe their *spinous processes?*

A. They are short, straight, strong, and horizontal, with narrow edges above and below; and broad flat sides, to give origin to strong muscles.

Q. Describe the *articular processes* of the lumbar vertebrae?

A. They are strong and remarkably deep; the two superior are concave from above to below, facing each other, or turned inwards; and the two inferior ones being convex longitudinally, and placed nearer each other, face outwardly; and being received between the superior articular processes of the next vertebra below, form an articulation, as with ball and socket, adapted for free motions in every direction.

Q. What kind of *inter-vertebral cartilage* have they?

A. These cartilages are very thick, particularly on

the anterior aspect, and, in consequence, the spine is made convex before.

Q. Are these *inter-vertebral cartilages* often the *subjects of disease?*

A. Yes; in scrofulous habits they frequently become inflamed, suppurate, waste, and ultimately cause the spine to become twisted. This wasting of the inter-vertebral cartilages sometimes pervades the spongy substance of the vertebrae themselves, particularly in the loins, and produces *Lumbar Abscess;* or, in infants, *Spina Bifida.*

OF THE OS SACRUM.

Q. What is the *situation* and *figure* of the *os sacrum?*

A. It is situated immediately below the lumbar vertebrae, and forms the back part of the pelvis; its figure is that of an inverted pyramid, and concave anteriorly.

Q. What is it composed of?

A. Of *five vertebrae* grown together, hence called *false;* their adhesions, however, are distinctly marked by transverse prominent lines.

Q. Does the bone exhibit any apppearance of *transverse processes?*

A. Yes; they are united, and form a large oblong thick process on either side, and are separated by a perpendicular ridge.

Q. Has the os sacrum any *spinous processes?*

A. Yes; they are short, sharp, and almost erect above, and less observable below.

Q. What is the *form of its canal* for containing the under end of the spinal marrow?

A. Between the bodies and processes of the three uppermost vertebrae it is triangular; becomes smaller as it descends, and below the third false vertebra it is open behind, where in the recent subject the *spinal marrow* is defended by a strong *ligamentous membrane.*

Q. What is the name of the lower end of the spinal marrow?

A. *Cauda equina*, from its fibrous bushy appearance.

Q. How many *holes* are ou the internal surface of the os sacrum?

A. Four pairs of large holes, with grooves leading from them.

Q. How many *foramina* arc observable on its external, or posterior surface?

A. Four pairs also, not much smaller in the dry bone, but so filled with membrane and cellular substance in the recent subject, as to become small.

Q. What passes through these foramina of the os sacrum?

A. The great *sacral nerves* pass out from the spinal marrow through the anterior; and *small nerves* also pass out to the large muscles; and *minute arteries* pass in through the posterior foramina.

Q. Has the os sacrum any *notches?*

A. Yes; there is a notch on either side below, corresponding to similar ones in the os coccȳgis, to form holes for the passage of the *last spinal nerves.*

Q. How many *articular surfaces* has the os sacrum?

A. Four; two at the base or upper part of the bone, facing backwards, to be articulated with the two inferior of the *last lumbar vertebra;* and a large, uneven irregular surface on either side, where it is firmly connected with the *ossa innominata.*

Q. What are the *connexions* of the os sacrum?

A. It is connected with the lumbar vertebra above; the innominata on the sides; and with the base of the os coccygis below.

Q. What *purposes* does it serve?

A. The os sacrum, being triangular with its base above and its apex below, forms a base for supporting the vertebral column, defends the large sacral nerves, of great importance; and behind, affords an origin to strong muscles moving the trunk and inferior extremities.

Q. What is the *condition* of the os sacrum *at birth?*

A. It is composed of five distinct vertebrae, with inter-vertebral substances in the foetal state.

OF THE OS COCCYGIS.

Q. What are the *situation* and *form* of the os coccyx?

A. It hangs from the apex of the os sacrum; is broad and flat above, and tapering below, convex behind, and curved forwards.

Q. How *many portions* does it consist of in the young?

A. Of *four* or *five*, which are similar to vertebrae.

Q. Do these vertebrae adhere in the adult?

A. Yes; they grow together, and admit of no motion, except a general elasticity.

Q. Do any *ligaments* strengthen it?

A. It is covered by a *strong ligament*, which gives origin to numerous muscular fibres on the sides of the bone.

Q. What is the *state* of the os coccyx *in the foetus?*

A. At birth it is almost wholly cartilaginous.

Q. What *uses* does the os coccygis serve?

A. It, with the parts connected with it, contracts the inferior opening of the pelvis, assists in supporting the intestinum rectum, the uterus, and the urinary bladder.

Remarks.

Q. How are these classes of vertebrae to be distinguished?

A. The *cervical* have foramina in their transverse, and bifurcations in their spinous processes: the *dorsal* have cavities on their sides for receiving the *heads*, and a smooth depression on the anterior part of the knobbed extremities of the transverse processes, for articulating with the *tubercle* of the ribs; and spinous processes sharply ridged above, hollowed below, and very much sloped downwards: the *lumbar* have no holes in their transverse processes, no depressions for the ribs on their bodies or transverse processes, and no sloping spines;

but they have larger bodies, long horizontal transverse processes, broad horizontal spinous processes with their edge up, and articular processes facing outwards and inwards.

Q. What parts of the vertebral column are best adapted for motion?

A. The cervical and lumbar vertebrae admit of free motion in every direction; the dorsal admit of motion forwards and backwards chiefly, and but of little laterally.

Q. Why are the dorsal vertebrae so confined in their motions?

A. That they may more safely defend the vital organs attached to various parts of the thorax.

Q. Are not vital organs contained in the abdomen, and yet why are the lumbar vertebrae destined to have free motion?

A. The important organs, namely, the *viscera*, are loosely attached to the internal surface of the bodies of the vertebrae, and in consequence are not affected by the free motions of the lumbar vertebrae.

BONES OF THE THORAX.

Q. What is the figure of the thorax?

A. It is somewhat conical, but largest near the middle; its under part is shorter before than behind, or on the sides.

Q. What bones compose the thorax?

A. The twelve dorsal vertebrae behind, the sternum before, and the twelve ribs on each side.

OF THE COSTAE, OR RIBS.

Q. How are the ribs commonly divided?

A. Into *true* and *false*.

Q. How many are in each class?

A. The *seven superior* are denominated *true*, because they have their cartilages joined to the sternum: the

five inferior are *false*, because their cartilages do not reach the sternum, but terminate in that of the last true rib.

Q. Describe the situation and figure of the ribs?

A. They slope a little downwards from their attachment to the vertebrae; are concave and smooth internally, convex externally, are flat near their middle; have an upper roundish edge, and a sharp under one.

Q. What *particular parts* are *in each rib?*

A. A head with a middle ridge, and a plane or hollow surface on each side of it; a cervix; a tubercle; an angle; a fossa or groove on the inner side of the inferior margin; and an oval pit in the anterior extremity.

Q. What parts are connected with the *head?*

A. The head of each rib is adapted to the intervertebral space, having an articulating surface with the vertebra above, and another with that below, excepting the first rib, which is articulated with the first dorsal vertebra, and has only one articulating surface.

Q. What is the situation and use of the *cervix?*

A. It is situated between the head and tubercle, and gives attachment to the capsular ligament of the articulation.

Q. Describe the situation and use of the *tubercle?*

A. It is situated a short distance from the head on the posterior part of the rib, having a flat surface, by which it is articulated with the *transverse process* of the lower of the two vertebrae, to which the head is joined.

Q. Where is the *angle* situated, and what is its use?

A. The angle of the rib, situated a little distance from the tubercle, is formed by the expansion of the ribs to give breadth to the thorax, and by the strong *sacro-lumbalis* muscle attached at that place.

Q. What is the use of the *groove* in the under margin?

A. The *intercostal artery, vein,* and *nerve,* are lodged in it; but that part of the rib between the head and angle is round, having no artery in contact with it, has

no groove: near the anterior extremity too, the groove becomes very inconsiderable and disappears, owing to the smallness of the vessels there.

Q. What is the use of the *oval pit* in the anterior end of the rib?

A. The cartilage, which connects the rib with the sternum, is inserted into that hole.

Q. Are not the ribs somewhat twisted?

A. Yes; the rib with its cartilage forms a curve along its superior margin, which rises considerably near the sternum; the curve is greater as the ribs descend.

Q. Have the different ribs the same degree of curve?

A. No; the first or upper rib is the most bent, and it is flat above and below, and internally; in their descent the ribs become gradually straighter.

Q. Are the ribs alike in horizontality?

A. No; with respect to the spine, the uppermost rib is nearer horizontal, and the obliquity increases as the ribs descend, their anterior extremities becoming more distant from each other.

Q. Are the *cartilages* of the different ribs of the same length?

A. No; the cartilages become longer, but approach nearer as they descend.

Q. Do the ribs differ much in length?

A. Yes; the length of the ribs increases from the first to the seventh, and then decreases.

Q. Is the distance between the tubercle and angle of the rib always the same?

A. No; the distance increases to the ninth rib, as they descend; corresponding to the breadth of the thorax, and of the *sacro-lumbalis* muscle, which covers them.

Q. How are the cartilages of the ribs attached?

A. Those of the true ribs are directly attached to the sternum; the cartilages of the three upper false ribs are joined to each other, and the union of substance to that of the under true rib.

Q. Are the *cartilages* of the *eleventh* and *twelfth ribs* not joined to the others?

A. Their cartilages are sometimes joined to the cartilages of the other false ribs; but the anterior extremities of these ribs more frequently are not joined to the others; and they lie loose among the muscles, hence are called *floating ribs*.

Q. Has the first rib any cartilage between it and the sternum?

A. Its posterior end is firmly fixed to the first dorsal vertebra, and its anterior to the sternum, so as to admit of no motion; cartilage forms its connecting medium.

Q. Has the second rib any cartilage interposed between it and the sternum?

A. The second rib has a little cartilage, which admits of a small degree of motion, but very little.

Q. Have the first and second ribs any groove in their inferior margin?

A. No; it is somewhat rounded, but is not grooved in these ribs.

Q. Do any of the other ribs want grooves?

A. The eleventh and twelfth generally want both the groove and tubercle.

Remarks.

Q. What motions are the ribs adapted to perform?

A. Two motions; one upwards and downwards with their anterior extremities, and another somewhat rotatory motion near their middle part.

Q. How can they perform such motions, seeing they are bound at both ends?

A. The articulation of their head with the bodies of the vertebrae, is to be considered the centre of motion; and their anterior extremities, being attached to cartilages, which are elastic and moveable, can be raised or depressed to a certain extent.

Q. How can the attachments of the ribs admit of *rotatory motion?*

A. The first rib is firmly fixed to the vertebra and

sternnm; hence, when the intercostal muscles act, they pull all the other ribs upwards to it, as a fixed point, in proportion as they are moveable.

Q. Do the ribs acquire mobility as they descend?

A. Yes; in proportion to the length of the cartilages interposed between them and the sternum, and to the intercostal spaces, which are greatest at the middle of the ribs.

Q. How is their *rotatory motion performed?*

A. While the intercostal muscles contract and elevate the ribs, they have greater power over their middle, where their fibres are longer, and the intercostal spaces wider; hence, when the anterior extremity is checked in its ascent, they elevate the middle of the ribs, and produce a partial rotatory movement on both their extremities.

Q. Do these movements of the ribs enlarge the thorax?

A. Yes; during every inspiration they enlarge the cavity of the thorax in all its dimensions.

Q. What is the *structure* of the substance of the ribs?

A. It is spongy, particularly near their anterior extremities, and covered with a thin external lamella, which becomes a little thicker towards their head.

Q. Does this spongy texture render them more susceptible of *disease?*

A. Yes; the anterior extremities of the ribs become soft, and enlarge in size, in *Rickets;* and deformity of the thorax is the consequence.

Q. What is the *state* of the ribs *in the foetus?*

A. The heads and tubercles are pretty well ossified, the other parts are cartilaginous.

Q. What purposes do the ribs serve?

A. They form the sides of the thorax, cover and defend the heart and lungs, and materially assist in the performance of respiration.

OF THE STERNUM.

Q. What are the situation and figure of the sternum?

A. It is situated in the fore and middle part of the thorax, and is of a triangular form, being broad and thick above, and thin and narrow below.

Q. How many pieces is it composed of?

A. Of three, joined together by cartilage, or ossified in the adult.

Q. Describe the sternum?

A. Its external surface is flat; its internal is somewhat hollowed, particularly above; it has thick strong upper corners, with a cavity in each; has seven pits or depressions on each side, which are considerably distant from each other above, but become gradually nearer as they descend.

Q. What is lodged in the cavities of the upper corner on each side?

A. The end of the clavicle on each side is firmly articulated in that cavity with the sternum.

Q. Why is the sternum concave internally, particularly above?

A. The internal surface of the thorax is round, and the internal part of the sternum forms a portion of its rotundity; the trachēa descending, is lodged under its upper and more concave part.

Q. What do the *pits* on the sides of the sternum receive?

A. They receive the ends of the cartilages of the ribs, which are firmly attached by capsular ligaments.

Q. What is the name of the third or lowest piece of the sternum?

A. It is shaped like the point of a broad-sword, and called *cartilāgo ensiformis*.

Q. What muscles are attached to the sternum?

A. The two *sterno-mastoidēi*, and the two *pectorales majores*.

Q. What is attached to its internal surface?

A. The *mediastīnum*, and two *sterno-costales* muscles.

Q. What is the *structure* of the sternum?

A. It is cellular, and its cancelli are covered by a thin lamella of a harder texture.

Q. Is it strengthened by any ligament in the recent subject?

A. It is invested by a strong tendinous membrane.

Q. What is the *state* of the sternum *in the foetus?*

A. It is composed of seven or eight pieces, which ultimately unite and form three.

Q. What are the *connexions* of the sternum?

A. It is connected by cartilage to the fourteen upper ribs, and by inter-articular cartilage to the anterior ends of the two clavicles.

Q. What purposes does the *sternum serve?*

A. It gives origin to several muscles, forms part of the thorax, defends the heart and lungs, gives attachment to the mediastinum internally, and to the ribs externally, and is a fulcrum on which the clavicles roll.

BONES OF THE PELVIS.

Q. Where is the *pelvis* situated?

A. At the inferior part of the trunk.

Q. Of what bones is it composed?

A. Of the os sacrum, and os coccȳgis behind, and of the two ossa innominata laterally and before.

Q. Of how many portions is each *os innominatum* composed?

A. Of three in children, namely, the os ilium, ischium, and pubis; which though completely ossified in the adult, yet retain their names to facilitate the description of this unshapely bone.

OF THE OS ILIUM.

Q. Where is the os ilium situated?

A. In the upper expanded part of the os innominatum.

Q. Describe the *ilium*?

A. Its dorsum or outer surface is irregularly convex, its inner surface concave, its upper edge or spine is thick, rough, and semicircular; its articulating surface with the os sacrum on the under, posterior, and internal part, large and scabrous; from which towards the pubis a transverse ridge called *linea innominata* arises; and on its anterior inferior external side a curved high ridge projects, exhibiting internally a semilunar cavity, behind which is a large notch.

Q. How many *processes* has the os ilium?

A. Four; an anterior superior, and an anterior inferior spinous process; and a superior and an inferior spinous process also behind.

Q. What is attached to the *anterior and superior spinous process*?

A. The *sartorius* muscle, POUPART'S *ligament*, and the *tensor vaginae femoris*.

Q. What is attached to the *anterior inferior spinous* process?

A. The *rectus femoris* muscle.

Q. What parts are attached to the *posterior superior*, and *inferior spinous* processes?

A. Ligaments for connecting this bone to the os sacrum, and for the origin of muscles.

Q. What *muscles* are attached to the *dorsum of the ilium*?

A. The *three glutei* muscles arise from it.

Q. What muscles are attached to the crest or spine of the ilium?

A. The *external* or descending *oblique* is inserted into it; and the *internal* or ascending *oblique*, and the *transverse abdominal* muscles, the *gluteus maximus*, *quadratus lumborum*, and *latissimus dorsi*, arise from it.

Q. What *muscle* is attached to its *internal concave* surface?

A. The *iliacus internus*.

Q. Describe the *inferior* and *posterior notch* of the ilium?

A. It is a kind of semi-circle, and when the two sacro-sciatic ligaments are entire in the recent subject, a large hole is formed, named the *sacro-sciatic hole*.

Q. What *vessels* pass through this *foramen sacro-sciaticum?*

A. The *gluteal* and *ischiatic arteries*, the *pyriform* muscle situated between them, and the *sciatic nerve*.

Q. What is the *purpose* of the *linea innominata?*

A. It forms the lateral portion of the brim of the pelvis, dividing the cavity of the pelvis from that of the abdomen.

Q. What is the *use* of that *semi-lunar cavity* with a highly curved ridge at the inferior anterior and exterior part of the ilium?

A. It forms the upper and back part of the *acetabulum*, being the socket in which the head of the femur is articulated.

OF THE OS ISCHIUM.

Q. What are the situation and figure of the os ischium?

A. It is situated at the lowest part of the os innominatum; its figure is irregular.

Q. How is the *os ischium* divided?

A. Into a body, tuberosity, and ramus.

Q. Describe the *os ischium?*

A. The upper part of its body forms the inferior part of the *acetabulum;* behind which its *spinous process* is situated in a line with the notch of the ilium.

Q. What *sinuosities* has the os ischium?

A. Immediately below the spinous process internally is a large depression, sometimes called the cervix; and externally, at the root of the spinous process, and between the acetabulum and tuberosity, is another sinuosity.

Q. Where is the *tuberosity* situated?

A. It is the lowest part of the bone, being that on which the weight of the body rests in the sitting posture.

Q. Where is the *ramus* of the ischium situated?

A. It rises up anteriorly to join the os pubis.

Q. What parts are attached to the *spine* of the ischium?

A. The *superior sacro-sciatic ligament*, the *coccygeus*, *superior gemellus*, and part of the *levator ani*, muscles, arise from it.

Q. What occupies the *sinuosity under* the spinous process?

A. The *tendon* of the *obturator internus* plays in it.

Q. What occupies the *sinuosity at the root* of the spinous process externally?

A. The *pyriformis* or *iliăcus externus* muscle.

Q. What parts are attached to the upper part of the *tuberosity* of the ischium?

A. The *inferior gemellus*, and *inferior sacro-sciatic ligament*.

Q. What passes through the *foramen* between the superior or internal, the inferior or external sacro-sciatic ligaments, and the great notch or sinuosity of the ilium?

A. The *obturator internus* muscle.

Q. What muscles arise from the upper posterior oblique surfaces of the tuberosity?

A. The *long head of the biceps flexor cruris*, and *semitendinosus* arise from the interior; and the *semimembrānōsus* from the exterior surface, which reaches nearer the acetabulum.

Q. What muscle arises from the lower and thinner scabrous part of the tubcrosity, bending forwards?

A. The largest head of the *triceps adductor femoris*.

Q. What muscle arises between the external margin of the tuberosity and the great hole of the os innominatum?

A. The *quadratus femoris*.

Q. What parts arise from the scabrous part of the ramus?

A. From its posterior part, the *transversālis* and erector penis; and from its thin scabrous part, the two lower heads of the *triceps adductor femoris;* the *crus penis* in the male, and the *crus clitoridis* in the female.

OF THE OS PUBIS.

Q. What is the situation of the os pubis?

A. At the anterior part of the pelvis.

Q. How is it divided?

A. Into a *body* near the acetabulum; an *angle* at its anterior part, where it joins its fellow of the opposite side; and a *ramus*, which descends from the angle to join the ramus of the os ischium.

Q. Describe the ridges or spines of this bone?

A. A ridge continued round from the linea innominata of the os ilium along its upper and inner edge to the angle, forming part of the brim of the pelvis: another ridge from the former, extending downwards and backwards, in the fore part of the acetabulum.

Q. Where is the *crest* of the pubis?

A. The upper and inner scabrous part, where it joins its fellow.

Q. What parts are attached to it?

A. The *rectus* and *pyramidalis* muscles, and the *end of* POUPART'S *ligament*.

Q. What *vessels* pass over the flattened part of the body of the pubis under the ligament of POUPART?

A. The *psoas magnus* and *iliacus internus* muscles play over it, the *femoral artery*, *vein*, and *nerve*, pass over it nearer to the angle.

Q. What muscle arises from the external part of the angle?

A. The *pectinālis*.

Q. What is the name of the large hole formed by the os ischium and pubis?

A. The *foramen thyroidēum*, which in the recent subject is all filled by a membranous ligament, excepting a *hole* formed by the *obturator ligament*.

Q. What vessels pass through this *foramen obturatorium?*

A. The *obturator artery*, *vein*, and *nerve*.

Q. What forms the *arch* of the pubis?

A. The two rami of the os pubis form its upper part, and the rami of the os ischium continue it downwards.

Q. What is the name of the junction of the ossa pubis?

A. The *symphysis pubis*, which is strengthened by a ligamentous cartilage, and keeps the two bones so firmly fixed together, as to admit of no motion.

Q. What *occupies the acetabulum?*

A. The round head of the *os femoris*.

Q. What is situated in the *scabrous pit* in the bottom of the acetabulum?

A. The *round ligament* of the head of the femur is attached to it.

Q. What is situated in the breach of the anterior part leading to the insertion of the round ligament?

A. A *ligament* is stretched across from the one side of the breach to the other, and the *synovial apparatus* of the joint is lodged under it, and towards the round ligament; the *vessels* of the joint also enter by it.

Q. Where is the acetabulum deepest?

A. At its upper and back part; its brim there rises very high, and besides is tipped with cartilage in the recent subject.

Q. What parts retain the head of the femur in the acetabulum?

A. The *round ligament* attached to the head of the femur, and inserted into the bottom of the acetabulum, the height and strength of its brim when tipped with cartilage, the capsular ligament, and the muscles surrounding the joint.

Q. What are the *connexions* of the *ossa innominata?*

A. They are connected behind to the os sacrum by a thin cartilage and by strong ligaments, so as to admit of no motion; called *posterior symphysis*; before to

each other by a ligamentous cartilage and ligaments so as to prevent all motion, called *symphysis pubis.*

Q. What are the *uses* of the pelvis?

A. It forms a firm arch for supporting the whole weight of the superincumbent parts of the body; it contains the urinary bladder and rectum, and the uterus also in females; it gives a safe passage to large and important blood-vessels and nerves; it gives origin behind to muscles, which extend the trunk; below and before to those which move the thigh; and insertion to others, which bend the body forwards.

Remarks.

Q. What are the *dimensions* of the brim *of the pelvis?*

A. The *short diameter,* being a line drawn from the middle or promontory of the os sacrum to the crest of the symphysis pubis, is four inches; the *long diameter* in a line drawn from the one os ilium to the other is *five inches and a quarter.* The *diagonal* of these lines, however, is the longest in the recent subject, and the long diameter of the child's head descends in that direction through the brim of the pelvis.

Q. Why is the *diagonal line* the longest in the recent subject?

A. Because the *psoas magnus* and *internal iliac* muscles on each side occupy a considerable space of the internal surface of the ossa ilia; and thereby diminish the long diameter in the skeleton.

Q. What are the *dimensions* of the pelvis *at its outlet* below?

A. The *long diameter* below is the reverse of the brim, being from the symphysis of the arch of the pubis to the point of the os coccygis *five inches and a quarter,* and the *diameter* from the one tuberosity of the ossa ischii to that of the other is *four inches.*

Q. What is the *depth* of the pelvis?

A. From the brim to the point of the os coccygis,

down the middle of the os sacrum, the pelvis usually measures *six inches*; on the sides, *three inches and a half*; and before, *one inch and a half*.

Q. Are the dimensions of the pelvis in the female different from those in the male sex?

A. The pelvis is more of an oval figure, and generally larger in the female.

OF THE SUPERIOR EXTREMITIES.

Q. What is the *division* of the bones of the superior extremity?

A. They are divided into the bones of the shoulder, arm, and hand.

Q. How many bones compose *the shoulder?*

A. Two; the *clavicle* and *scapula*.

Q. How many bones compose *the arm?*

A. Three; the *os humeri* in the arm, and the *ulna* and *radius* in the fore-arm.

Q. How are the bones which compose *the hand* subdivided?

A. Into those of the *carpus*, *metacarpus*, and *fingers*.

Q. How many bones compose the *carpus?*

A. It is composed of *eight bones* disposed in two rows; those of the first are the *scaphoides*, *lunare*, *cuneiforme*, *pisiforme*; those of the second row, the *trapezium*, *trapezoides*, *os magnum*, *et unciforme*.

Q. How many bones compose the *metacarpus?*

A. It consists of *four bones* for the fingers, and *one* for the thumb.

Q. How many bones compose the *fingers?*

A. Twelve; arranged into three phalanges.

Q. How many compose the *thumb?*

A. Two.

OF THE CLAVICLE.

Q. What is the *situation* of the clavicle?

A. It is situated transversely between the superior

angle of the sternum and the acromion process of the scapula.

Q. What is the *form* of the clavicle?

A. It is long, and a little bent at each end in opposite directions, like the italic *f*.

Q. What is the appearance of its *sternal extremity*?

A. It is considerably enlarged in size, and triangular, with its posterior angle produced to form a sharp ridge; its end round, flat, and hollowed, for receiving the inter-articular cartilage adapted to the pit in the sternum.

Q. What is the appearance of the *body* of the clavicle?

A. Its interior portion is bent obliquely forwards and downwards, rounded above, hollowed a little below; its exterior portion somewhat flattened, sloping behind, and bent backwards to form an articulation with the scapula.

Q. Has the clavicle any *tubercle?*

A. Yes; there is a *tubercle* about an inch from the scapular extremity.

Q. What is attached to the *ridge* of the produced posterior angle of its sternal extremity?

A. The *inter-clavicular ligament*, extending from the one clavicle to the other, and binding them firmly together.

Q. What is the nature of the *inter-articular cartilage?*

A. It is very similar to the inter-vertebral cartilages, being very strong and elastic; it grows to the end of the clavicle, is adapted to the hollow of the sternum, and binds them together so as to admit of a considerable degree of rotatory motion.

Q. Has the sternal extremity of the clavicle a *capsular ligament* also?

A. Yes; a strong capsular ligament, which allows the clavicle to move with a rotatory motion.

Q. How is the *scapular extremity* fixed?

A. It is tipped with *cartilage* in the recent subject,

which adheres very firmly to the *acromion process* of the scapula.

Q. Has it a *capsular ligament ?*

A. Yes ; it adheres firmly around the articulation.

Q. What is attached to the *tubercle ?*

A. A very strong short *ligament*, which connects the *clavicle* to the *coracoid process* of the scapula.

Q. Does the *articulation* at the scapular extremity admit of much motion ?

A. It admits of little or no motion.

Q. What *muscles* are attached to the body of the clavicle near its sternal extremity ?

A. The *sterno-hyoidēus*, and *sterno-mastoidēus*, and *pectoral* muscle, partly arise from it.

Q. What *muscle* is situated in the *hollow* below ?

A. The *subclavian* muscle is inserted there.

Q. What muscles are attached to the body towards the scapular extremity ?

A. A portion of the *deltoid* arises from the concave part, and the *trapezius* is inserted into the opposite convex part of it.

Q. What are the *uses of the clavicle ?*

A. It supports the shoulder, and keeps it at a proper distance from the trunk, that the motions of the arm may be more extensive : it defends the *subclavian artery, vein,* and *nerves,* and gives attachment to various muscles.

Q. What is the *state* of the clavicle *in the fœtus ?*

A. It is completely formed.

OF THE SCAPULA.

Q. Where is the scapula situated ?

A. On the superior and posterior part of the thorax.

Q. What is the form of the scapula ?

A. It is triangular ; its longest side or base is placed towards the spinous processes of the vertebrae ; its second longest, or inferior costa, before ; and its shortest and most uneven side, named its superior costa, above.

Q. Describe the *scapula?*

A. Its venter, or inner surface, is concave, corresponding to the convexity of the ribs; and its dorsum or outer surface convex; its inferior angle blunt, its superior and posterior acute, and the glenoid cavity occupies the anterior angle.

Q. Which *costa* is the thickest?

A. The anterior or inferior.

Q. Between what ribs is the scapula extended?

A. Its superior or cervical costa is nearly opposite to the second rib, and its inferior angle extends downwards to the eighth, in the natural easy mode of sitting erect, with the arms in their natural depending position.

Q. Where is the *semilunar notch?*

A. Near the anterior part of the superior costa, at the root of the *coracoid* process.

Q. What *vessels* does it transmit?

A. The *dorsalis superior scapŭlae artery*, its corresponding *vein*, and the *nerve*, named *scapularis*.

Q. How many *processes* has the scapula?

A. Three; the *spine*, small at its beginning, and rising higher in its course forwards; the *acromion* process, arising from the termination of the spine; and the *coracoid*, arising from the neck in a line with the superior costa.

Q. What are the names of the parts near to the *glenoid cavity?*

A. The anterior and superior angle terminates in the *cervix*, and adjoining is the *head*, which contains the *glenoid cavity*.

Q. What *sinuosities* has it?

A. Two very conspicuous; one large, under the acromion around the cervix; and the other smaller, under the root of the coracoid process in the hollow of the cervix.

Q. What purpose does the *head serve?*

A. It forms the oval prominent brim of the glenoid cavity.

Q. What occupies the *great sinuosity* under the acromion?

A. The *infra* and *supra-spinăti* muscles pass in it.

Q. What occupies the *sinuosity* under the coracoid process?

A. The *subscapularis* muscle passes over it.

Q. What muscles are attached to the end of the coracoid process?

A. The *short head* of the *biceps flexor cubĭti*, and the *corăco-brachiālis*, arise from it; and the *pectoralis minor* is inserted into it.

Q. Do any *ligaments* arise from the coracoid process?

A. Three; the *proper anterior triangular ligament*, which passes transversely from its side, to be fixed to the posterior margin of the acromion; the *ligamentum conoidēum*, which arises from the root of the coracoid process, and is fixed to the tubercle of the clavicle; and the *ligamentum trapezoidēum*, arising from the point of the coracoid process, is fixed to the under edge of the clavicle.

Q. What muscle is attached to the base above the spine of the scapula?

A. The *levātor scapŭlae*.

Q. What *muscles* are attached to the *inferior angle?*

A. The *teres major* arises from it; and the *latissimus dorsi* passes over it.

Q. What muscle is attached to the *triangular space* between the root of the spine and the base?

A. Part of the insertion of the *trapezius*.

Q. What muscle arises from the *inferior* or *anterior costa* of the scapula?

A. The *teres minor*.

Q. What muscles arise from the cavities above and below the *spine?*

A. From the large sinuosity above the spine the *supraspinatus* arises: and from the other below it on the dorsum scapŭlae, the *infraspinatus* arises.

Q. What muscle is attached to the concave surface of the scapula?

A. The *subscapularis* arises from its three costae, and whole inner surface.

Q. What muscle arises from the superior edge of the glenoid cavity?

A. The *long head* of the *biceps flexor cubiti*.

Q. What renders the *glenoid cavity* deeper and more secure?

A. The *cartilage*, which lines it in the recent subject, being much thickened on the brim, deepens it; and ligaments and muscles surrounding it very closely render the articulation more secure.

Q. Why is this *glenoid cavity* not deeper in the bone, and thereby rendered more secure?

A. That the rotatory motions of the arm may be exercised in every possible direction.

Q. Has this articulation of the shoulder a strong *capsular ligament?*

A. Yes; it arises from the neck of the scapula, surrounds the round head of the os humĕri loosely, and is inserted into its neck; other ligaments also strengthen this.

Q. What are the *connexions* of the scapula?

A. It is firmly fixed to the clavicle by ligaments; to the head, os hyoides, trunk and arm by muscles, and to this last also, by its articulation with the os humeri.

Q. What *motions* can the scapula perform?

A. It can be moved in every direction, upwards, downwards, and to either side; and has a slight rotatory motion upon the sternum, through the medium of the clavicle, by means of the different muscles attached to it.

Q. What is the *state* of the scapula *in the fœtus?*

A. The acromion and coracoid processes and head are cartilaginous, and are joined by epiphysis to the body of the bone.

OF THE OS HUMERI.

Q. What are the figure and situation of the *os humeri?*

A. It is roundisb, cylindrical, slightly twisted, and nearly straight; and situated at the side of the trunk of the body.

Q. How is the *os humeri divided?*

A. Into a head, body, and lower extremity.

Q. Describe the *head* of the humerus?

A. It is round, and nearly a semicircle, situated on the upper and ulnar aspect, terminated by a circular depression, called its neck.

Q. What occupies the circular depression of the neck of the humerus?

A. The capsular ligament, which is inserted into it all around the head.

Q. Where is the long groove?

A. It comes from the head, along the fore or radial, and inner or thenal aspect of the bone, about three or four inches.

Q. What occupies that *long groove?*

A. The *tendon* of the long head of the *biceps flexor cubiti* muscle plays in it.

Q. Has the os humeri any *tubercles* near its head?

A. Yes, two; the smaller tubercle, situated on the inner or thenal aspect of the groove; and the larger, on the outer or radial aspect of it.

Q. What parts are attached to these *tubercles?*

A. The *subscapularis* is inserted into the smaller; and the *supraspinatus*, *infraspinatus*, and *teres minor*, are inserted into the larger tubercle.

Q. Has the *body* of the os humeri any *ridges* upon it?

A. It has four; a rough ridge, gently flattened in the middle, runs down from each tubercle along the sides of the groove; a large ridge on the radial, and a smaller one on the ulnar aspect of the cubital extremity.

Q. Does any *membrane* stretch across the *groove* between those superior ridges?

A. Yes; a *tendinous sheath* extends across the groove, and confines the tendon of the biceps in its course.

Q. What muscle is attached to the rough ridge on the inner side of the bicipital groove?

A. The *tendon* of the *pectoralis major* is inserted into it.

Q. What muscles are attached to the ridge on its outer side?

A. The *latissimus dorsi*, and the *teres major* are inserted into it.

Q. Describe the surface of the body of the humerus?

A. On the outer part of the bone there is a rough protuberance; interior to this, a flat smooth surface; from which a blunt ridge descends on the fore part; on the posterior, or anconal aspect, the bone is rather sharp and smooth, diverging into two ridges leading to the two condyles, between which is a flat smooth surface.

Q. What muscles are attached to the anterior rough uneven surface near its middle?

A. The *deltoid* and *coraco-brachialis* are inserted; and the *brachialis internus* arises there.

Q. What muscles are attached to the posterior surface of the body of the humerus?

A. The *second* and *third heads* of the *triceps extensor cubiti* arise from it, and flatten the bone with their fleshy belly.

Q. What vessel enters the foramen near the middle of the humerus?

A. The medullary artery penetrates it slanting obliquely downwards.

Q. What muscles are attached to the *large ridge* descending to the *radial condyle?*

A. The *supinātor radii longus*, and the *longest head* of the *extensor carpi radialis* arise from it.

Q. What arises from the smaller *ulnar ridge?*

A. A strong *tendinous fascia* arises from it, which gives origin to muscles of the fore arm.

Q. Describe the *cubital extremity of the os humeri?*

A. It has *two condyles*, of which the ulnar or inner is by much the larger; between the condyles is the *trochlea* or pulley, consisting of two lateral circular protuberances, of which the inner is the higher, and a middle sinuosity; and between the outer protuberant circle and

the condyle is a rounded articular head, with a circular depression separating it from the articular trochlea.

Q. Has it any *cavities?*

A. It has two considerable cavities, of which the posterior or anconal is by far the larger.

Q. What *muscles* are attached to the *external* or *radial condyle?*

A. It gives origin to the extensors and supinators of the hand and fingers, namely, the *extensor carpi radialis brevior*, *extensor carpi ulnaris*, and the *extensor digitorum communis;* the *anconēus* and *supinator radii brevis.*

Q. What *muscles* are attached to the *internal condyle?*

A. It gives origin to the flexors and pronators of the hand and fingers, viz. the *flexor carpi radialis*, *flexor carpi ulnaris*, part of the *flexor digitorum sublimis* vel *perforatus*, *pronator radii teres*, and *palmaris longus.*

Q. What is the *purpose* of the *trochlea?*

A. It is smooth and covered with cartilage in the recent subject, and articulated with the ulna by a corresponding trochlear part.

Q. What is applied to the *round articular head* adjoining to the trochlea?

A. The *upper* or *cubital end* of the *radius* plays upon it in flexion and extension of the elbow-joint.

Q. What occupies the *anterior* and *posterior cavities?*

A. The anterior cavity receives the *coronoid process* of the ulna in the flexion of the fore-arm: the posterior receives the *olecranon process* in extension of it.

Q. Is this articular surface of the os humeri directly transverse?

A. The side of it toward the ulnar aspect is longer or farther distant from the head of the bone, which renders the articulating surface considerably oblique; by which obliquity, the hands, when raised without any turning of the os humeri, are directed towards the face, breast, or simply laid across as they descend.

Q. What *motions* does the *elbow-joint* admit of?

A. It is a complete hinge, and admits of flexion and extension of the fore-arm only.

Q. What is the *state* of the os humeri *in the foetus?*

A. Its extremities are cartilaginous; its head with the tubercles, and its condyles with the trochlea, are detached, and afterwards unite to the body of the bone by epiphyses.

Q. What are the *connexions* of the os humeri?

A. It is connected above to the scapula; below to the ulna by the articular surface of the trochlea, and to the radius by the round head adjoining to the radial side of the trochlea.

OF THE ULNA.

Q. What bones compose the fore-arm?

A. The *ulna* and *radius*.

Q. What is the *situation* of the ulna?

A. At the inner or ulnar aspect of the fore-arm in its easy depending state.

Q. How is the *ulna divided?*

A. Into two extremities and a body.

Q. What *processes* are on its cubital extremity?

A. Two large processes, the *olecranon* and *coronoid*, and one smaller *tubercle*.

Q. Where is the *olecranon* situated?

A. It forms the posterior prominent part of the elbow, and has a rough surface at its end.

Q. Where is the *coronoid process* situated?

A. At the fore, or thenal, aspect of the bone, it projects sharp but not so high as the olecranon.

Q. Where is the *tubercle* situated?

A. On the forepart of the ulna near to the root of the coronoid process, it appears small and rough.

Q. How many *cavities* are observable on the cubital extremity of the ulna?

A. Two; the *great* and the *small sigmoid*, or semilunar *cavities*.

Q. Where is the *great sigmoid* cavity situated?

A. Between the olecranon and coronoid processes, and divided by a middle ridge into two slanting surfaces.

Q. Where is the *small sigmoid* cavity situated?

A. At the outer or radial side of the coronoid pracess.

Q. What *parts* are attached to the *olecranon* process?

A. The *triceps extensor cubiti* is inserted into its whole posterior surface.

Q. What is attached to the *coronoid* process?

A. The strong short *tendon* of the *brachialis internus* is inserted into it.

Q. What is attached to the *rough tubercular spot* of the ulna?

A. Part of the insertion of the *brachialis internus* is extended down to it.

Q. What is the *use* of the *great sigmoid* cavity?

A. It is lined with cartilage, and nicely adapted to the trochlea of the humerus, to form the articulation of the elbow-joint.

Q. What is the *use* of the *small sigmoid* cavity?

A. It is adapted to the round head of the radius, which plays in it when performing its rotatory motions.

Q. What is the *form of the body* of the ulna?

A. It is triangular, becoming gradually smaller towards its carpal extremity, and having its sharpest angle opposed to the radius.

Q. What is the appearance of its sides?

A. They are flat, and marked by the attachment of muscles: There is a foramen slanting upwards on the thenal aspect.

Q. What is attached to the *angle* opposed to the radius?

A. The *interosseous ligament.*

Q. What *vessel* enters the *slanting foramen?*

A. The *medullary artery.*

Q. What parts are observable on the *carpal extremity* of the ulna?

A. A small *round head*, and a *styloid process.*

Q. What is the *round head* connected with?

A. It is adapted to a corresponding cavity on the side of the radius, in which it plays during the motions of pronation and supination of the hand.

Q. What is attached to the *styloid process?*

A. This process, situated at the inner or ulnar side of the round head, gives attachment to a *strong ligament* to be inserted into the *os cuneiforme* and *pisiforme* of the carpus.

Q. Has this carpal extremity any *sinuosities?*

A. It has two, one on the anconal or posterior aspect, and another on the thenal or anterior.

Q. What occupies the *sinuosity* on the *anconal aspect?*

A. The *tendon* of the *extensor carpi ulnaris.*

Q. What is placed in that on the *thenal aspect?*

A. The *ulnar artery* and *nerve* lie in it in their passage to the hand.

Q. What is the *use of the ulna?*

A. It forms the *articulation of the elbow-joint* with the *os humeri* like a hinge, termed *ginglimus;* it strengthens the fore-arm, and with the radius rolling upon it, renders the hand capable of pronation and supination; is articulated with the *os cuneiforme* of the carpus, and assists in forming the articulation of the wrist.

Q. What are the *connexions* of the ulna?

A. It is connected with the humerus above, with the radius laterally, and with the os cuneiforme at the carpus.

OF THE RADIUS.

Q. Where is the radius situated?

A. At the outer side of the fore-arm, in a line with the thumb.

Q. How is the radius *divided?*

A. Into a head, cervix, body, and lower or carpal extremity.

Q. What is the form of its *head?*

A. It is circular, hollowed in the end applied to the os humeri, and has a smooth surface on its circumference to the extent of a fourth part of it.

Q. What is observable on the *cervix?*

A. The cervix is much smaller than the head, and impressed with a rough surface.

Q. Why is the *vertex* of the head of the radius *hollowed?*

A. That it may be adapted to the round head in the articular surface of the os humeri, around which it plays in flexion and extension of the fore-arm; and at any degree of flexion or extension it may be capable of a rotatory motion for pronation and supination of the hand.

Q. What is the *use* of the *articulating surface* on the circumference of the head, and what part is it applied to?

A. It is received into the small *semilunar* or *sigmoid cavity* on the side of the ulna, and plays in it during pronation and supination of the fore-arm.

Q. What is the *use* of the cervix?

A. It is surrounded by the *capsular ligament*, which is firmly attached to it in such a manner as to permit the various movements of the head of the bone.

Q. Has the radius any *processes?*

A. It has two; a *tubercle* of considerable size about an inch from the cervix on the ulnar aspect; and *another process*, at the carpal extremity on the outer or radial aspect of the fore-arm, stronger but not unlike the *styloid process* of the ulna.

Q. What is attached to the *tubercle?*

A. The *tendon* of the *biceps flexor cubiti* is inserted into it.

Q. Describe the *body* of the radius?

A. It is *round* and *convex* on its outer side, forming the segment of a large circle from its cervix to its carpal extremity; has a *sharp ridge* on its ulnar aspect, with a *flat surface* a little hollowed on either side of it.

Q. Why is the *radius round* and *convex* on its outer or radial aspect?

A. It is made round by the pressure of the circumjacent muscles, particularly the extensors of the hand; is formed convex the better to resist external injuries, and to make room for the muscles situated on its inner or ulnar surfaces.

Q. What is attached to the *sharp spine?*

A. The interosseous ligament.

Q. What *muscles* arise from the *anterior surface* of the radius?

A. The fleshy belly of the flexor digitorum sublimis, and flexor longus pollicis manus.

Q. What muscles occupy the posterior surface?

A. The extensor digitorum communis, and extensor carpi radialis brevior.

Q. Describe the *inferior* or *carpal extremity* of the radius?

A. It is larger than the head, flat before, and rising at the extremity; has a ridge behind with a depression on either side; has a semilunar depression on its ulnar, and a styloid process on its radial aspect; and in the end an oval cavity, with a slight transverse middle ridge.

Q. What is placed on its *flat anterior surface?*

A. The pronator radii quadratus covers it, and the tendons of the flexors of the hand and fingers play over it.

Q. What is attached to the *middle ridge* on the anconal aspect of the carpal extremity?

A. The *annular ligament* for binding the tendons in their places.

Q. What occupies the *depressions* at either side of it?

A. The tendons of the extensor muscles of the hand.

Q. What is placed in its *inner semilunar cavity?*

A. It receives the rounded carpal extremity of the ulna, which rolls in it in pronation and supination of the hand.

Q. What occupies the *articular cavity of the end?*

A. Two bones of the carpus, namely, the os scaphoides, and os lunare.

Q. What is attached to the *styloid process* of the radius?

A. A strong ligament binding it to the bones of the carpus.

OF THE CARPUS.

Q. How are the bones of the hand commonly arranged?

A. Into those of the carpus, metacarpus, and fingers.

Q. What is the general appearance of the hand?

A. It is convex behind, and concave before.

Q. Why is it concave?

A. That it may be the better adapted to grasp and hold things.

Q. How many bones is the *carpus* or *wrist* composed of?

A. Of *eight*, arranged in two rows.

Q. Enumerate those of the *first row*, nearest to the radius?

A. The os scaphoides, lunare, cuneiforme, and pisiforme.

Q. Describe the situation and connexions of the *os scaphoides?*

A. It is situated in the radial or outer side of the carpus, having a large *round convex superior surface*, adapted to the cavity in the extremity of the radius; and a projecting *hook-like process* upon its outer part, and is connected with the os lunare internally, and the trapezium and trapezoides below.

Q. Describe the situation and connexions of the *os lunare?*

A. It is situated at the inner side of the os scaphoides, has a roundish superior surface joined to that of the scaphoides, and with it forming an oval ball, fitted to the socket of the radius; its lunated edge is towards the second row.

Q. Describe the *os cuneiforme* and its connexions?

A. Its thin edge is towards the palm, its upper part

is slightly convex, and adapted to the hollowed end of the ulna; its anterior part has an orbicular spot to be connected with the os pisiforme; it is situated on the inner side of the os lunare.

Q. Describe the *os pisiforme* and its connexions?

A. It is small and roundish, placed on the anterior and inner surface of the os cuneiforme, projects into the palm, and can be felt externally.

Q. What bones then form the *joint of the wrist?*

A. The upper surfaces of the os scaphoides and lunare together, making an oval convex ball, nicely fitted to the cavity in the extremity of the radius, form the chief articulation; but the slightly convex surface of the os cuneiforme is also articulated with the hollow end of the ulna, and thus the whole articulation is completed.

Q. Enumerate the *bones of the second row* of the carpus?

A. The os trapezium, trapezoides, os magnum, and unciforme.

Q. Describe the *trapezium* and its connexions?

A. It is pretty large, of an irregular form, situated on the radial aspect; its upper convex part is connected with the hollow of the os scaphoides, and its inner with that of the trapezoides; its inferior and rather external surface is hollow, with a middle transverse ridge like a pulley, to be articulated with the *metacarpal bone of the thumb;* and from its anterior and external part it sends out a kind of *styloid process* towards the palm.

Q. What are the connexions of the *os trapezoides?*

A. It is wedged in between the trapezium and os magnum, is connected with the convex under surface of the os scaphoides above, and forms a pulley-like cavity below for the reception of the *metacarpal bone* of the *fore-finger.*

Q. Describe the connexions of the *os magnum?*

A. It has a round convex head, articulated with the hollow surfaces of the os lunare and scaphoides above, and having the trapezoides on its outer, and the os un-

ciforme on its inner side, it presents a slightly hollowed surface below for the articulation of the *metacarpal bone* of the *middle finger*.

Q. Describe the connexions of the *os unciforme*?

A. It is wedged in between the os magnum and the os cuneiforme; sends out a *hook-like process* towards the palm; has two concave surfaces below, with which the *metacarpal bones* of the *ring* and *little finger* are articulated.

Q. What substance connects all those carpal bones together?

A. All their articular surfaces are covered with cartilage, and they are bound to each other also by all forms of cross ligaments.

Q. What prominent points is the *ligamentum carpi annulare* attached to?

A. It is attached chiefly to four, namely, the eminences of the os scaphoides, and trapezium, on the outer or radial aspect; and to those of the os pisiforme and unciforme on the inner or ulnar aspect.

Q. Is not the *annular ligament* attached to more points than those four?

A. It is also firmly fixed to all the bones of the carpus, and in such a manner as to afford sheaths for the tendons of the different muscles, passing to the fingers, playing easily in.

Q. What *motions* can the articulation formed by the radius, ulna, and carpal bones perform?

A. The construction of the joint is ball and socket, in an oblong or oval form; in consequence, it can perform motions in every direction, but to greatest extent perpendicularly to the long axis of the cavity, *i. e.* flexion and extension of the wrist.

Q. Do the bones of the carpus move upon each other?

A. Yes; the articulation of the os magnum with the os scaphoides and lunare above, being that of ball and socket, admits of motions in every direction, and its lateral connexions admit of motions radiad and ulnad,

so that the hand can readily perform rotatory movements.

OF THE METACARPUS.

Q. How many bones compose the metacarpus?

A. *Four* for the fingers, and *one* for the thumb.

Q. How are they *divided?*

A. Into a base, body, and head.

Q. Describe the *base of the metacarpal bones?*

A. The base of the metacarpal bone of the *fore-finger* is a little hollow with a ridge on its inner side, and a lateral surface; the base of that of the *middle finger* is oblique and triangular, with two lateral surfaces; the base of that of the *ring-finger* irregularly triangular and small, with two lateral surfaces, and the base of that of the *little-finger* slants downwards and outwards, and has no lateral surface.

Q. Describe the *bodies* of the metacarpal bones?

A. They are long, roundish, and convex towards the back of the hand; concave and ridged towards the palm, with a flat surface on each side. That of the fore-finger is the longest, and they diminish in length towards the little-finger.

Q. Describe their *heads?*

A. The heads, or *digital extremities*, of the metacarpal bones, are larger than their bodies, and form round balls flattened on their sides, where they are in contact with each other; from the anterior part of each side of the heads a little prominence arises, to which ligaments are attached for binding the bones together: around their heads is a depression for the insertion of the capsular ligament.

Q. What are the *connexions* of the metacarpal bones?

A. They are connected with the bones of the carpus by capsular ligaments, with each other on nearly plain surfaces by strong ligaments, and with the fingers.

Q. What *muscles* lie between the metacarpal bones?

A. The *interossei*.

Q. What muscles are inserted into the metacarpal bones before and behind?

A. The *tendon* of the *flexor carpi radialis* is inserted into the fore and upper part of that of the fore-finger; and that of the *extensor carpi radialis* into its back part: that of the *extensor carpi ulnaris* into the upper and back part of the metacarpal bone of the little finger; while the tendon of the *flexor carpi ulnaris*, and *palmaris brevis*, are inserted into the pisiform bone, on the fore part.

Q. Do the *articulations* of the metacarpal bones admit of much *motion?*

A. No: Those of the fore and middle fingers are nearly fixed; those of the other figures have a greater degree of motion.

Q. In what does the metacarpal bone of the THUMB differ from that of the fingers?

A. Its *base* forms a ball articulated with the concave pulley of the os scaphoides, in which it performs motions in every direction; its *body* is thicker and shorter than those of the fingers; it stands out obliquely, and in flexion comes in opposition to the fingers.

Q. How can a joint formed by two lateral depressions and a middle ridge, and a ball fitted to them, perform free motions in every direction?

A. The articulation may be regarded as double, composed of two sockets and a ball fitted to each: the capsular ligament is loose, and when the thumb is directed towards the palm it rolls in the socket nearest the palm, when directed towards the back of the hand it rolls in the cavity nearest that aspect, and when bent or extended in its natural position, it moves equally in both sockets.

OF THE FINGERS.

Q. How many bones are in each finger and thumb?

A. Each finger is composed of *three bones*, and the thumb of *two*.

Q. How are these bones arranged?

A. Into three phalanges: those attached to the metacarpal bones compose the first phalanx; the next transverse row the second, and those at the ends of the fingers compose the third phalanx.

Q. What is the general appearance of these *phalanges?*

A. Their bases are larger than their distant extremities, their posterior surface convex, their anterior flat and in some parts grooved; and they taper a little towards their points.

Q. How are the *bases* of the *first phalanx* articulated with the metacarpal bones?

A. Their ends are formed into sockets to receive the round balls of the metacarpal bones, and are bound together by capsular ligaments.

Q. What *motions* are performed at their bases?

A. The ball and socket being irregular, are fitted for motions of flexion and extension most freely; or a considerable degree of lateral, and also of circular motion.

Q. What is the *form* of the *distant extremity* of the first phalanx of the fingers?

A. Each bone has a round prominence like a condyle on either side of its distant end, with a depression between them.

Q. Is the construction of the second phalanx adapted to this?

A. Yes; the *bases* of the *second phalanx* have two lateral cavities, and a middle prominence, which answer exactly to the extremities of the first.

Q. Is the construction of the *most distant joint* of the fingers the same?

A. Yes; the ends of the second phalanx are round on each side, and the base of the third phalanx is hollowed to receive them.

Q. What is the *form* of the *second bone* of the *thumb*, corresponding to the first phalanx of the fingers?

A. It has a large base with an oblong cavity, a convex body behind, and flat before, a distant extremity

with two round lateral protuberances and a middle cavity.

Q. Is the most distant bone of the thumb articulated with the last as the fingers are?

A. Yes; exactly similar.

Q. What *motions* does the *second bone of the thumb* perform in its articulation with the metacarpal bone?

A. Its hollow socket being much lengthened from side to side, and of considerable depth, receives the oblong round end of the metacarpal bone, and being firmly bound in its situation by lateral ligaments, it performs flexion and extension chiefly, and but a very small degree of lateral motion.

Q. What *muscle* is attached to the back, or convex part, of the fingers?

A. The *extensor digitorum communis*, by a tendinous expansion, is inserted into all the phalanges behind.

Q. What *muscles* are attached to the palmer part of the fingers?

A. The *interossei* and *lumbricales* are inserted on the lateral parts of the fingers to bend the *first phalanx*; the *flexor digitorum sublimis* vel *perforatus*, is inserted into the fore part of the *second phalanx*; and the tendons of the *flexor digitorum profundus* vel *perforans*, pass under the tendinous sheaths of the sublimis, run in the grooves defended by a ligamentous sheath from pressure, and are inserted into the *third phalanx* of the fingers.

Q. Is the surface of the third phalanx of the fingers smooth, or what?

A. It is rough where the nail, the vascular, nervous, and pulpy substance are situated.

Q. Are there not *ossa sesamoidea* sometimes found connected with the fingers?

A. Yes; small bones are sometimes found between the tendons of the flexor muscles and the joints at the roots of the fingers, and of the second bone of the thumb.

Q. What *purposes* do these *ossa sesamoidea serve?*

A. They are convex, and inclosed by the tendons externally; are concave and adapted to the joint, upon which they play, internally; and seem destined to increase the power of the muscle by lengthening the lever upon which it acts, and to facilitate its movements over the joint.

OF THE INFERIOR EXTREMITIES.

Q. How are the bones of the inferior extremity *arranged?*

A. They are commonly classed into those of the *thigh*, the *leg*, and the *foot*.

Q. How many bones compose the *thigh?*

A. One, namely the *os femoris*.

Q. How many compose the *leg?*

A. Two; the tibia and fibula.

Q. How are the bones of the *foot* subdivided?

A. Into the bones of the tarsus, metatarsus, and toes.

Q. How many bones compose the *tarsus?*

A. Seven; namely, the astragalus, os calcis, naviculare, cuhoides, cuneiforme externum, cuneiforme medium, and cuneiforme internum.

Q. How many bones does the *metatarsus* consist of?

A. Of five metatarsal bones, corresponding to the toes.

Q. How are the bones of the *toes arranged?*

A. Into three phalanges, excepting the great toe, which has two bones, as in the thumb.

OF THE OS FEMORIS.

Q. What are the form and situation of the *os femŏris?*

A. It is long, thick, and strong, and situated at the under and lateral part of the pelvis; it stands obliquely, being much nearer the mesial perpendicular of the trunk below, than above.

Q. How is the os femŏris *divided?*

A. Into an upper, and lower extremity, and a body.

Q. What parts of the *upper end* of it require particular attention?

A. Its head, cervix, the trochanter major, et minor.

Q. Describe the *relative situation* of these parts?

A. The *head* is the smooth round upper end of the bone; the *cervix* considerably smaller adjoining to the head, and stands off from the body at an angle of about 45 degrees; the *trochanter major* is a large tuberosity situated on the angle towards the outer side, in a line with the body of the femur; the *trochanter minor* is situated about two inches lower at the under and inner part of the root of the cervix.

Q. What is observable on the *head?*

A. Its rotundity is about three-fourths of a sphere; it is smooth, and has a rough pit a little below its centre.

Q. What is worthy of notice on its *cervix?*

A. The cervix is long, rough, and has numerous holes for the insertion of a ligament, reflected from the capsular one.

Q. What is attached to the *rough pit* on the head of the femur?

A. The *ligamentum teres*, or round ligament, is inserted into it, and attached by its other end to the bottom of the acetabulum, in order to keep the head firmly in the socket.

Q. What purpose does the *trochanter major* serve?

A. It is placed on the outer part of the angle, and by increasing the lever, it gives the muscles attached to it much greater power of action.

Q. What *muscles* are attached to it?

A. On its anterior rough surface the *glutēus minĭmus* is inserted; on its superior part the *glutēus medius;* the tendon of the *glutēus maxĭmus* passes over its posterior part.

Q. Are any *cavities* placed at the root of the cervix under the prominent extremity of the trochanter major?

A. There is a large and deep cavity at its posterior part, and more superficial at its anterior.

Q. What parts are attached to it?

A. The tendons of the *obturātor externus*, and obturator *internus*, of the *pyriformis* and of the *gemini*, are inserted into it.

Q. What is attached to the oblique *rough line* between the trochanters before and behind?

A. The *capsular ligament* is inserted there.

Q. What is attached to the *rough ridge* running downwards from the posterior and outer part of the great trochanter?

A. The *quadratus femŏris* is inserted there.

Q What are the form and situation of the *trochanter minor?*

A. It is a pointed, roundish, papilla-looking process, situated an inch and a half, or two inches at most, before the great trochanter, at the posterior part of the femur, and pointing inwardly.

Q. What purposes does the *trochanter minor* serve?

A. It gives attachment to various flexor muscles of the thigh.

Q. To what muscles?

A. The tendons of the *psoas magnus* and *iliacus internus*, and part of that of the *pectinālis* are inserted into it.

Q. Describe the *body of the os femŏris?*

A. The body of the femur is long, bent a little forwards, round and flattish before; and forms an angle on which is a rough ridge behind, called the *linea aspĕra*, on either side of which the bone is somewhat flat.

Q. What occupies the smooth flattish anterior part of the femur?

A. The *crurālis*, and *rectus* muscles.

Q. What forms the *linea aspĕra?*

A. The insertions and origins of several muscles.

Q. What muscles are inserted into it?

A. The *triceps adductor femŏris*, the *glutēus maximus*, and part of the *aponeurosis femoris* are inserted into the linea aspera.

Q. What muscles arise from it?

A. The *vastus externus*, and *internus*, and the short head of the *biceps flexor cruris*.

Q. What is situated on the flat surfaces on each side of the linea aspera?

A. The *vastus externus* on the one side, and the *vastus internus* on the other.

Q. Describe the *inferior end* of the *os femŏris*?

A. About five inches from the extremity in an ordinary sized bone, the linea aspera divides into two lines, each of which terminates in the lateral part of the condyles; the intermediate space is triangular; the end of the bone is much enlarged, particularly in breadth.

Q. Describe the *condyles* of the os femoris?

A. They are two large protuberances with a smooth articular surface on their circumference, having a cavity deep enough to conceal one's thumb between them, the internal condyle is longer and larger than the external; they have the articular surfaces higher on their anterior part, with a smooth depression between them.

Q. Why is the internal condyle longer than the external?

A. To compensate for the oblique direction of the body of the femur approximating its fellow from above downwards; and that the leg may stand parallel to the axis of the trunk.

Q. What are situated in the *cavity* between the condyles?

A. The *poplitēal artery*, *vein* and *nerves* pass through it; and the two *crucial ligaments* arise from its bottom and roots of the condyles towards it anterior part.

Q. What is *lodged* on the *smooth hollow* surface between the anterior parts of the condyles?

A. The small bone named *patella*, or rotŭla, moves round in it as a rope in a pulley.

Q. What purposes does the *patella* serve there?

A. It is a medium, by means of which the tendons of the extensor muscles of the leg, playing easily in the hollow surface between the condyles on the fore part of the joint, are removed farther from the centre of motion,

and their lever in consequence being lengthened, they have greater power of action.

Q. How do the *vessels enter* for the nutrition of the femur?

A. There is a *hole* or *canal* slanting upwards about the middle and posterior part of the femur, where the *medullary vessels* enter; and sometimes various other holes in different parts of the bone for the same purpose.

Q. What is attached to the rough surface on the margin of the condyles?

A. The *capsular* and other *ligaments* are attached there.

Q. What *use* do the crucial ligaments serve?

A. They strengthen the joint, limit its motions, prevent the leg from going beyond a straight line forwards; and allow the toes to be turned outwards, but not inwards.

Q. What are the *motions of the knee-joint?*

A. *Flexion* and *extension* chiefly; and in flexion a slight degree of rotatory motion of the toes of the foot outwards.

Q. What *ligaments*, besides the capsular and crucial ligaments, secure the knee-joint?

A. Various strong *lateral ligaments* on each side, and the *ligamentous expansion* of the *tendons* of the muscles from the patella, secure this joint most firmly.

Q. Are its condyles and the inferior surface of the patella covered with *cartilage?*

A. Yes; they are all covered.

Q. What *muscles* are attached to the posterior triangular space above the condyles?

A. The *gastrocnemius externus*, and *plantāris*, arise there, and also from the tuberosities on the upper and lateral part of the condyles.

Q. What is the *structure* of the *os femoris?*

A. It is spongy at the extremities, consisting of innumerable cancelli; its middle is composed of a dense thick outer shell, and a medullary canal within.

Q. What are the *connexions* of the os femoris?

A. It is connected above to the os innominatum, and below to the tibia.

Q. What is the *state* of the os femoris *in the foetus?*

A. Its different processes are cartilaginous, and afterwards form large epiphyses.

OF THE PATELLA OR ROTULA.

Q. What is the figure of the patella?

A. It is triangular, or heart-shaped, with its apex downwards; its anterior convex surface is perforated by a great number of holes, its posterior surface has a longitudinal prominent ridge with a cavity on either side corresponding to the condyles of the femur, and forming a trochlea.

Q. What is its situation?

A. The patella plays upwards and downwards on the fore part of the joint of the knee.

Q. Do the *situation* and *office* of the Patella resemble those of *sesamoid bones?*

A. Yes, very much indeed; the patella may very justly be regarded as the sesamoid bone of the combined tendons of the rectus, crurālis, and vasti muscles of the thigh, by means of which they play easily and freely over the knee-joint in the extensions and flexions of the leg.

Q. What is the use of the numerous holes on its convex surface?

A. The tendons and ligaments which cover it are inserted into them.

Q. What is inserted into its rough circumference?

A. The *capsular ligament*, and the tendons of the *rectus*, *cruralis*, *vastus externus* and *internus*.

Q. How happens the patella to be able to bear the force of these strong muscles?

A. The bone itself is of a compact texture, but the ligaments and aponeurotic expansion of the combined

tendons of the muscles cover it, adhere firmly to its anterior surface, and render it very strong.

Q. Is the *patella* ever *fractured?*

A. Yes; when these strong muscles act suddenly upon it, while the joint is half bent, they sometimes fracture it across.

Q. What binds it to the bones below?

A. That strong aponeurotic tendinous expansion and strong ligaments bind it firmly to the tibia.

Q. What *motions* does the patella perform?

A. It can be moved by the motions of the leg upwards and downwards freely, and it can be moved a little to either side.

OF THE TIBIA.

Q. What is the situation of the tibia?

A. It is situated at the inner side of the leg.

Q. What is its form?

A. It has been compared to a pipe; being long, somewhat triangular, and greatly enlarged at its upper end.

Q. How is it commonly *divided?*

A. Into an upper, and an under extremity, and a body.

Q. Describe the *upper end of the tibia?*

A. Its upper surface has two superficial cavities, and a rough protuberance between them, with a rough porous circumference.

Q. How can the large condyles of the femur rest securely on these *superficial cavities?*

A. They are considerably deepened by two *semilunar cartilages* much thickened at their convex margin.

Q. What is attached to the *rough protuberance* between the articular cavities of the tibia?

A. The *anterior* and *posterior crucial ligaments* are inserted into its anterior and posterior parts.

Q. What is attached to the porous rough circumference?

A. The *capsular ligament* is inserted there.

Q. What is attached to the *anterior protuberance* a little below the articular surfaces?

A. The strong tendinous *ligament of the patella*, and, on its scabrous inner side, the *tendons* of the *semi-tendinosus*, *gracilis*, and *sartorius* muscles, and the *aponeurosis* of the *vastus internus* are inserted into it.

Q. What is applied to the *circular flat surface* below the external articular surface?

A. The *head* of the *fĭbŭla* is articulated there with the tibia.

Q. Describe the *body of the tibia?*

A. It is triangular, with the sharpest angle or spine anterior and a little bent, extending from the tubercle to the inner ankle; its anterior and inner side smooth and covered only by the integuments; its outer and posterior surfaces a little hollowed.

Q. What is attached to the posterior and outer angle of the tibia?

A. The *interosseous ligament.*

Q. Where, and in what direction is the *canal* for the entrance of the *medullary vessels?*

A. The canal is situated at the inner or posterior part, a little above the middle of the bone, and is directed downwards.

Q. How are the *posterior* and *outer sides hollowed?*

A. The anterior and outer surface is hollowed by the *tibiālis antĭcus* above, and below by the *extensor longus digitorum pedis*, and the *extensor proprius pollĭcis.* The posterior is flattened and hollowed by the *tibiālis postĭcus*, and the *flexor longus digitorum.*

Q. Enumerate the parts deserving attention at the *under end of the tibia?*

A. It is much smaller than the upper end, its extremity is hollow, its inner and fore part produced forming the *malleŏlus internus*; a pit in the point of the malleolus; a groove behind it; at its outer side, a semicircular depression, and a rough circumference of the articular cavity.

Q. What is *lodged* in its *hollow articular cavity?*

A. It receives the *convex round surface* of the *astragalus.*

Q. What purposes do the prolonged *process* forming the *malleŏlus internus* and the pit in its point serve?

A. The *malleŏlus internus* guards the articulation in such a manner, that the joint cannot be luxated with the foot turned inwards, without *this process* of the tibia being *fractured;* the *internal lateral ligament* is attached to the *pit* or notch at the point of the malleŏlus.

Q. What occupies the *groove* behind the malleolus internus?

A. The *tendon* of the tibialis postĭcus plays in it.

Q. What occupies the *semilunar depression,* as if made by the impression of the point of a thumb, on the outer side of the tibia?

A. The *lower end of the fibŭla* is lodged in it.

Q. What is the *use* of the *rough circumference* of the articulation?

A. It is the circular line where the *capsular ligament* is inserted.

Q. What is the *structure* of the tibia?

A. Its upper end is spongy, and covered by a thin compact lamella; but its body has a thick, strong, external table, with a cavity for the medulla.

Q. What is the *state* of the tibia in the foetus?

A. Its extremities are cartilaginous, and become afterwards epiphўses.

Q. *What parts* of the tibia ought the Surgeon *to avoid* in amputation of the leg?

A. The *anterior protuberance* near to the knee, where the tendons of various muscles are inserted, should be avoided, in order to preserve the action of the muscles; and that *part, where* the *medullary vessels* are passing in the slanting canal through the hard substance of the bone, should also be avoided, lest the vessels should be divided in the canal, and occasion profuse haemorrhagy, which neither styptics nor compression can reach to stop.

OF THE FIBULA.

Q. Describe the form and situation of the *fibŭla?*

A. It is a long slender bone, having three angles, and sides, a little twisted; and situated at the outer side of the tibia.

Q. How is the *fibŭla divided?*

A. Into a head, body, and lower extremity.

Q. Describe its *head?*

A. The head of the fibula is considerably enlarged, has a superficial, smooth, circular cavity on its inner side; a rough protuberance on its outer side.

Q. What is applied to the *orbicular surface* on the inside of its head?

A. This part is applied to the circular flat surface on the outer side of the tibia, and firmly secured in its situation by ligaments.

Q What is attached to the *rough protuberance* on its outer side?

A. The *tendon* of the *biceps flexor cruris*, and the *external lateral ligament*, are inserted into it.

Q. Describe the *body* of the fibula?

A. It is somewhat bent inwards and backwards, having a sharp ridge on the inner part; its surfaces marked by muscles; and a *canal* slanting downwards a little above its middle, on its posterior part, for the entrance of the *medullary vessels.*

Q What is attached to the *inner ridge* of the fibula?

A. The interosseous ligament.

Q. What *muscles arise* from the anterior side of the fibula?

A. The peronēus longus, peronēus brevis, the peronēus tertius being part of the extensor longus digitorum, and extensor proprius pollĭcis.

Q. What *muscles* arise from the posterior side of the fibŭla?

A. The greater part of the tibiālis posticus, flexor

longus pollicis, and the outer head of the gastrocnemius internus.

Q. Describe the *under extremity of the fibula?*

A. Its lower end is flat, broad, and smooth in the inside; it sends down a *corŏnoid process*, and has a *sinuosity* behind.

Q. What is the oblong flat smooth surface of the under end of the fibula applied to?

A. It is received into the semilunar depression on the outer side of the tibia, and firmly attached by strong ligaments.

Q. What forms the *maleŏlus externus?*

A. The lower end of the fibula, a little enlarged into an oblong head.

Q. Does the *malleŏlus externus* secure and guard the joint in the same manner as the malleolus internus?

A. Yes; exactly in the same manner; being applied to the outer side of the articulating surface of the astragalus, the *joint cannot be dislocated* outwardly, without the under end of the fibula being fractured.

Q. What is attached to its *corŏnoid process?*

A. *Ligaments*, which go to the bones of the tarsus.

Q. What occupies the *sinuosity* on the posterior part of the malleolus externus.

A. The *tendons* of the peronēi muscles play around it.

Q. What *motions* does the ancle-joint perform?

A. This joint is so constructed, that it is purely a hinge, and performs motions of flexion and extension of the foot only.

Q. What is the *use* of the fibula?

A. It gives attachment to muscles, form and strength to the leg, widens the space for the interosseous ligament, and secures the outer-side of the ankle-joint.

Q. What is the *state* of the fibula *in the foetus?*

A. Its extremities are cartilaginous, and becoming epiphўses, grow to the body.

OF THE TARSUS.

Q. How are the *bones of the foot* divided?

A. Into those of the tarsus, metatarsus, and toes.

Q. How many bones compose the *tarsus?*

A. *Seven;* the astragalus, os calcis, naviculare, cuboides, cuneiforme externum, cuneiforme medium, and cuneiforme internum.

Q. What is the form of the tarsus?

A. It forms an arch, being convex above, and concave below.

Q. Describe the situation and form of the *astragalus?*

A. Its head is round, smooth, gently hollowed in the middle, flattened on each side, and articulated with the tibia and fibula; its body is very irregular, having a large concave posterior articulating surface, and an anterior one irregularly convex; and a smooth oblong anterior head.

Q. What is connected with the concave posterior surface of the astragalus?

A. The upper and middle part of the os calcis.

Q. What is opposed to the irregular convex anterior surface of the astragalus?

A. Two smooth cavities at the inner and fore part of the os calcis, and the *cartilaginous ligament* stretched between the os calcis and os naviculare.

Q. What is its *oblong anterior head* received into?

A. Into the *articulation* with the *os naviculare.*

Q. Describe the form and situation of the *os calcis?*

A. The os calcis is irregular, but somewhat oblong; it is situated under the astragalus, and forms the projection of the heel.

Q. Describe the parts of the os calcis most deserving of attention?

A. The large rough tuberosity projecting backwards forming the heel; the upper smooth convex surface and two prominences at its fore part, articulated with the as-

tragalus; and an anterior surface articulated with the os cuboides; and a large cavity downwards on its inside.

Q. What is attached to the posterior rough projection of the *os calcis?*

A. The *tendo Achillis.*

Q. Which of the superior prominences gives attachment to the *cartilaginous ligament* fixed to the os naviculare?

A. The posterior of the two at the inner and fore part of the bone.

Q. What parts occupy the *large sinuosity* or *arch* at the inner and under part of the posterior projection?

A. The *tendons* of the flexor longus pollicis pedis, flexor longus digitorum, and peroneus longus; the *artery* named *tibialis postica*, and *veins* corresponding to it, and the *tibial nerve.*

Q. What *muscles arise* from the tuberosity on the inferior and hollow part of the os calcis?

A. The flexor brevis digitorum pedis, abductor pollicis, abductor minimi digiti, and aponeurosis plantaris.

Q. Do any other muscles arise from the inferior part of the os calcis?

A. The flexor digitorum accessorius, or massa carnea JACOBI SYLVII, arises partly from the sinuosity, and partly from its anterior part, together with the flexor brevis pollicis.

Q. What are the *connexions* of the os calcis?

A. It is firmly articulated with the astragalus by strong ligaments, with the os cuboides before by a concave surface.

Q. What is the situation of the *os naviculare?*

A. It is situated at the anterior part of the astragalus, and inner side of the foot.

Q. How many surfaces has it?

A. A hollow posterior surface for receiving the convex head of the astragalus; three anterior convex surfaces to be articulated with the three cuneiform bones.

Q. Has the os naviculare any *prominences?*

A. A considerable prominence, or tuberosity, directed inwards and downwards.

Q. What parts are attached to that *tuberosity?*

A. The *tendon* of the tibialis postīcus is inserted into it, and the *abductor pollicis* arises from it: the strong *ligament*, which supports the astragalus, is fixed to it, nnd also another *ligament* stretched across the metatarsal bones.

Q. What *motions* does the os naviculare perform upon the astragalus?

A. They are adapted to each other by ball and socket, and are capable of performing motions in various directions, turning the toes inwards, raising or depressing one side of the foot.

Q. Where is the *os cuboides* situated?

A. In the anterior and outer part of the tarsus.

Q. How many *articulating surfaces* has the *os cuboides?*

A. Three; a posterior, smooth, irregular surface, corresponding to the os calcis; its inner surface, articulated with the os naviculare and the os cuneiforme externum; and its anterior surface, articulated with the metatarsal bones of the fourth, and little toe.

Q. What is the appearance of the under surface of the os cuboides?

A. It is rough and irregular; exhibiting a round protuberance, with a knob on its outside, and a fossa, or groove, immediately before the knoh.

Q. What is attached to the *round protuberance?*

A. The adductor pollicis arises from it, and ligaments are also attached between this bone and the os calcis.

Q. What lies in the *fossa?*

A. The *tendon* of the peronēus longus, while it runs across the sole.

Q. What is the use of the *knob?*

A. The thin flat cartilage, or sometimes a sesamoid bone, plays on the knob, as the tendon turns round it.

Q. What is the situation of the *three cuneiform bones* of the tarsus?

A. They are placed on the inner side of the os cuboides on the fore part of the tarsus, and applied to each other transversely, as stones in an arch.

Q. In what order are they placed?

A. The *os cuneiforme externum* is placed next the os cuboides, but it is named sometimes *medium*, as being of an intermediate size between the other two: the *os cuneiforme medium*, placed in the middle, as being the smallest in size, is sometimes named *minimum*; and the *os cuneiforme internum*, placed the innermost, is, from its being the largest in size, named sometimes *maximum*; this has its base towards the sole, while the apices of the other two are in that direction.

Q. What is their appearance above?

A. They appear flattish.

Q. What is their under surface?

A. It is concave and irregular, the os internum exhibiting *two* considerable *tubercles*.

Q. What is attached to these *tubercles?*

A. The abductor pollicis arises from, and the tendon of the tibialis posticus is inserted into, them.

Q. What is the posterior surface of the cuneiform bones?

A. Their posterior surface is flat, and articulated with the os naviculare.

Q. What is their anterior surface?

A. It is also flat, and articulated with three metatarsal bones.

Q. Describe *their articulations* particularly with the metatarsal bones?

A. The os cuneiforme internum is articulated with the metatarsal bone of the *great toe*; and the os cuneiforme *medium*, with that of the *second toe*; and the os cuneiforme *externum*, with that of the *third* or *middle toe*; while the *fourth* and *fifth metatarsal* bones are articulated with the *os cuboides*.

Q. Are cartilages interposed between these bones on their articulating surfaces?

A. They have cartilages between them, and capsular,

and other ligaments, binding them very firmly to each other.

Q. Do they admit of much *motion?*

A. Excepting the articulation of the os naviculare with the astragalus, the others are so connected as to admit of no motion, but of a certain degree of *elasticity;* which, in the different violent motions of the body, prevents disagreeable concussion.

OF THE METATARSUS.

Q. How many bones compose the metatarsus?

A. *Five;* which, in general characters, agree with the metacarpal bones of the fingers.

Q. What is the form of their bases?

A. Their base is large, flat, and a little hollowed, to be articulated with the fore part of the tarsal bones.

Q. What is the form of the bodies of the metatarsal bones?

A. Their body is sharpish above, and flattened at the sides.

Q. What is situated on their oblique flat sides?

A. The *interosseous muscles* arise from them.

Q. What is the form of their anterior extremity?

A. It terminates in a round ball or head, longer from above downwards.

Q. Does the metatarsal bone of the *great toe* differ from that of the rest?

A. Yes; its base is more hollowed and larger; its body thicker, stronger, and shorter; its anterior extremity is formed into a middle prominence, with two lateral depressions.

Q. Is there any thing particular in these *lateral depressions?*

A. Yes; a *sesamoid bone* plays in each of them, being placed between the tendon of the flexor muscle and the joint.

OF THE TOES.

Q. How many bones are in each toe?

A. *Three* in the small, and *two* in the great toe.

Q. How are they arranged?

A. Into phalanges, in the same manner as the fingers.

Q. How are their *bases* formed?

A. They are hollowed, forming sockets for receiving the heads of the *metatarsal* bones.

Q. Are the joints between the phalanges the same as in the fingers already described?

A. Yes; the proximate extremities of the second and third phalanges have a middle eminence, and two lateral depressions; and their distant extremities have a middle depression, and two lateral prominences; which, when applied to each other, form hinge-joints, termed ginglimus.

Q. What *motions* can the toes perform?

A. Flexion and extension only.

Q. Have the bodies of the phalanges *grooves* below?

A. Yes; in which the tendons of the flexor muscles run.

Q. Have all these articulations of the toes capsular ligaments?

A. Yes; they have not only capsular ligaments, but also strong lateral, and other ligaments, which connect them strongly together.

Q. What purposes does the arched construction of the foot serve?

A. It allows the tendons, muscles, blood-vessels, lymphatics, and nerves to lie, or pass along, free from pressure; it admits of a considerable degree of elasticity, by which it facilitates walking, and in violent motions prevents concussion injurious to the tender viscera.

Q. What are the CHEMICAL CONSTITUENTS of bones?

A. *Calcareous earth*, *cartilage*, *gelatin*, and *oil*.

Q. What *chemical substances* does the *earthy part* contain?

A. The greatest part is *phosphate of lime*, a small portion of *carbonate of lime*; and a very minute portion of *sulphate of lime*.

Q. How can the earthy be separated from the animal matter?

A. By burning the bones to whiteness, the animal matter is dissipated; or, by immersing the bone in *muriatic acid*, its earthy part is dissolved and held in solution, while the *cartilage* remains, and retains the same figure of the bone, although it has become flexible.

Q. How are the gelatin and oil separated?

A. By boiling the bones in water, the *oil* is collected on the surface; while the *gelatin* is dissolved, and held in solution, and may be obtained by cautious and proper evaporation on cooling.

ORGANIC DISEASES OF BONES.

Q. What diseases are the bones subject to?

A. The bones are exposed to external injuries, and may be bruised, broken, cut, or dislocated.

Q. Are they not subject to organic diseases also?

A. Yes; their organised structure is affected by various causes, and very considerably changed.

Q. Can we treat of bruised, cut, fractured, and dislocated bones just now?

A. They will be more properly comprehended in our surgical conversations.

Q. Enumerate the ORGANIC DISEASES of bones?

A. The principal are Exostōsis, Caries, Abscess, Spina Ventosa, Gangrene, Exfoliation, Necrosis, an Excess of Earthy Matter, Rickets, Mollities, Fragilitas, Osteo-Sarcoma, and Anchylosis.

Q. What is understood by EXOSTŌSIS?

A. It is a morbid enlargement of a bone, or a tumor growing upon it.

Q. Is *Exostosis* a constitutional, or local disease?

A. It is generally a local disease; but in some constitutions there seems to be a strong disposition to the formation of Exostōsis in a great number of bones.

Q. What bones are most frequently seized with Exostosis?

A. The bones of the cranium, inferior maxilla, sternum, humerus, radius, ulna, carpal bones, the femur, tibia, and tarsal bones.

Q. Does *exostosis* grow outwardly, or inwardly?

A. It generally grows outwardly, but sometimes, though rarely, it grows inwardly, and makes compression upon the brain, the viscera of the thorax, or pelvis, and sometimes displaces the eye by growing into the orbit.

Q. What kinds of *exostosis* are generally met with?

A. Two; the *scrofulous* and the *venereal.*

Q. What bones does the *scrofulous exostosis* most frequently seize?

A. The bones of the spine, of the carpus and tarsus, and those of the hip and knee-joints; i. e. bones of a soft and spongy texture.

Q. What bones does the *venereal exostosis* most frequently seize?

A. Those of a firm compact texture, such as the middle of the humerus, tibia, fibula, ulna, os frontis, and ossa parietalia.

Q. What is the *internal structure of exostosis?*

A. It is very different, sometimes made up of a thin external plate, with numerous thin cross plates within, whose interstices are filled with cartilage; it sometimes consists of cartilage, fungous granulations, and pus; is sometimes composed of fibres closely compacted and hard.

Q. Which of these kinds grows the largest?

A. Those of a soft consistence, and containing fungous, and ill-conditioned pus.

Q. Are these denominated *Cancerous Exostoses?*

A. Yes, most frequently; because they degenerate speedily into Caries.

Q. Which kind of *exostosis* continues small and stationary?

A. That of a very compact hard texture like ivory.

Q. Do *venereal nodes* or *exostoses* degenerate into Caries?

A. Yes; always, if they be allowed to take their course, without being checked and discussed by medicine.

Q. When *Caries* supervenes upon *exostosis*, is the tumor removed?

A. The Caries generally wastes, and gradually destroys the tumor, which formed the exostosis.

Q. What is understood by CARIES *of a bone?*

A. It is a gradual wasting of a part of the bone, which had previously been deprived of nourishment, and had died; *caries* of a bone, and *ulceration* of a soft part, are very similar processes, carried on in parts of different textures.

Q. What bones are most subject to caries?

A. Those of a spongy soft texture, covered by a thin external lamella, such as, the bodies of the vertebrae; the extremities of the femur and tibia; the carpal and tarsal bones.

Q. Does caries of a bone produce purulent matter like an ulcer?

A. Caries produces a fetid, ichorous, ill-conditioned matter.

Q. Is the skin discoloured above a caries bone?

A. Yes; it inflames and suppurates, and a fistulous opening is made to evacuate the matter generated below.

Q. What sensation to the finger does a carious part give when probed?

A. A sensation of touching something rough, and gritty; or sometimes that of softness, when the parts are spongy.

Q. In what bones do ABSCESSES take place?

A. An Abscess most frequently happens in bones not

much covered with thick muscles, such as the bones of the fore-arm, hand, leg, foot, cranium, and face.

Q. Where does the matter form?

A. In the medullary part of the bone, or where the cancelli are soft and spongy.

Q. What is the result of an abscess of a bone?

A. The matter formed irritates, inflames, and produces suppuration of the integuments, by which it finds an exit by fistulous openings.

Q. Is not this the same as SPINA VENTOSA?

A. When suppuration has taken place, and an ichorous matter is issuing from the fistulous orifices, the sharp cancelli standing out from the sides of the apertures, and the almost empty cavity of the bone, now suggested the name of *Spina Ventosa*.

Q. Is then *Spina Ventosa* to be considered the *sequēla* of suppuration and abscess of a bone?

A. Yes, it properly is; but that name is frequently given to the whole progress of disease in the part, both in a state of inflammation and suppuration.

Q. What is meant by GANGRENE of a bone?

A. When a bone, by any cause, has been deprived of nourishment, and becomes dead, of an opaque white, brown, or blackish colour, it is said to be *gangrenous*.

Q. Does this *gangrene*, or *death*, affect the whole bone, or a part of it only?

A. It sometimes, in consequence of an injury, affects a part only, which, when dead, is cast off by exfoliation.

Q. What is the *process of* EXFOLIATION?

A. When the outer lamellae of a bone have been deprived of their nourishment by the periostĕum being torn off, and the bone bruised, they become gangrenous, or dead; the extremities of the arteries in the living bone nearest to the dead, throw out a fluid, similar to that produced by suppuration in other soft parts, between the

dead and the living parts of the bone; and a separation of the dead is the consequence.

Q. What happens when the whole or greater part of a bone becomes gangrenous or dead?

A. The process is in effect the same as that of exfoliation, but to a much greater extent; the vessels of the living parts adjacent to, and surrounding the dead, throw out a purulent fluid, which cuts off all communication between the living and dead parts, and then they secrete a gelatinous and cartilaginous fluid as a *nidus*, in which osseous particles are afterwards deposited in the formation of a new bone.

Q. What is this extensive process called?

A. It is denominated NECROSIS.

Q. By what name is the dead bone called in *necrosis*?

A. It is called the *sequestra*.

Q. What bones does Necrōsis most frequently attack?

A. The hard or middle parts of those slightly covered with muscular substance, such as, the inferior maxilla, clavicle, os humeri, tibia, and cranium.

Q. Does the new formed osseous shell surround the sequestra?

A. Yes; the new case is formed around the old dead bone.

Q. How then does the *sequestra* get out?

A. It generally produces irritation, inflammation, and suppuration of a surrounding part, and thus forms an opening for itself; or this process is facilitated by a Surgical Operation of making or enlarging the opening, and extracting the loose sequestra.

Q. Is the *sequestra* not absorbed?

A. Yes; in young people especially, it is frequently all absorbed; and in every case a considerable portion of its circumference is converted into a kind of pus, and absorbed.

Q. How can this *absorption* take place, if there be no communication between the living and dead parts, as you said before?

A. There is no vascular communication: the puru-

lent matter constantly thrown out by the extreme vessels of the surrounding living parts, softens and dissolves the exterior of the sequestra; and as the absorbent vessels of the living surrounding parts are constantly at work, removing part of that purulent fluid, part of the sequestra is of course removed with it. This is the constant gradual process of absorption of bone.

Q. Is not the member, in which Necrosis is going on, larger than usual?

A. Yes; the new osseous shell being formed around the old bone, enlarges the bulk of the member, and makes it irregular on the surface, and ill-shaped.

Q. Do bones sometimes acquire a MORBID EXCESS OF EARTHY MATTER?

A. Yes; an unusual quantity of earthy matter is in some instances deposited either on the external surface, or in the internal structure of a bone; in consequence of which it acquires an unnatural size.

Q. What bones attain this *morbid size* most frequently?

A. Various bones are subject to this morbid increase of earth, particularly those of the cranium, the humerus, femur, and tibia.

Q. Is the *calcareous matter* deposited on the outer side of the bones of the cranium, or where?

A. It seems to be deposited between the two tables in the diploë, and the bones in consequence become very much thickened; sometimes even to half an inch, or more.

Q. Where is it deposited in cylindrical bones?

A. Most frequently in the substance of the bone; its general size is much augmented; its medullary canal almost obliterated; and the cellular structure of its extremities filled with it. In some rare cases, an excrescence is attached to the outside of the bone, the cells of which are filled with matter resembling *soft cheese*, and a hard bony callus occupies the other parts.

Q. Has not the *earthy matter* of bones been sometimes converted into CHALK?

A. In people long afflicted with Gout, or perhaps Rheumatism, *chalk-like substances* are formed in the joints of the hands and feet; which are to be regarded as morbid concretions of this sort.

Q. Is a brittleness, or FRAGILITAS OSSIUM, owing to an increase of earthy matter?

A. *Fragilĭtas* is owing to an excess of earthy matter in proportion to the cartilaginous part of the bones, but it is not often attended with an increase of size.

Q. Is this *fragility* of bones owing to age?

A. It occurs most frequently in advanced age, when the bones attain a greater degree of solidity from an increase of earthy matter; and when their cartilaginous, gelatinous, and oleaginous parts are diminished.

Q. Does *fragility* of the bones ever follow disease?

A. Yes; the bones have been observed to become remarkably brittle in the latter stage of *Scorbūtus*, of *Cancer*, and of *Lues*.

Q. Is not a DEFICIENCY *of earthy matter* in bones a more frequent cause of disease?

A. Yes; much more frequent.

Q. What diseases are owing to a deficiency of the usual proportion of earthy matter?

A. Rickets, Mollities Ossium, and Osteo-Sarcoma.

Q. Are not all these varieties of the same disease?

A. They all denote a deficiency of earthy matter; but Rachītis is a disease of infancy; while Mollities is rather peculiar to advanced age, and is attended with much greater softness of the bones than the former.

Q. Does Rachītis affect all the bones, or one or two?

A. It commonly affects one, two, or more bones in a part, but sometimes, though more rarely, a great number.

Q. What bones are most frequently affected with Rickets?

A. The vertebrae of the spine; the ribs, and sternum; and the extremities of long bones.

Q. What *appearances* occur in a case of Rickets?

A. The bones become bent, and flattened; when the ribs are affected, the thorax is narrow and protuberant at the sternum, compressed on the sides, the cartilages of the ribs becoming concave instead of their natural convexity.

Q. What is presented when the *vertebrae* are affected?

A. The spine becomes crooked in various places, and the head sinks, as it were, between the shoulders.

Q. What is the appearance when the *head* is affected?

A. The cranium seems preternaturally enlarged, and often misshapen.

Q. When Rickets affect the joints, what is their appearance?

A. They become enlarged in size, and misshapen.

Q. What happens when it affects the *long bones?*

A. They are bent in a direction opposite to their flexor muscles; thus the femur and tibia are bent forwards.

Q. When Rickets or Mollities affects the *bones of the pelvis*, what appears?

A. The *pelvis* becomes distorted, and diminished in capacity; the ossa innominata opposite to the acetabulum are pressed inwards, the pubis projects with its rami approaching closer together, and the promontory of the os sacrum often projects forward.

Q. Is the effect of MOLLITIES OSSIUM nearly the same as that of Rickets?

A. *Mollities* generally affects a greater number of bones; and seems in some cases to be constitutional, and to affect nearly the whole bones of the system.

Q. What is the *cause* of the *mollities ossium?*

A. It may be owing either to a deficiency of earthy matter, as has been said, or to an increased proportion of gelatinous and cartilaginous matter.

Q. How can the earthy matter become deficient?

A. It may be dissolved within the body by an excess of acid, and absorbed; as we dissolve the earthy mat-

ter of bones out of the body, and keep it in solution, by the *Muriatic Acid.*

Q. Is it the *Muriatic Acid* in excess, then, which dissolves the earthy part of the bones, and produces *mollities ?*

A. It seems to be an acid, but whether the Muriatic, or another, is uncertain.

Q. What is meant by OSTEO-SARCŌMA ?

A. It is a softening and conversion of bone into a substance not unlike to *lard* or *fat :* or the external table of the bone includes a substance like fungus, instead of the cancellated internal structure.

Q. Is *Osteo-Sarcoma* a common disease ?

A. No ; it is fortunately very rare, and has been observed in a few cases to affect those, who in youth had been Rickety.

Q. What is understood by ANCHYLŌSIS ?

A. It is the accretion of the extremities of bones, and a stiffening of the joint.

Q. Is *anchylōsis* the effect of disease of the bones, or of the inter-articular cartilages ?

A. It may be the effect of both.

Q. How does a disease of the articular cartilages produce *anchylosis ?*

A. When these cartilages becomc inflamed, they throw out a quantity of coagulable lymph, which in the immoveable state of the limb produces adhesion of the inflamed surfaces of the cartilages tipping the extremities of the bones forming the joint, and ultimately partial or total rigidity of the joint.

Q. What disease of tbe bones produces *anchylosis ?*

A. In scrofulous constitutions, WHITE SWELLING of the knce sometimes destroys the cartilages, and softens thc spongy extremities of the femur and tibia, and in some rare cascs ultimately produces *anchylosis.* The *Morbus Coxarius* sometimcs has the same termination.

Q. Is the destruction of the cartilages and the softness of the bones the cause of *anchylosis* in such cases?

A. Both must have taken place; but the *fibrin*, or *coagulable lymph* effused by the extreme arteries, is the direct cause of the accretion of parts, or of the *anchylosis*.

Q. Does *fibrin* abound in the blood of young people?

A. The blood of the young must contain a large proportion of the principles necessary for the growth of the individual parts of the system; and as fibrin is contained in those most essential to our existence and loco-motion, it must be derived from the blood.

Q. Do the bones of the young contain a greater proportion of cartilaginous and gelatinous matter than those of middle age?

A. Yes; gelatinous and cartilaginous matter is necessary for the tenacity and growth of the bones in young people. Hence they are more juicy, and much less apt to be fractured, than the bones of the adult of more advanced age; when the bones acquire a greater proportion of earthy matter, and become more brittle.

OF CARTILAGE.

Q. What is understood by *Cartilage?*

A. Cartilage is a white, elastic substance, nearest to bone in density; of a structure obscurely fibrous; and nearly a third lighter than bone.

Q. Are the *blood-vessels* of cartilages very conspicuous?

A. No; the vessels of cartilages are so small, that they do not admit the red particles of the blood, nor the coloured injection of the Anatomist, except when osseous particles are just beginning to be deposited in them in the formation of bone.

Q. Can the *nerves* of cartilages be traced?

A. No; they are so small that they have never been traced in the compact dense substance of cartilage.

Q. Have cartilages much *sensibility?*

A. They have very little sensibility in their healthy state; their situation and office could not admit of great sensibility, without producing the greatest inconvenience and pain in the different motions of the body.

Q. How many *offices* do cartilages perform?

A. *Four;* they supply the place of bone; afford a nidus for the deposition of the earthy matter of bones; form articular surfaces; and perform the office of cartilages and ligaments at the same time.

Q. In what parts of the body does cartilage supply the *place of bone?*

A. In the nose, larynx, ends of the ribs, and on the brim of articular cavities making them deeper.

Q. In what parts does cartilage form a *nidus* for earthy matter?

A. In the long bones of infants and children, a great part of them towards the extremities is cartilage, in which earthy matter is deposited in the due conformation of the bone.

Q. In what parts does it form *articular surfaces?*

A. In all the moveable joints cartilage covers the surfaces applied to each other, and by its smoothness and slipperiness facilitates their motions.

Q. In what parts does cartilage perform the *office of cartilage* and *ligament* at the same time?

A. Between the vertebrae of the spine, it gives all the elasticity of cartilage and the flexibility of ligament; and between the bones of the pelvis it is interposed, and fixes them together with all the firmness of ligaments.

Q. What ORGANIC DISEASES are *cartilages* subject to?

A. They sometimes become thinner, thicker, and softer; or harder than natural, and ossified.

Q. In what circumstances do *cartilages become thinner?*

A. When the trunk of the body is kept in nearly the same position for a great length of time, whether by certain occupations, or by reclining much in nearly the

same posture, the inter-vertebral cartilages are compressed on one side, and eased on the other.

Q. What is *the effect* of that continued *posture* of the trunk?

A. The pressure on one side of the cartilages produces irritation there, and this in turn promotes the activity of the absorbents, by which part, or the whole, of the cartilages of the compressed side becomes much thinner, or is wholly removed; while the removal of the usual pressure from the other side of the cartilage makes it increase in thickness and density. Hence a permanent curvature of the spine is the consequence.

Q. In what circumstances do the *cartilages become softer and thicker* than natural?

A. In scrofulous constitutions, the cartilages, which cover the articulating surfaces of bones, sometimes become inflamed, painful, thickened, and spongy in their texture. This most frequently happens in the knee-joint, the hip-joint, the tarsus, and inter-vertebral substances, constituting *White Swelling*, *Morbus Coxarius*, *Tarsal*, *and Lumbar Abscess.*

Q. Do this softness and thickening not happen to bones themselves?

A. The cartilaginous part of bones undergoes the same change in many instances. Hence the extremities of the femur and tibia, also part of the bodies of the vertebrae, and the bones of the tarsus, or carpus, have been softened, thickened, ulcerated, and sometimes absorbed.

Q. In what circumstances are *cartilages converted into bone?*

A. When the vessels in the cartilages are moderately irritated, they deposite osseous particles, which sometimes happens in diseased joints, and *Anchylosis* is the consequence: or, in advanced age, when the lubricating fluid is too scanty, the necessary motions produce irritation of the articular surfaces, and ultimately ossification takes place.

Q. What parts are most frequently ossified?

A. The cartilages of the ribs, inter-vertebral cartilages, and those tipping the ends of bones in the joints: sometimes loose cartilaginous bodies have been found in the knee-joint.

OF LIGAMENTS.

Q. What is understood by ligament?

A. *Ligament* is a strong, whitish, flexible substance, composed of longitudinal and obliquely transverse fibres.

Q. Have *ligaments* distinct *blood-vessels?*

A. Yes; they are supplied with numerous blood-vessels, which can readily be filled with coloured injection by the Anatomist.

Q. Have *ligaments nerves* large enough to be traced?

A. The nerves of ligaments are very minute, but they can be traced upon their surface in some parts of the body.

Q. Have ligaments much *sensibility?*

A. Their sensibility, like that of cartilage, in the sound state, is very inconsiderable; but when inflamed, they become extremely sensible, as the acute pain in *Rheumatism*, *Gout*, and *White Swelling*, clearly shows.

Q. What *offices* do ligaments perform?

A. They in many instances form bags, which include the joints, and are then called *capsular* ligaments; others are so fixed to the ends of the articulating bones as to confine the motions of the joint; others supply the place of bones, as in the pelvis, and between the radius and ulna, giving origin to muscles; and others fix the bones almost immoveably together.

Q. What is the *structure of capsular ligaments?*

A. The outer part of them is formed by a continuation of the periosteum, which is connected with the surrounding parts by cellular substance; the inner layer of the capsule being thin and dense, is reflected over the cartilages, which tip the ends of the articulating bones.

Q. What lubricates the articulations, and facilitates their motions?

A. A mucilaginous fluid, called SYNOVIA, secreted by the vessels of the internal surface of the capsular ligaments; and also by organs placed in some joints for the purpose.

Q. What are these organs?

A. The *synovial organs*, or *glands*, are composed of little masses of fatty-looking substance covered by a continuation of the inner layer of the capsule, and projecting so as to be gently moved or pressed in the motions of the joint.

Q. Are they really *glands?*

A. They are generally considered glands, because they secrete a fluid; although, on minute inspection, no glandular apparatus can be discovered in their structure.

Q. What is their colour and appearance?

A. They are whitish, and sometimes from the number of their blood-vessels they are reddish; from their margin fimbriae hang loose, and transmit the synovial liquor into the joint.

Q. What is the *nature of the synovia?*

A. It is of a yellowish hue, like olive oil; is of the consistence of the albumen ovi; froths when agitated; is smooth, viscid, and slippery to the touch.

Q. Does the quantity of synovia secreted vary at different times?

A. Its quantity varies very much, and seems to depend on the motions of the joint; for, when the joint is at rest it is not required, but when exercised, its motions stimulate the synovial organs to pour out a quantity of their fluid sufficient to moisten and lubricate the whole articulating surfaces of the joint.

Q. What are the *chemical properties* of synovia?

A. The quantity that can be procured of human synovia being too small to furnish a suite of experiments in order to establish its properties, that of the ox has been had recourse to, and contains a peculiar matter,

albumen, gelatin, mucilage, soda, muriate of soda, and phosphate of lime.

OF THE LIGAMENTS OF THE HEAD, AND TRUNK.

Q. How many *ligaments* are proper to the INFERIOR MAXILLA?

A. Three on each side, the capsular, suspensory, and lateral.

Q. What are the attachments of the *capsular ligament* of the *inferior maxilla?*

A. It *arises* from the whole margin of the glenoid cavity of the temporal bone; and is *inserted* into the edge of the inter-articular cartilage, and around the cervix of the maxilla.

Q. What are the attachments of the *suspensory ligament?*

A. It *arises* from the *styloid process* and from a *ligament* passing across from the same process to the os hyoides; and is *inserted* into the *angle* of the inferior maxilla.

Q. What is the *use* of it?

A. The *suspensory* ligament supports the stylo-glossus muscle, and gives origin to part of it.

Q. What are the attachments of the *lateral ligament?*

A. It *arises* from the margin of the glenoid cavity, and is *inserted* into the inner side of the angle near the foramen maxillare posterius.

Q. What is the *use* of this *lateral ligament?*

A. It keeps the condyle in situ, and defends the blood-vessels and nerve entering the foramen, from the pressure of the internal pterygoid muscle during its action.

Q. How many *ligaments* attach the HEAD TO THE VERTEBRAE of the neck?

A. *Four* properly, viz. the two capsular, circular, and perpendicular; and other two assist, namely, the two lateral or moderator ligaments.

Q. Describe the attachments of the *capsular ligaments* of the head?

A. They *arise* from the margin of the superior articular processes of the Atlas, and are inserted into the base of the condyles of the os occipitis.

Q. What are the attachments of the *circular ligament?*

A. It *arises* from the margin of the large spinal foramen of the atlas, is connected with the capsular ligaments, and is *inserted* into the edge of the foramen magnum.

Q. What are the attachments of the *perpendicular ligament?*

A. It *arises* from the point of the processus dentatus, and is *inserted* into the anterior part of the margin of the foramen magnum.

Q. What are the attachments of the two *lateral ligaments,* which assist those proper to the head?

A. They *arise* from the sides of the processus dentatus, ascend laterally, and are *inserted* into the inner part of the side of the atlas, and to the internal edge of the foramen magnum before the condyles.

Q. What is the *use* of these two strong short *lateral ligaments?*

A. They moderate the rotatory motions of the head, and prevent it from being turned too far.

Q. What ligaments secure the *processus dentatus* in situ?

A. The perpendicular, and two lateral ligaments just mentioned; and especially the transverse ligament.

Q. What are the attachments of the *transverse ligament?*

A. It *arises* from the inner sides of the anterior part of the atlas, and running across behind the processus dentatus in a circular groove, is *inserted* into the opposite side.

Q. Is there any other ligament connecting the head to the cervical vertebrae?

A. Yes; the *ligamentum nuchae* vel *colli.*

Q. What are its attachments?

A. The *ligamentum nuchae arises* from the perpendicular spine of the occipital bone, and descending is *inserted* into the spinous processes of the cervical vertebrae.

Q. How many *ligaments* are common to all the VERTEBRAE?

A. *Two;* the anterior and posterior common ligaments.

Q. Describe the *common anterior ligament of the vertebrae?*

A. It is a tendinous ligament beginning round and small at the atlas, and gradually becoming broader as it descends to the os sacrum; it covers the convex anterior part of the bodies of the vertebrae, being much thicker and stronger on the fore part than on the sides.

Q. What is the *use* of this anterior common ligament?

A. It is thinner above and below near the under part of the os sacrum, is firmly connected to the bodies and periosteum of the vertebrae, binds them firmly together, and prevents the spine from being too much bent backwards.

Q. Describe the *common posterior ligament* of the vertebrae?

A. It begins at the anterior part of the foramen magnum, descends on the inner concave part of the bodies of the vertebrae, becoming broader over the inter-vertebral substances, and adhering firmly to them, terminates at the lower part of the os sacrum.

Q. What is the *use* of this posterior common ligament?

A. It binds the vertebrae strongly together, and prevents the spine from being too much bent forwards.

Q. How many *ligaments* have the *vertebrae in general?*

A. The *inter-vertebral substance*, and *seven ligaments*, viz. the crucial, inter-spinous, inter-transverse, and capsular ligaments.

Q. Describe the *inter-vertebral substance?*

A. It is a cartilago-ligamentous substance composed of concentric lamellae, whose edges are firmly fixed to the bodies of the vertebrae; and it is very elastic.

Q. What are the *uses* of the inter-vertebral substances?

A. These substances fix the bodies of the vertebrae together, diminish the effect of concussion, and allow the spine to bend in all directions.

Q. Describe the situation of the *crucial* or *inter-vertebral ligaments?*

A. These two ligaments are composed of numerous strong, short fibres, which, situated behind the anterior common ligament, cross each other obliquely in passing from the edge of one vertebra to that of another.

Q. What are their *uses?*

A. The *crucial ligaments* fix the bodies of the vertebrae together, adhere to the inter-vertebral substance, and retain it in its proper situation.

Q. What are the situation and use of the *inter-spinous ligaments?*

A. They pass from the edge of the arch and spinous process of one vertebra to those of another, and connect them together.

Q. What are the situation and use of the *inter-transverse ligaments?*

A. They are attached to the transverse processes, and connect them firmly together.

Q. Describe the capsular ligaments?

A. They are two between every two vertebrae, attached to the margin of the articular oblique processes, fixing them together so as to admit of their proper movements.

Q. How many *ligaments* attach the RIBS *to the vertebrae?*

A. *Five;* the capsular ligament of the head, and of the tubercle, the external and internal transverse, and the external ligament of the neck of the rib.

Q. What are the attachments of the *capsular ligament of the head of the ribs?*

A. It *arises* from the spongy margin of the articulating surface on the head of the rib, and is *inserted* into the circumference of the cavity in the vertebrae and in their inter-vertebral substance.

Q. Describe the attachments of the *capsular ligament of the tubercle?*

A. The back part of the tubercle is applied to the fore part of the transverse process, and firmly attached by the capsular ligament, which *arises* from the margin of the articular surface near the end of the transverse process, and is *inserted* around the base of the tubercle.

Q. Describe the situation and attachments of the *internal and external transverse ligaments?*

A. The *internal* arises from the inferior surface of the transverse process, and is *inserted* into the upper margin of the neck of the nearest rib: the *external* arises from the point of the transverse process, and is *inserted* into the back of the neck.

Q. Describe the *external ligament of the neck* of the ribs?

A. This ligament *arises* from the external side of the inferior oblique process, and descending obliquely outwards, is *inserted* into the upper and outer part of the neck of the ribs.

Q. What *motions* are these ligaments calculated to allow?

A. They admit of motions upwards and downwards only.

Q. What ligaments connect the *ribs to the* STERNUM?

A. The capsular, and radiated or transverse ligaments.

Q. Describe the attachments of the *capsular ligaments* of the ribs *with the sternum?*

A. The *capsular* ligament of the cartilages of the seven true ribs *arises* from the margin of the articular ca-

vity in the side of the sternum, and is *inserted* around the extremity of each of the cartilages.

Q. What are the attachments of the *radiated* or *transverse ligaments?*

A. They *arise* from the sternum, and run over the capsular ligaments, and are *inserted* into the cartilages of the ribs.

Q. Are there not *other ligaments* connected with the ribs?

A. Yes; the union of the rib and its cartilage is secured by a covering of ligamentous fibres; and near the sternum a tendinous expansion of fibres connects the cartilages together.

Q. What *ligaments* has the *sternum* peculiar to itself?

A. A very firm tendinous expansion covers the whole sternum internally and externally.

Q. What ligaments has the *ensiform cartilage?*

A. It has various ligamentous bands from the covering of the sternum, and from the cartilages of the seventh pair of ribs.

Q. How are the *ligaments of the* PELVIS divided?

A. Into those which unite the bones; and into those on the anterior, and those on the posterior aspect of the pelvis.

Q. What ligaments fix the bones of the pelvis together?

A. The uneven articulating surfaces of the ossa innominata and each side of the os sacrum are covered with *cartilage*, which, intervening between the bones, fixes them so very firmly together as to admit of no motion.

Q. Is the *symphysis pubis* joined in the same manner?

A. Yes; exactly in the same manner, and admits of no motion.

Q. Have these joinings of the bones of the pelvis any other ligaments?

A. They have each a *capsular ligament*, which covers and strengthens the articulation.

Q. Do *these articulations* relax, and *open* a little at the symphysis pubis *during parturition?*

A. It was long thought so, but it is a mistake; for these articulations of the pelvis never admit of the smallest motion even in parturition without a disease, which renders the woman incapable of walking for a long time, or perhaps for life.

Q. What ligaments are situated on the *fore part* of the pelvis?

A. The inguinal, and obturator membrane or ligament.

Q. Describe the *inguinal ligament?*

A. This ligament, called also POUPART'S, FALLOPIUS' *ligament*, and *crural arch*, is considered by some as part of the tendon of the external oblique muscle; it *arises* from the anterior superior spinous process of the ilium, runs transversely, and is *inserted* into the crest of the os pubis.

Q. Describe the *obturator ligament?*

A. It is a strong membranous ligament, which is attached to the margin of the *foramen thyroidēum*, and closes up the whole of the foramen, except an oval notch at its superior part for the passage of the *obturator artery, vein*, and *nerve*.

Q. What ligaments are situated in the *posterior part* of the pelvis?

A. The two transverse, the ilio-sacral, the long and the short sacro-ischiatic, and other slips, on either side.

Q. What are the attachments of the two *transverse ligaments?*

A. They *arise* from the spine of the os ilium, run transversely, and are *inserted*, the *superior* into the last lumbar vertebra, the *inferior* into the first transverse process of the os sacrum.

Q. Describe the attachments of the *ilio-sacral ligaments?*

A. They *arise* from the posterior spinous process of the os ilium, descend obliquely, and are *inserted* into the

first, third, and fourth transverse processes of the os sacrum.

Q. Describe the attachments of the *long* and *short sacro-sciatic* or *ischiatic ligaments?*

A. They *arise* in common from the transverse processes, from the under and lateral part of the os sacrum, and from the upper part of the os coccygis; the *long one* is *inserted* into the tuberosity of the os ischium; and the *short one* running transversely, is *inserted* into the spinous process of the os ischium.

Q. What are the *uses* of these *sacro-sciatic ligaments?*

A. They bind the bones together, support the contents of the pelvis, and give origin to muscles. The long or external one forms the notch of the ilium into a large foramen, through which the *pyriform muscle*, *sciatic blood-vessels*, and *nerve*, pass out; between the two a hole is formed, through which the *obturator internus* muscle passes out of the pelvis.

Q. Where are the *ligamenta vaga* dispersed?

A. They are numerous slips running in various directions between the os sacrum and ossa ilia.

Q. What *ligaments* are attached to the *os coccygis?*

A. It has a *capsular ligament*, where it is articulated with the os sacrum, and a *general ligamentous expansion* descending from the sacrum covers the whole of it.

OF THE LIGAMENTS OF THE SUPERIOR EXTREMITIES.

Q. By what ligaments is the CLAVICLE *bound to the sternum?*

A. By the interarticular cartilage, the capsular, radiated, interclavicular, and rhomboid ligaments.

Q. What is the *use of the interarticular cartilage?*

A. It covers the articulating surfaces of the sternum and clavicle, accommodates them to each other, and adapts them for easy motion.

Q. What are the attachments of the *capsular ligament?*

A. It *arises* from the thick upper corner of the sternum around the articular cavity, incloses the interarticular cartilage, and is *inserted* around the head of the clavicle.

Q. What are the attachments of the *radiated* ligament?

A. This ligament on either side *arises* from the external surface of the sternal end of the clavicle, and is *inserted* into the sternum around the capsular ligament.

Q. What are the attachments of the *interclavicular* ligament?

A. It is extended from the elongated angle of the extremity of the one clavicle to that of the other behind the top of the sternum, and fixes them strongly together.

Q. Describe the attachments of the *rhomboid* ligament?

A. It *arises* from the rough inferior surface of the clavicle on each side, and is *inserted* into the first rib at its sternal articulation.

Q. What ligaments *fix the clavicle to the* SCAPULA?

A. The capsular, conoid, and trapezoid ligaments.

Q. What is the situation of the *capsular* ligament?

A. The *scapular end* of the clavicle, and also the articular surface of the *acromion* process, are covered generally with interarticular cartilage, and firmly fixed together by this and the capsular ligament, which closely surrounds the articulation, and is attached to both bones.

Q. What are the attachments of the *ligamentum conoidēum?*

A. It *arises* from the root of the coracoid process, and is *inserted* into the tubercle of the clavicle.

Q. What are the attachments of the *ligamentum trapezoidēum?*

A. It *arises* from the point of the corăcoid process, and is inserted into the under edge of the clavicle near the tubercle.

Q. What *ligaments* are *proper to the* SCAPULA?

A. The anterior and posterior ligaments.

Q. What are the attachments of the *anterior ligament of the scapula?*

A. It is of a triangular form, *arises* broad from the external surface of the coracoid process, and becoming narrower, is *inserted* into the posterior and upper edge of the acromion.

Q. What *use* does *this anterior* ligament serve?

A. It binds down the tendon of the supra-spinatus, protects and secures the upper and inner part of the shoulder joint.

Q. What is the situation of the *posterior ligament* of the scapula?

A. It is stretched across the *semilunar notch*, forming it into a hole for the passage of the superior-posterior *blood-vessels* and *nerve*.

Q. What ligaments *connect the* SCAPULA *and* HUMERUS?

A. The capsular ligament and the tendon of the long head of the biceps flexor cubiti.

Q. Describe the attachments of the *capsular ligament* of the shoulder joint?

A. It *arises* from the cervix of the scapula near the margin of the glenoid cavity, and is *inserted* around the neck of the os humeri; forms a sheath on its fore part for keeping the tendon of the biceps in situ.

Q. Describe the *tendon of the biceps*, and how it contributes to the security of the joint?

A. This tendon *arises* from the upper edge of the glenoid cavity, passes over the ball of the humerus within the joint, and being inclosed in its sheath, gives great security to the shoulder joint, against accidents forcing the head of the humerus upwards.

Q. What ligaments bind the OS HUMERI TO THE RADIUS AND ULNA?

A. The capsular, the humero-cubital, humero-radial, and the two inter-muscular ligaments.

Q. Describe the attachments of the *capsular ligament of the elbow joint?*

A. It *arises* from the margin of the articular surface of the humerus, and is *inserted* into the edge of that of the ulna, and into the coronary ligament of the radius.

Q. What are the attachments of the *humero-cubital* ligament?

A. It, called also *internal lateral, arises* from the anterior part of the inner condyle of the os humeri, spreads in a radiated manner, and is *inserted* into the inner side of the coronoid process of the ulna.

Q. What are the attachments of the *humero-radial?*

A. It, called also *external lateral, arises* from the external condyle, and is expanded upon, and *inserted* into the coronary ligament of the radius.

Q. Describe the *inter-muscular ligaments,* and their use?

A. They *arise,* the one from the external, and the other from the internal condyle, and are *inserted* into the sides of the humerus: they are destined to give origin to muscles.

Q. Describe the attachments of the *coronary* or *annular* ligament of the radius?

A. It *arises* from the one side of the semilunar cavity of the ulna and capsular ligament, and is *inserted* into the other side, and also around the neck of the radius.

Q. What is the *use* of the coronary ligament of the radius?

A. It binds the head of the radius to the ulna, and allows it to move easily round its own axis, as well as upon the articular surface of the ulna, in flexion and extension of the elbow-joint.

Q. What other ligaments *connect the radius and ulna?*

A. The interosseous, oblique, and capsular or sacciform ligaments.

Q. Describe the attachments of the *interosseous ligament?*

A. It extends between the acute ridges of the radius and ulna, and fills up the intermediate space.

Q. Are there any *holes* in it?

A. Yes; a large opening at its upper part for muscles passing; and a few small perforations for blood-vessels passing from its anterior to the posterior side.

Q. What is the *use of the interosseous ligament?*

A. It binds the radius and ulna together, limits the motion of supination, and affords attachment to muscles.

Q. What is the situation of the *oblique ligament?*

A. Some consider this a part of the interosseous ligament; it *arises* from the tubercle at the base of the coronoid process of the ulna, and is *inserted* into the under part of the tubercle of the radius.

Q. Describe the *capsular* or *sacciform* ligament?

A. It *arises* from the edges of the semilunar cavity at the carpal extremity of the radius, surrounds the head of the ulna, and fixes it in situ, while it admits of their movement partially round each other in pronation and supination of the hand.

Q. What ligaments connect the RADIUS AND ULNA TO THE CARPUS?

A. The capsular, the external and internal lateral ligaments, and the inter-articular cartilage.

Q. Describe the attachments of the *capsular ligament of the wrist?*

A. It *arises* from the margin of the *navicular cavity* of the radius, and of the moveable cartilage at the head of the ulna, and is *inserted* into the cartilaginous edges of the os scaphoides, lunare, and cuneiforme of the carpus.

Q. Describe the attachments of the *lateral ligaments of the wrist?*

A. The *external* arises from the styloid process of the radius, and is inserted into the os scaphoides; the *internal* from the styloid process of the ulna, and is inserted into the cuneiform and pisiform bones.

Q. Describe the *interarticular cartilage* of the ulna?

A. It is placed between the head of the ulna and the os cuneiforme, seems a continuation of the cartilage, which covers the end of the radius; it is loosely attached to the end of the styloid process.

Q. What are the LIGAMENTS OF THE CARPUS?

A. The annular and capsular ligaments.

Q. Describe the *annular ligament?*

A. It is frequently divided into an anterior, and a posterior portion; it is fixed to the projections of the pisiform and cuneiform bones, stretches across, and adheres to the os scaphoides, and trapezium, embracing the tendons of the muscles.

Q. Does the annular ligament not form *sheaths* for the tendons of muscles?

A. Yes; the anterior portion of it, called *ligamentum carpi annulare anterius*, not only binds down the different tendons of the flexors of the wrist and fingers, but forms different sheaths for them.

Q. Does the *posterior portion* do the same?

A. Yes; the *ligamentum carpi annulare posterius* binds down the different tendons of the extensor muscles, and also forms distinct sheaths for them to play in.

Q. Describe the *capsular ligament of the carpal bones?*

A. It arises from the cartilaginous edge of the first row, and is inserted into that of the second row.

Q. Are there other ligaments of the carpus?

A. There are various ligamentous slips, running in different directions, binding the carpal bones firmly together.

Q. What ligaments connect the CARPAL TO THE METACARPAL BONES?

A. *Capsular* or *articular ligaments* surround the different articulations, and bind the respective bones together; as their fibres are stronger on the sides, as well as behind and before, they have been termed lateral, dorsal, and palmar ligaments.

Q. What ligaments connect the *metacarpal bones together?*

A. They have *interosseous ligaments*, which run in various directions.

Q. What ligaments have the *articulations of the* PHALANGES of the fingers?

A. Each joint has a *capsular*, and *two lateral* ligaments for strengthening the sides of the capsular, to which they adhere.

Q. What retains the tendons of the flexors of the fingers in situ?

A. *Viginal* or *crucial* ligaments pass across them from one ridge to the other on the sides of the grooves in the concave or volar side of the phalanges.

OF THE LIGAMENTS OF THE INFERIOR EXTREMITIES.

Q. What ligaments connect the OS FEMORIS *with the* OS INNOMINATUM?

A. The round, and capsular ligaments.

Q. What are the attachments of the *internal* or *round ligament?*

A. It *arises* broad and flat from the under and inner part of the cavity of the acetabulum, runs backwards and upwards, becoming rounder, and is *inserted* into the pit on the inner surface of the head of the femur.

Q. What is the *use* of it?

A. The *internal* or *round ligament* retains the ball of the os femoris in the acetabulum, and materially assists in preventing dislocation of the joint from accidents forcing it upwards, or inwards.

Q. Describe the attachments of the *capsular ligament* of the os femoris?

A. This capsular ligament is very thick and strong; it *arises* from the outside of the brim of the acetabulum, incloses the head, and is *inserted* around the root of the neck of the femur; its outer part descends farther than its inner, a layer of which is reflected up to the margin of the head, and transverse slips connect them.

Q. Is this *capsular ligament* of the *hip-joint* not strengthened also by various other means?

A. Yes; various ligamentous slips lie on its surface, sent off from the fascia lata, and inferior anterior spinous process of the os ilium; it is strengthened also by surrounding muscles, particularly the iliacus internus and quadratus.

Q. What *means* are *used to deepen* the cavity of the acetabulum?

A. There is a *cartilage*, thick and strong, surrounding the osseous brim, and rising to a considerable degree, which deepens the cavity and renders the articulation more secure.

Q. Is there a *gland* in this articulation?

A. Yes; a gland is lodged in a depression at the under and inner part of the acetabulum, for the purpose of lubricating the joint.

Q. Is this *glandular apparatus* peculiar to this hip-joint?

A. No; a similar apparatus is found in all the large joints; thus, a *fimbriated organ* is placed within the capsular ligament of the *shoulder-joint* for the secretion of a lubricating fluid; and a *fatty-looking substance* within that of the *elbow-joint* for a similar purpose.

Q. What ligaments attach the OS FEMORIS TO THE TIBIA AND FIBULA?

A. The two lateral, the popliteal, that of the patella, the capsular, and crucial ligaments.

Q. Describe the attachments of the *two lateral ligaments?*

A. The *internal lateral*, of considerable breadth and strength, arises from the upper part of the internal condyle of the femur, and is inserted into the upper and inner part of the tibia; the *external lateral*, longer and stronger, arises from the tubercle of the external condyle, and is inserted into the fibula below its head.

Q. Describe the *popliteal ligament?*

A. It, sometimes called the *posterior of* WINSLOW, arises

from the upper and posterior part of the external condyle, descends obliquely over the capsular ligament, and is inserted into tbe inner and back part of tbe tibia.

Q. What is the *use* of it ?

A. It prevents the leg from being stretcbed too far forwards, and affords origin to part of the gastrocnemius and plantaris muscles.

Q. Describe the *ligament of the patella ?*

A. It arises from a depression of the patella, descends, and is inserted into the tuberosity of tbe tibia; it is strengthened by the tendinous expansion of the muscles of the thigh.

Q. What are the attachmcnts of the *capsular ligament of the knee-joint ?*

A. It arises from the circumference of the articular surface of the femur, and above the large notch behind, and is inserted into the margin of the articular surface of the tibia, and into that of the patella, which forms a part of the capsule itself.

Q. Is this *capsular* ligament of the *knee-joint* strengthened by any other means ?

A. It is covered on different parts by the *ligaments* already described, by tbe strong *aponeurosis* of tbe thigh, and also by the *tendons* of various muscles.

Q. Does it not form processes at the sides of the patella ?

A. It seems folded tbere, and forms the *ligamenta alaria*, which are merely strong parts of the capsule.

Q. Has the *knee-joint* any *glandular apparatus ?*

A. It has the largest synovial apparatus of any of the joints, situated chiefly round the patella, and in other parts of the joint also.

Q. Describe the *crucial ligaments ?*

A. The *anterior* arises from tbe outer part of the rough notcb between the condyles, descends forwards, and is inserted into a pit before the rough protuberance in the middle of the articular surface of the tibia : the *posterior* arises from the inner sidc of the notch, and is

inserted into a pit behind the protuberance of the tibia ; they decussate each other.

Q. What are the *uses of the crucial,* or internal ligaments of the knee-joint ?

A. They are situated within the capsular ligament, bind the bones firmly together, prevent the leg from being too far extended, and admit of a little rotation of the toes outwards in the bent state of the knee, but prevent rotation inwards.

Q. Are any *cartilages* situated in the knee-joint?

A. The two *interarticular cartilages* are placed on the upper surfaces of the tibia.

Q. Describe these *interarticular cartilages ?*

A. They are also called *semilunar* from their shape, their circumference is thick, while their inner concave edge is thin like a sickle, their cornua are joined, and their convex thick surface adheres to the capsular ligament.

Q. What is the *use* of these two *semilunar cartilages* in each knee-joint?

A. They deepen the cavities on the top of the tibia, and adapt them better to the condyles of the femur, by which they give greater security to the joint.

Q. What *ligaments* bind the FIBULA TO THE TIBIA?

A. The capsular above, the interosseous in the middle, and the transverse ligaments below.

Q. What are the attachments of the *capsular ligament of the fibula ?*

A. It is attached around the articulating surface of the two bones, and is much strengthened by the external lateral ligament of the knee, and the tendon of the biceps.

Q. What are the attachments of the *interosseous ligament ?*

A. It is attached to the posterior and outer ridge of the tibia, extends across to the inner ridge of the fibula, and fills up the intermediate space between the bones.

Q. Are any *holes* in it?

A. There is a large opening above occupied by muscles, and some small holes lower down, through which *blood-vessels* and *nerves* pass.

Q. What is the *use* of this *interosseous ligament* ?

A. It binds the bones together, and affords origin to muscles.

Q. What are the attachments of the *transverse ligaments* of the fibula ?

A. The *anterior* arises from the anterior edge of the semilunar cavity of the tibia ; the *posterior* from its posterior edge, and they are both firmly inserted into the end of the fibula, which forms the *malleolus externus*.

Q. What ligaments connect the ends of the TIBIA and FIBULA TO THE BONES OF THE TARSUS ?

A. The anterior, posterior, and middle ligaments of the fibula, the deltoid of the tibia, and the capsular ligament.

Q. What are the attachments of the *anterior ligament of the fibula* ?

A. It *arises* from the fore part of the malleolus externus, and passing obliquely forwards, is *inserted* into the upper and outer part of the *astragălus*.

Q. What are the attachments of the *posterior ligament of the fibula* ?

A. It *arises* from the under and back part of the malleŏlus externus, and running backwards, is *inserted* into the outer and posterior part of the *astragălus* ?

Q. What are the attachments of the *middle* or *perpendicular ligament of the fibula* ?

A. It *arises* from the point of the malleolus externus, and descending almost perpendicularly is *inserted* into the outside of the os calcis.

Q. Describe the *ligamentum deltoides of the tibia* ?

A. It *arises* from the malleolus internus, and descending in a radiated manner is *inserted* into the astragalus, os calcis, and os naviculare.

Q. What are the attachments of the *capsular ligament of the tarsus* ?

A. The capsular ligament, lying within those just mentioned, *arises* from the margin of the articular cavity of the tibia and fibula, and is *inserted* around the articulating surface of the astragalus.

Q. What *motions* does the *ankle-joint* perform?

A. Motions of flexion and extension only. This joint is so firmly secured by the projections of the tibia and fibula, and by these different strong ligaments, that one of the malleoli must be fractured before it can be dislocated.

Q. What *ligaments* have the BONES OF THE TARSUS?

A. They have articulating cartilages between them, and capsular ligaments around every articulation; and besides, they are bound together most firmly by ligaments passing across from bone to bone in a variety of directions.

Q. Mention the most conspicuous of these?

A. The *capsular* ligament, which surrounds the articulation *of the os calcis and astragalus;* the *capsule of the astragalus* and *os naviculare*, which admits of the lateral and rotatory motions of the foot; the *internal ligament* passing between the under part of the os calcis and os naviculare for supporting the astragalus.

Q. What *ligaments* connect the TARSAL AND METATARSAL BONES?

A. *Capsular* ligaments around their articulations, strengthened by dorsal, plantar, lateral, oblique, or transverse ligaments, as their fibres are directed.

Q. What ligaments connect the *metatarsal bones* together?

A. The dorsal or transverse, plantar and lateral ligaments.

Q. What ligaments connect the *phalanges of the toes* together?

A. The capsular and lateral ligaments.

Q. What ligaments retain the *tendons* of the muscles of the foot and toes in situ?

A. The strong *annular* ligament of the tarsus, formed

by the aponeurosis. It forms also sheaths for the tendons in playing round the ankles, and the plantar aponeurosis forms other sheaths in the sole.

OF THE ORGANIC DISEASES OF LIGAMENTS.

Q. What *organic derangements* are ligaments subject to?

A. Ligaments are ruptured, inflamed, thickened, relaxed, reduced to a thickened and spongy state, ossified, and give rise to morbid cartilaginous bodies.

Q. In what circumstances are *ligaments lacerated and ruptured?*

A. In *cases of luxation;* where some ligaments are always overstretched, lacerated, and ruptured, which is the cause of the acute pain.

Q. From what causes do they become *inflamed?*

A. Ligaments may become inflamed from various causes, such as, injuries, Gout, Rheumatism, and White Swelling.

Q. What are the *effects of inflammation* of ligaments?

A. It renders the ligaments extremely sensible and painful; and in the progress of disease they become often much thickened, and rigid; and sometimes suppurate.

Q. In what diseases are the ligaments reduced to a *thickened and spongy state?*

A. In Scrofulous diseases of the joints, the ligaments, as well as the cartilages covering the articular surfaces, become soft, spongy and thick; and are sometimes dissolved into an ill-conditioned pus.

Q. In what disease do the ligaments become *unusually relaxed?*

A. In some rare cases of general, or topical debility, the capsular ligament becomes so preternaturally relaxed and elongated, as to allow the head of the articulating bone to remove from its socket, and to produce a temporary and spontaneous luxation.

Q. Is the *conversion of ligament into bone* a frequent occurrence?

A. It is pretty frequent, especially if the ligament partakes of a cartilaginous nature. It is more frequent too in advanced age.

Q. Are *cartilaginous bodies* frequently attached to ligaments?

A. Sometimes, though rarely, they grow from ligaments; or are formed between the external layers of their substance, and are called *tophi*.

Q. What seems to be the *cause of the growth* of these bodies?

A. They seem to arise from some strain or overstretching, or from a bruise of the ligament of the part; in which an effusion takes place, which is gradually consolidated and converted into cartilage.

OF MYOLOGY.

Q. What is understood by a MUSCLE?

A. It is a fleshy substance, composed of fibres susceptible of contraction and relaxation.

Q. What parts does a muscle consist of?

A. Of an origin, a belly, and an insertion or termination.

Q. How is the origin known from the insertion?

A. The extremity attached to the most fixed part, to which the contraction is made, is called the origin of the muscle.

Q. What is meant by the belly?

A. It is that thickest part, which in contraction swells and enlarges.

Q. What connects the fibres of the muscles together?

A. Cellular substance.

Q. What forms the tendons of muscles?

A. The cellular substance condensed into a tendinous expansion gives attachment often to the oblique fibres in the course of the muscle, and at the extremity,

generally becomes stronger and rounder so as to form the tendon.

Q. What purposes do the tendons of muscles serve?

A. They occupy less space while passing over joints to their termination, and preserve the symmetry of the parts, and are not easily fatigued with continued action.

Q. Does the tendinous expansion answer any other purpose besides giving attachment to muscular fibres?

A. It also sometimes covers the muscles, binds them in their situation, and in certain parts keeps their tendons from starting out of their places.

Q. Are tendons to be considered different from muscles, although they form a part of them?

A. Yes; the fibrous and fleshy part of muscles is that capable of contraction and relaxation; while the white, glistening, tendinous part of them, having very little sensibility, and no contractibility, is disposed in layers, or chords in their substance, in order to afford attachment to the fibres, and towards their termination it becomes firmer and stronger for sustaining the whole power of the fibrous part.

Q. Can the fibrous part of a muscle then not act without a tendinous part?

A. Yes; when the distance is small between the origin and termination of muscles, they have no tendons; but when the distance is great, their fibres are generally disposed obliquely, and are attached to one or more tendinous chords, or fasciae, to which they contract as to a fixed point.

Q. Have muscular fibres a large supply of blood, and of nervous influence?

A. Yes, it is the quantity of blood in the moving fibres that gives them their red colour; and the copious supply of nerves gives them their great sensibility, and mobility.

Q. Have the tendons less blood and fewer nerves in their texture?

A. Yes, much less; their texture is compact and firm, and does not admit of vessels carrying red blood;

their office is such, as not to require sensibility ; and in consequence their nervous filaments are so small, that they have never yet been traced.

Q. Since tendons have so small blood-vessels and nerves, can adhesion take place in them after they have been ruptured ?

A. Yes ; the injury irritates and stimulates the ruptured vessels to an increased action, by which adhesion, though slow in progress, of the ruptured parts is effected.

OF THE MUSCLES OF THE HEAD.

Q. In treating of the MUSCLES, we shall begin with the head and proceed downwards, in the order best calculated for assisting the memory and explaining the movements of the joints. In the first place, then, describe the origin and insertion of the *Occipĭto-frontālis muscle ?*

A. It *arises* from the transverse ridge of the occipital bone, fleshy in the middle, and tendinous near the temporal bones ; its broad tendinous expansion runs forwards, adhering to the integuments, becomes fleshy on the os frontis, and is *inserted* into the skin of the eyebrows, and parts under it, into the orbicularis palpebrarum muscle, and the os frontis at the inner angle of the orbit.

Q. What is the use of the *Occipito-frontalis ?*

A. It moves the eyebrows upwards, and wrinkles the integuments of the forehead.

Q. What are the origin and termination of the *Corrugator supercilii ?*

A. The corrugator supercilii *arises* fleshy from the internal angular process of the os frontis, and is *inserted* into the occipito-frontalis, and orbicularis palpebrarum, at the middle of the superciliary ridge.

Q. What are its actions ?

A. Its name denotes its actions ; it corrugates the

skin of the forehead by drawing the eyebrow down and inwards.

OF THE EAR.

Q. Enumerate the muscles attached to the EXTERNAL EAR?

A. They are three, the attollens aurem, anterior auris, and retrahentes aurem.

Q. Describe the origin, insertion, and use of the *Attollens aurem?*

A. It *arises*, broad and thin, from the tendon of the occipĭto-frontalis, and is *inserted* into the upper part of the concha or cartilage of the ear; it draws the ear upwards, and makes the parts tense.

Q. Describe the origin, insertion, and use of the *Anterior auris?*

A. It *arises* thin and membranous from the posterior part of the zygoma, and is *inserted* into the back of the helix; it elevates the ear.

Q. What are the origin, insertion, and use of the *Retrahentes aurem?*

A. Two or three distinct small muscles *arise* from the upper and outer part of the mastoid process; and are *inserted* by small tendons into the back of the concha; they draw the concha backwards.

Q. What muscles are *peculiar* to the EXTERNAL EAR itself?

A. The *helĭcis major, helĭcis minor, tragĭcus, antitragĭcus, and transversus auris.*

Q. Describe the origin, insertion, and use of the *Helicis major?*

A. It *arises* from the anterior acute part of the helix, ascends upon it, and is *inserted* into the helix above the tragus; it is destined to contract part of the helix, or to render it tenser; but few persons can use these muscles of the external ear.

Q. Describe the *Helicis minor?*

A. It *arises* from the under and fore part of the he-

lix, and is *inserted* into the helix a little higher up; it should contract the fissure over which it passes.

Q. Describe the origin, insertion, and use of the *Tragicus*?

A. It *arises* from the middle and outer part of the concha, and is *inserted* into the point of the tragus; it should pull the point of the tragus forwards.

Q. Describe the origin, insertion, and use of the *Anti-tragicus*?

A. It *arises* from the internal and lower part of the anti-helix, and is *inserted* into the tip of the antitragus; it should pull the antitragus and antihelix towards each other.

Q. What are the origin, insertion, and use of the *Transversus auris*?

A. It *arises* from the back and prominent part of the concha, and is *inserted* into the outside of the antihelix; it should draw its attachments towards each other.

Q. Enumerate the muscles of the INTERNAL EAR?

A. They are *three;* the laxātor tympăni, tensor tympăni, and stapedius.

Q. What are the origin, insertion, and use of the *Laxātor tympăni*?

Q. It *arises* from the spinous process of the os sphenoides, and running backwards and a little upwards, along with the nerve named *chorda tympăni*, through the fissūra GLASSERI, is *inserted* into the long process of the mallĕus within the tympănum; it draws the malleus obliquely forwards and outwards, by which it relaxes the membrāna tympăni adhering to the malleus.

Q. Describe the *Tensor tympăni*?

A. It *arises* from the cartilaginous portion of the Eustachian tube, and from the spinous process of the os sphenoides, and running backwards, its tendon turns into the tympanum, and is *insertcd* into the handle of the malleus; it pulls the malleus inwards, and makes the membrana tympani more concave and tense.

Q. Describe the origin, insertion, and use of the *Stapedius*?

A. It *arises* from a small cavern in the pars petrosa, near the mastoid process, its tendon passes forwards through a small hole of the cavern, enters the tympanum, and is *inserted* into the posterior part of the head of the stapes; it pulls the stapes obliquely up and backwards, and thereby stretches the membrana tympani.

OF THE EYE.

Q. What muscles MOVE THE PALPEBRAE?

A. Two; the orbicularis palpebrarum, and levator palpebrae superioris; the movements of the occipito-frontalis also influence their motions.

Q. What are the origin, insertion, and use of the *Orbicularis palpebrarum*?

A. It *arises* from the orbitar and nasal processes of the superior maxilla, and from the internal angular process of the frontal bone, and running round the orbit, under the skin, is *inserted* into the integuments of the eyelids, and above into the corrugator supercilii and frontalis; it closes the eyelids, presses the ball and lachrymal organs.

Q. Describe the *Levator palpebrae superioris*?

A. It *arises* from the upper margin of the foramen opticum, and is *inserted* into the cartilage, or tarsus, of the upper eyelid by a broad thin tendon; it raises the eyelid and opens the eye.

Q. What muscles are concerned in moving the EYE-BALL?

A. *Six;* namely, four straight, the levator, depressor, adductor, and abductor oculi; and two oblique, the obliquus superior or trochlearis, and the obliquus inferior.

Q. Describe the origin, insertion, and uses of the *four recti* muscles?

A. They all four *arise* from the bottom of the orbit,

around the foramen opticum, and are *inserted* into the tunica sclerotĭca, near to the cornea; the *Levator* on the upper, the *Depressor* on the under, the *Adductor* on the inner, and the *Abductor* on the outer part of the globe of the eye; each pulls the eye in its own particular direction.

Q. Describe the origin, insertion, and use of the *Obliquus superior* or *trochleāris?*

A. It *arises* from the edge of the foramen opticum between the levator and adductor ocŭli, runs forwards, forms a round tendon, which passes through a cartilaginous pulley fixed behind the internal angular process of the frontal bone, turns downwards, outwards, and backwards under the levator oculi, and is *inserted* by a broad thin tendon into the sclerotic coat half way between the insertion of the levator oculi and the optic nerve; it rolls the eye-ball, turning the pupil down and outwards.

Q. What are the origin, insertion, and use of the *Obliquus inferior?*

A. The inferior oblique *arises* narrow from the outer edge of the orbitar process of the superior maxilla near the lachrymal groove, and passing obliquely outwards, backwards, and upwards round the ball, is *inserted* by a broad thin tendon into the sclerotic coat between the entrance of the optic nerve and insertion of the abductor oculi; it rolls the eye, turning the pupil upwards and inwards, and during the action of the superior oblique, it pulls the eye forwards.

Q. What *nerves* are distributed to these six muscles of the eye-ball?

A. The third pair, named *Motor oculi,* is distributed to the levator, depressor, abductor, and obliquus inferior; the fourth pair, the *Nervus Patheticus,* is dispersed entirely upon the trochlearis or superior oblique; and the sixth pair, the *Abducens,* is dispersed entirely upon the abductor muscle.

OF THE NOSE.

Q. How many muscles are proper to the NOSE?

A. There is *one* only on each side of it, namely, the compressor naris.

Q. Describe the origin, insertion, and use of the *Compressor naris?*

A. It *arises* narrow from the root of the ala nasi externally, runs upwards, spreading on the cartilage towards the ridge of the nose, and is *inserted* into the anterior extremity of the os nasi, and nasal process of the superior maxilla, and meets with fibres descending from the occipito-frontalis; it compresses the ala in smelling, and by the assistance of the frontalis pulls the ala outwards, corrugates the skin of the nose in expressing certain passions.

OF THE LIPS.

Q. What muscles are connected with the LIPS?

A. *Nine;* three above, namely, the levātor angŭli oris, levator labii superioris alaeque nasi, depressor labii superioris alaeque nasi; three below, the depressor angŭli oris, depressor labii inferioris, levator labii inferioris; and three lateral, towards the cheek, the buccinator, zygomatĭcus major, and minor.

Q. Describe the origin, insertion, and use of the *Levator angŭli oris?*

A. It *arises* thin and fleshy from the superior maxilla, between the socket of the first dens molaris and the foramen infra-orbitarium, and is inserted into the angle of the mouth; it draws up the corner of the mouth, and makes the cheek prominent, as in smiling.

Q. Describe the *Levator angŭli oris alaeque nasi?*

A. It *arises* partly from the external part of the orbitar, and partly from the upper part of the nasal process of the superior maxilla, and is *inserted* into the up-

per lip and outer part of the ala nasi; it elevates the upper lip, and dilates the nostril.

Q. Describe the origin, insertion, and action of the *Depressor labii superioris alaeque nasi?*

A. It *arises* thin and fleshy from the alveŏli of the two dentes incisīvi, and canīnus, and running up under the levator, is *inserted* into the upper lip and root of the ala nasi; it draws the lip and ala downwards.

Q. Describe tbe *Depressor angŭli oris?*

A. It *arises* broad and fleshy from the lower edge of the inferior maxilla at the side of the chin, is there connected with the platysma myoides, the depressor labii, and skin, and becoming narrower as it ascends, is *inserted* into the angle of the mouth, joining the levator angŭli oris, and zygomatĭcus major; it depresses the corner of the mouth.

Q. Describe the origin, insertion, and use of the *Depressor labii inferioris?*

A. It *arises* broad and fleshy from the inferior part of the lower jaw nearest tbe chin, ascends obliquely inwards, and is *inserted* into one half of the under lip; it depresses the lip.

Q. What are the origin, insertion, and use of the *Levator labii inferioris?*

A. It *arises* from the roots of the alveoli of two incisivi and the caninus, and is *inserted* into the under lip and skin of the chin; it pulls these parts upwards.

Q. Describe the origin, insertion, and use of the *Buccinātor?*

A. It *arises* tendinous and fleshy, from the ridge extending from tbe last dens molaris to tbe coronoid process of the inferior maxilla, and from the superior maxilla between the last dens molaris and pterygoid process of the sphenoid bone, and partly from its extremity, being joined to the constrictor pharyngis superior; it thence runs forwards, adhering to the membrane which lines the mouth, and is *inserted* into the angle of the mouth within the orbicularis oris; it draws the angle of

the mouth back and outwards, presses the cheek, and is employed in blowing wind-instruments.

Q. Describe the origin, insertion, and action of the *Zygomaticus major?*

A. It *arises* fleshy from the os malae near the zygomatic suture, and descending obliquely forwards is *inserted* into the angle of the mouth, intermixing its fibres with those of the depressor anguli oris and orbicularis; it draws the angle of the mouth and under lip upwards and outwards, and makes the cheek prominent.

Q. What are the origin, insertion, and use of the *Zygomaticus minor?*

A. It *arises* from the prominent part of the os malae above the former, and is *inserted* into the upper lip near the corner of the mouth; it raises the angle of the mouth obliquely upwards and outwards.

Q. Describe the *Orbicŭlāris oris?*

A. It is a complete sphincter, composed of the fibres of the superior descending, and of the inferior ascending muscles, decussating each other at the corner of the mouth, and running along the lips to join those of the opposite side; it draws both lips together, and shuts the mouth.

OF THE INFERIOR MAXILLA.

Q. How many muscles are concerned in *raising* the INFERIOR MAXILLA, and shutting the mouth?

A. *Four* on each side; namely, the temporalis, massēter, pterygoidēus internus, and externus.

Q. Is there any *aponeurosis* covering the temporal muscle?

A. Yes; it is a strong tendinous membrane, *arising* from the bones, which give origin to the upper semicircular portion of the temporal muscle, and descending over it, is *inserted* into the zygōma.

Q. Describe the origin, insertion, and use of the *Temporal muscle?*

A. It *arises* fleshy from the semicircular ridge of the

lower and lateral part of the parietal bone, from the squamous portion of the temporal, from the external angular process of the frontal, and from the temporal process of the sphenoid bone; its fibres converge, pass down under the zygoma, and form a strong tendon, which embraces, and is *inserted* into the coronoid process of the inferior maxilla; it pulls the jaw upwards, and a little backwards.

Q. Describe the origin, insertion, and use of the *Massēter*?

A. It *arises* by strong tendinous and fleshy fibres from the superior maxilla, where it joins the os malae, and from the whole length of the under and inner edge of the zygoma, the external fibres slant backwards, and the internal forwards; and it is *inserted* into the angle of the lower jaw and upwards near to the top of the coronoid process; it pulls the jaw upwards, and, by means of its decussating fibres, forwards or backwards.

Q. Describe the *Pterygoidēus internus*?

A. It *arises* from the fossa pterygoidea of the sphenoid and palate bones, passing downwards and outwards, is *inserted* into the inner side of the angle of the lower jaw as far as the groove; it raises the jaw, and draws it obliquely towards the opposite side.

Q. What are the origin, insertion, and use of the *Pterygoidēus externus*?

A. It *arises* from the outer side of the pterygoid, and root of the temporal process of the sphenoid bone, and from the tuberosity of the superior maxilla, and passing almost horizontally outwards, is *inserted* into the cervix and capsular ligament of the lower jaw; it pulls the jaw towards the opposite side, and with the assistance of its fellow brings it forwards, and draws the capsule from the joint, lest it should be pinched in the motions of the jaw.

Q. What muscles appear superficially on the *fore* and *lateral* part of the NECK?

A. *Two* on each side; the platysma myoides or muscŭlus cutānĕus, and the sterno-cleido-mastoidēus.

Q. Describe the origiu, insertion, and use of the *Platysma Myoides*, or *Muscŭlus Cutāneus*?

A. It *arises* by fleshy slips from the cellular substance covering the upper parts of the pectoral and deltoid muscles, they unite into a thin muscle, which runs obliquely upwards on the side of the neck, adhering to the skin, and is *inserted* into the side of the lower jaw, and depressor anguli oris, and into the skin; it assists in depressing the lower jaw, angle of the mouth, and skin of the cheek.

Q. Describe the origin, insertion, and use of the *Sterno-cleido-mastoidēus*?

A. It *arises* by a round tendinous and a little fleshy head from the sternum, and by another broad and fleshy from the sternal portion of the clavicle, they unite into a strong muscle, which ascends obliquely outwards, being covered by the platysma myoides, and is *inserted* by a thick strong tendon into the mastoid process, and becoming thinner as far back as the lambdoidal suture.

Q. What muscles depress the INFERIOR MAXILLA, and OPEN THE MOUTH?

A. *Five* on each side; namely, the digastrĭcus, mylo-hyoidēus, genio-hyoidēus, genio-hyo-glossus, and the platisma myoides.

Q. Describe the origin, insertion, and use of the *Digastricus*?

A. It *arises* fleshy from the fossa at the root of the mastoid process, descends forwards forming a round tendon, which passes through the belly of the stylo-hyoidēus, and *is fixed* by a ligament to the *os hyoides*, from which it receives an addition of muscular and tendinous fibres, descends obliquely forwards, and becoming again fleshy, is *inserted* into a rough sinuosity on the anterior and inferior edge of the chin at the symphysis; it opens the mouth, or raises the os hyoides, as in swallowing.

Q. What are the origin, insertion, and use of the *Mylo-Hyoidēus?*

A. It *arises* broad and fleshy from the inside of the inferior maxilla, between the last dens molaris and the middle of the chin, joined there to its fellow by a tendinous line, descends behind the digastricus, and converging its fibres, is *inserted* into the lower edge of the base or body of the os hyoides; it draws the os hyoides upwards, forwards, and to a side.

Q. Describe the origin, insertion, and use of the *Genio-Hyoidēus?*

A. It *arises* tendinous from a rough protuberance on the inside of the symphysis, becoming broader as it descends, is *inserted* into the base of the os hyoides, under the former; it draws the os hyoides towards the chin; or when the os hyoides is fixed by muscles attached to the sternum, it draws down the chin, and opens the mouth.

Q. Describe the *Genio-hyo-glossus?*

A. It *arises* a little higher from the same rough protuberance on the inside of the symphysis, spreading its fibres like a fan forwards, upwards, and backwards, is *inserted* into the whole length of the tongue, and base of the os hyoides near its cornu; according to the direction of its fibres, it draws the tongue forwards, or backwards, its middle downwards, and makes its upper surface concave: or it pulls the os hyoides forwards, and thrusts the tongue out of the mouth.

OF THE OS HYOIDES.

Q. What muscles attach the OS HYOIDES to the TRUNK?

A. *Four* on each side; namely, the sterno-hyoidēus, omo-hyoidēus, sterno-thyroidēus, and thyro-hyoidēus.

Q. Describe the *Sterno-hyoidēus?*

A. It *arises* thin and fleshy from the extremity of the first rib, from the upper part of the sternum, and from the sternal extremity of the clavicle, and ascending, is

inserted into the base of the os hyoides, which it pulls downwards.

Q. Describe the origin, insertion, and use of the *Omo-hyoidēus?*

A. It *arises* thin, broad, and fleshy from the superior costa of the scapula near the semilunar notch, and running obliquely upwards and forwards, becomes tendinous under the sterno-mastoideus, and again fleshy, is *inserted* into the base of the os hyoides at the side of the former; it pulls the os hyoides obliquely downwards; and, together with its fellow, straight downwards.

Q. Describe the origin and insertion of the *Sterno-thyroidēus?*

A. It *arises* fleshy from the upper and inner part of the sternum, and end of the first rib, and is *inserted* into the rough line at the under and lateral part of the thyroid cartilage.

Q. Describe the origin, insertion, and use of the *Thyro-hyoidēus?*

A. It *arises* fleshy from the rough line of the thyroid cartilage at the insertion of the former, and is *inserted* into part of the base, and almost all the cornu of the os hyoides; which it depresses when the former keeps the thyroid cartilage fixed.

OF THE TONGUE.

Q. What muscles are attached to the TONGUE?

A. Four; part of the genio-hyo-glossus, the hyo-glossus, lingualis, and stylo-glossus.

Q. Describe the origin, insertion, and use of the *Hyo-glossus?*

A. It *arises* fleshy from the half of the os hydoides, and running upwards and outwards is *inserted* into the side of the tongue near the stylo glossus; it pulls the tongue inwards and downwards.

Q. Describe the origin, insertion, and use of the *Lingualis muscle?*

A. It *arises* from the lateral part of the root of the

tongue, and, running forwards between the hyo-glossus and genio-hyo-glossus, is *inserted* into the tip of the tongue; it contracts the substance of the tongue, and pulls it backwards.

Q. Describe the origin, insertion, and use of the *Stylo-Glossus?*

A. It *arises* tendinous and fleshy from the styloid process of the temporal bone and ligament connecting it to the angle of the jaw, and running downwards and forwards, is inserted into the root and side of the tongue near to its apex; it draws the tongue backwards to one side.

OF THE FAUCES.

Q. What muscles are situated in the FAUCES?

A. *Four* on each side; namely, the constrictor isthmi faucium, palato-pharyngēus, circumflexus vel tensor palati, levator palati; and the azygos uvŭlae in the middle.

Q. What are the origin, insertion, and use of the *Constrictor isthmi faucium?*

A. It *arises* from the side of the root of the tongue, runs in the douhling of the skin forming the anterior arch of the palate before the amygdăla, and is *inserted* into the velum palati at the root of the uvŭla, where it joins its fellow: it assists in shutting the passage into the fauces.

Q. Describe the *Palato-pharyngēus?*

A. It *arises* from the middle of the velum palati, from the insertion of the former, and the tendinous expansion of the circumflexus palati, and running within the duplicature of the posterior arch behind the amygdala, backwards to the superior and lateral part of the pharynx, is *inserted* into the edge of the upper and back part of the thyroid cartilage, and back of the pharynx; it assists in shutting the passage into the nostrils, and, in swallowing, conveys the bolus into the pharynx.

Q. Describe the origin, insertion, and use of the *Circumflexus* or *Tensor palati?*

A. It *arises* from the spinous process of the sphenoid

bone, from the osseous and cartilaginous parts of the Eustachian tube, and from the root of the internal pterygoid process, runs down along the pterygoideus internus, forms a round tendon, which passes over the hook of the internal pterygoid plate, then spreads out into a tendinous expansion, and is *inserted* into the velum pendŭlum palāti, and semilunar edge of the os palati, as far as the suture, where its fibres are joined to those of the two former muscles; it stretches and depresses the velum.

Q. Describe the origin, insertion, and use of the *Levator palati?*

A. It *arises* tendinous and fleshy from the point of the petrous portion of the temporal bone, and membranous part of the Eustachian tube, and descending, is *inserted* into the whole length of the velum palati, and uniting with its fellow at the root of the uvŭla, it pulls the velum upwards and backwards, and shuts the passage into the nose and mouth.

Q. Describe the origin, insertion, and use of the *Azygos uvŭlae?*

A. It *arises* fleshy from the posterior extremity of the longitudinal palate suture, runs down the whole length of the velum and uvula, adhering to the tendons of the circumflexi, and is *inserted* into the point of the uvula; it raises and shortens the uvula.

OF THE PHARYNX.

Q. What muscles are concerned in the movements of the PHARYNX?

A. *Four* on each side; the stylo-pharyngēus, the constrictor pharyngis inferior, medius, and superior.

Q. Describe the origin, insertion, and use of the *Stylo-pharyngēus?*

A. It *arises* fleshy from the root of the styloid process, and running downwards and forwards is *inserted* into the side of the pharynx and back part of the thyroid cartilage; it dilates and raises the pharynx, so as to receive

the bolus in swallowing, and it elevates the thyroid cartilage.

Q. Describe the *Constrictor pharyngis inferior ?*

A. It *arises* from the side of the thyroid and cricoid cartilages, and is *inserted* into its fellow behind, forming a longitudinal tendinous line ; it compresses the lower part of the pharynx, and draws it and the larynx a little upwards.

Q. What are the origin, insertion, and use of the *Constrictor pharyngis medius ?*

A. It *arises* from the appendix and cornu of the os hyoides, and from the ligament attaching the cornu to the thyroid cartilage, spreading its superior fibres obliquely upwards, and the others more transversely, it is *inserted* into the middle of the cuneiform process of the occipital bone before the foramen magnum, and into its fellow by a tendinous line ; it compresses the middle of the pharynx.

Q. What are the origin, insertion, and use of the *Constrictor pharyngis superior ?*

A. It *arises* from the cuneiform and pterygoid processes, from the upper and under maxilla near the last alveolar processes, from the back part of the buccinator, root of the tongue, and palate ; and is *inserted* into its fellow by a tendinous line on the posterior surface of the pharynx ; it compresses the upper part of the pharynx, draws it forwards and upwards.

OF THE LARYNX.

Q. What muscles are concerned in the movements of the LARYNX ?

A. *Four* on each side ; the crico-arytaenoidēus posticus, crico-arytaenoideus lateralis, thyro-arytaenoideus, and the arytaenoideus oblīquus ; and one common to both sides, the arytaenoideus transversus.

Q. Describe the origin, insertion, and use of the *Crico-arytaenoidēus postīcus ?*

A. It *arises* fleshy from the back part of the cricoid

cartilage, and is *inserted* by a narrow extremity into the posterior part of the base of the arytēnoid cartilage, which it pulls backwards, making the ligament of the glottis tense, and opening the rima glottidis.

Q. Describe the *Crico-arytaenoidēus laterālis ?*

A. It *arises* fleshy from the side of the cricoid cartilage, where it is covered by the thyroid, and is *inserted* into the side of the base of the arytēnoid cartilage ; it opens the rima glottĭdis.

Q. Describe the origin, insertion, and use of the *Thyro-arytaenoidēus ?*

A. It *arises* from the middle and under part of the back of the thyroid cartilage, and running backwards and a little upwards, is *inserted* into the fore part of the arytenoid cartilage, which it pulls forwards and outwards, and opens the glottis.

Q. Describe the origin, insertion, and use of the *Arytaenoidēus oblīquus ?*

A. It *arises* from the base of one of the arytenoid cartilages, and crossing its fellow obliquely, is *inserted* into the point of the other ; it, with its fellow, draws the two arytenoid cartilages together, and shuts the aperture of the glottis.

Q. Describe the *Arytaenoidēus transversus ?*

A. It *arises* from the whole length of the back of the one arytenoid cartilage, and running transversely, is *inserted* into the whole length of the other ; it draws the arytenoid cartilages together and closes the rima glottidis.

OF THE EPIGLOTTIS.

Q. What muscles are attached to the EPIGLOTTIS ?

A. *Two* on each side ; the thyro-epiglottideus, and arytaeno-epiglottideus.

Q. Describe the *Thyro-epiglottidēus ?*

A. It *arises* by a few scattered fibres from the thyroid cartilage, and is *inserted* into the side of the epiglottis ; it with its fellow draws down the epiglottis upon the rima glottidis, and shuts the aperture.

Q. What are the origin, insertion, and use of the *Arytaeno-epiglottidēus ?*

A. It *arises* by a few slender fibres from the lateral and upper part of the arytēnoid cartilage, and running along the outer side of the external rima, is *inserted* into the epiglottis along with the former muscle; it and its fellow pull down the epiglottis and shut the glottis.

Q. What are the *antagonists of these muscles* of the epiglottis.

A. They have no antagonist muscles; but the structure of the cartilage of the epiglottis is so formed, that it turns upwards by its *own elasticity*, and opens the glottis.

OF THE NECK.

Q. What muscles are situated near to the vertebrae on the ANTERIOR PART OF THE NECK ?

A. *Four*, the longus colli, rectus capitis anterior major, and minor, and rectus capitis lateralis.

Q. Describe the *Longus colli ?*

A. It *arises* tendinous and fleshy from the side of the bodies of the three superior dorsal vertebrae, and from the transverse processes of the four inferior cervical vertebrae, and is *inserted* by tendons covered with fibres into the anterior part of the bodies of all the cervical vertebrae; it and its fellow bend the neck forwards.

Q. Describe the *Rectus capitis anterior major* ?

A. It *arises* from the fore part of the transverse processes of the four undermost cervical vertebrae, and running up and inwards, is *inserted* into the cuneiform process of the occipital bone; it bends the head forwards.

Q. Describe the origin, insertion, and use of the *Rectus capitis anterior minor* ?

A. It *arises* from the fore part of the atlas, and running obliquely inwards on the outside of the former is *inserted* into the cuneiform process immediately before the condyles; it and its fellow assist the rectus major in nodding the head.

Q. Describe the origin, insertion, and use of the *Rectus capitis lateralis*?

A. It *arises* fleshy from the anterior part of the transverse process of the atlas, and running obliquely outwards, is *inserted* into the os occipitis behind the jugular fossa; it pulls the head to one side.

Q. What muscles are situated on the LATERAL PART OF THE NECK?

A. The three Scaleni; namely, the scalēnus antīcus, medius, and postīcus; and the levator scapulæ.

Q. Describe the origin, insertion, and use of the *Scalēnus antīcus*?

A. It *arises* tendinous and fleshy from the upper edge of the first rib near the sternum, and is *inserted* by tendons into the transverse processes of the fourth, fifth, and sixth cervical vertebrae; it pulls the neck to one side, or with the assistance of its fellow it draws the neck forwards.

Q. Describe the *Scalēnus medius*?

A. It *arises* from the upper and outer part of the first rib from its root to near its cartilage, and is *inserted* by strong tendons into the transverse processes of all the cervical vertebrae; it draws the neck to one side; or in conjunct action with its fellow it brings it forwards.

Q. Describe the origin, insertion, and use of the *Scalēnus postīcus*?

A. It *arises* from the upper edge of the second rib near the spine, and is *inserted* into the transverse processes of the fifth and sixth cervical vertebrae; it assists in drawing the neck to one side, or it and its fellow pull the neck forwards.

Q. What are the *actions of all the three scaleni* muscles?

A. They co-operate in pulling the neck to one side, or with their fellows they pull it directly forwards; or, if the neck is fixed erect by the antagonist muscles on its posterior part, they elevate the ribs, and dilate the thorax in difficult respiration.

Q. Describe the origin, insertion, and use of the *Levātor scapŭlae?*

A. It *arises* from the transverse processes of the five superior cervical vertebrae by as many distinct heads, that unite and form a flat muscle, which is *inserted* into the base at the root of the spine, and under the superior angle of the scapula; which it raises, or pulls the neck to one side; or with its fellow, pulls it backwards.

Q. Where is the course of the *subclavian artery* and *nerves?*

A. The subclavian artery, and also the cervical nerves, which form the brachial plexus, pass outwards between the scalenus anticus, and the scalenus medius, to the axilla.

Q. What muscles are attached to the POSTERIOR PART OF THE HEAD?

A. *Seven* on each side; namely, the trapezius, splenius, complexus, trachēlo-mastoideus, rectus capitis postīcus major, rectus capitis postīcus minor, and the obliquus capitis superior.

Q. Describe the origin, insertion, and use of the *Trapezius?*

A. It *arises* by a thick round tendon from the middle of the great arched ridge of the occipital bone, and by a tendinous expansion covering the splenius and complexus, from the rough arch extending towards the mastoid process; from its fellow by the intervention of the ligamentum nuchae covering the upper cervical spinous processes, from the spinous processes of the two inferior cervical, and from all those of the dorsal vertebrae, adhering all the length to its fellow, and is *inserted* fleshy into the scapular half of the clavicle, tendinous into the acromion and spine of the scapula; it moves the scapula and clavicle in various directions, and when the scapula is fixed, it and its fellow draw the head backwards.

Q. Describe the origin, insertion, and use of the *Splenius?*

A. It *arises* tendinous from the four superior spinous processes of the dorsal, tendinous and fleshy from the five inferior of the cervical vertebrae; it adheres firmly to the ligamentum nuchae; and at the third cervical vertebra, recedes from its fellow, and is *inserted* by as many tendons into the five superior transverse processes of the cervical vertebrae; and by a tendinous and fleshy portion into the posterior part of the mastoid process, and into the os occipitis near it; it and its fellow pull the head and neck backwards.

Q. What are the origin, insertion, and use of the *Complexus?*

A. It *arises* tendinous and fleshy from the transverse processes of the seven superior dorsal, and four inferior cervical vertebrae, and is *inserted* into the depression between the superior and inferior transverse ridges of the occipital bone; it draws the head backwards and to one side, and with its fellow directly backwards.

Q. Describe the origin, insertion, and use of the *Trachēlo-mastoidēus?*

A. It *arises* from the transverse processes of the three upper dorsal, and five lower cervical vertebrae, where it is connected to the transversalis cervīcis by as many thin tendons, and ascending under the splenius, is *inserted* by a thin tendon into the posterior part of the mastoid process; it pulls the head backwards.

Q. Describe the *Rectus capitis postīcus major?*

A. It *arises* fleshy from the external part of the spinous process of the second cervical vertebra; becoming broader, it ascends obliquely outwards, and is *inserted* tendinous and fleshy into the inferior transverse ridge of the occipital bone; it draws the head backwards, and assists in its rotation.

Q. Describe the Rectus capitis posticus minor?

A. It *arises* tendinous from the protuberance in the place of a spinous process of the atlas, becoming broader and fleshy, is *inserted* into a depression between the smaller arch and foramen magnum of the os occipitis; it assists in pulling the head backwards.

Q. Describe the origin, insertion, and use of the *Obliquus capitis superior ?*

A. It *arises* from the transverse process of the atlas, and ascending a little inwards, is *inserted* at the outer part of the insertion of the rectus major into the inferior transverse ridge of the occipital bone, behind the mastoid process ; it assists in pulling the head backwards.

Remarks.

Q. What muscles particularly strengthen and secure the *articulation* of the head with the atlas ?

A. The *two recti capitis interni* vel *anteriores*, the *two recti capitis laterales* on the sternal aspect ; and the two recti capitis postĭci minores, and the two obliqui capitis superiores on the dorsal aspect.

Q. What muscles *bend the head forwards, or sternad ?*

A. The two recti capitis anteriores minores, two recti capitis anteriores majores ; two recti capitis laterales, and the two sterno-mastoidēi ; and also, when the inferior maxilla and os hyoides are fixed, the two platysma myoides, or latissĭmi colli, two digastrĭci, two mylo-hyoidēi, two genio-hyoidēi, and the two genio-hyo-glossi.

Q. What muscles *fix the inferior maxilla* close to the superior ?

A. The two temporal, two massēters, and the four pterygoid muscles.

Q. What muscles *fix the os hyoides*, and prevent it from rising upwards, or corōnad ?

A. The two omo-hyoidēi, two sterno-hyoidēi, and two thyro-hyoidēi.

Q. What muscles *extend the head backwards, or dorsad ?*

A. Part of the two trapezii, the two splenii, two complexi, two recti capitis postĭci majōres, and the two trachēlo-mastoidēi.

Q. Why has the head five pairs of such strong muscles to extend it backwards, seeing their antagonists are so weak in proportion to them ?

A. The condyles of the os occipĭtis are placed much

farther back than the line of equipoise between the anterior and posterior parts of the head; hence the head by its own gravity naturally falls forwards; strong muscles therefore are necessary to keep it perpendicularly erect; particularly in carrying burdens on the head.

Q. What is the use of the *ligamentum nuchae*?

A. It assists these strong muscles in their continued action of keeping the head erect.

Q. What muscles perform the *rotatory motions of the head*?

A. The two obliqui capitis inferiores, which *arise* from the spinous process of the second cervical vertebra, and running upwards and outwards, are *inserted* into the transverse processes of the atlas, are wholly rotators of the head; many others assist them, namely, the recti postici majores, trachelo-mastoidei, complexi, splenii, trapezii, sterno-mastoidei, and latissimi colli.

Q. How far can they turn the head round from the front, or sternal aspect?

A. The symphysis menti can be turned, generally speaking, to the right, or left, from the sternal aspect, about twenty-six degrees, or the seventh part of a circle.

Q. Do the cervical vertebrae assist in the rotatory motions of the head?

A. Motions of the head *dextrad* and *sinistrad*, are performed by the rolling of the atlas on the horizontal plane of the second vertebra, from which the processus dentatus is raised perpendicularly to regulate and steady its motions. The other cervical vertebrae are so bound together by ligaments and muscles, by the form of their articulations, of their spinous processes, and inter-vertebral cartilages, that they have no sensible motion on their individual axis; but when taken together, they are susceptible of a considerable contortion along with the head.

Q. What muscles prevent the *cervical vertebrae from rotating*?

A. The inter-spinales colli occupy the spaces between the bifurcated extremities of the spinous processes, *arising* from each inferior, and *inserted* into the superior,

and the inter-transversales colli, occupying the spaces between the bifurcated extremities of the transverse processes, fix them together, and tend to draw the neck to one side.

OF THE SCAPULA.

Q. What muscles arise from the SCAPULA?

A. *Seven*, the greater part of the deltoid, supra-spinātus, infra-spinātus, teres minor, teres major, corăco-brachiālis, and suh-scapulāris.

Q. Describe the origin, insertion, and use of the *Deltoides?*

A. It *arises* fleshy from the scapular portion of the clavicle unoccupied hy the pectorālis major, from the acromion, and lower margin of the spine of the scapula; and is *inserted* hy a short strong tendon into a rough surface on the middle of the outside of the humerus between the hiceps, and short head of the triceps extensor, and just above the origin of the hrachialis internus; it raises the arm upwards to a plane with the shoulder, turns it a little backwards or forwards.

Q. What are the origin, insertion, and use of the *Supraspinātus?*

A. It *arises* fleshy from the scapula above the spine, passes under the acromion, adheres to the capsular ligament, and is *inserted* tendinous into the large tubercle on the head of the os humeri at the outside of the hicipital groove; when the scapula is fixed it raises the arm, and prevents the capsular ligament from heing pinched. It is covered by a strong aponeurōsis.

Q. Describe the origin, insertion, and use of the *Infraspinātus?*

A. It arises fleshy from the scapula below the spine, and adhering to the capsular ligament, is *inserted* hy a flat thick tendon into the upper and outer part of the large tubercle on the head of the os humeri; it turns the humerus outwards, and raises the arm.

Q. What are the origin, insertion, and use of the *Teres minor?*

A. It *arises* fleshy from the inferior costa of the scapula, runs along the inferior edge of the infraspinatus, adheres to the capsular ligament, and is *inserted* tendinous into the back part of the large tubercle below the infraspinatus; it rolls the humerus outwards, draws it back, and prevents the capsular ligament from being pinched in the motions of the joint.

Q. Describe the *Teres major?*

A. It *arises* fleshy from the outside of the inferior angle, and thick rough part of the inferior costa of the scapula, and running forwards and upwards along the under edge of the teres minor, passes the infraspinatus, to which some fibres adhere, forms a broad flat tendon, which, accompanied by the tendon of the latissimus dorsi passing under the humerus, is *inserted* into the ridge at the inner side of the bicipital groove; it rolls the humerus inwards, and pulls it backwards.

Q. Describe the origin, insertion, and use of the *Corăco-brachialis?*

A. It *arises* tendinous and fleshy from the point of the corăcoid process of the scapula, together with the short head of the biceps, to which it adheres, and is *inserted* into the internal part of the middle of the humerus, whence it sends down an aponeurosis to the internal condyle: it assists in raising the arm obliquely forwards.

Q. Describe the origin, insertion, and use of the *Subscapulāris?*

A. It *arises* fleshy from the three costae, and whole internal surface of the scapula, is composed of tendinous and fleshy portions, which converge, and form a tendon, which passes under the coraco-brachialis and short head of the biceps; it adheres to the capsular ligament, and is *inserted* into the upper part of the small tubercle at the head of the humerus; it rolls the humerus inwards, and draws it to the side of the trunk.

OF THE SHOULDER.

Q. What other muscles are concerned in the *motions of the* SHOULDER-JOINT?

A. The pectoralis major, and minor, biceps, and the latissimus dorsi.

Q. Describe the origin, insertion, and use of the *Pectoralis major*?

A. It *arises* from the anterior half of the clavicle, from nearly the whole length of the sternum, and from the cartilages of the fifth and sixth ribs, its fibres converge towards the axilla; those of the superior portion run on the anterior part, the fibres of the inferior ascend between them and the ribs; they form a broad twisted tendon, which is *inserted* into the ridge at the outer side of the bicipital groove, about a fourth part of the length of the humerus from its head, just above the insertion of the deltoid, and below that of the latissimus dorsi on the opposite side of the groove; it brings the arm forwards to the sternum.

Q. What are the origin, insertion, and use of the *Pectoralis minor*?

A. It *arises* serrated, tendinous and fleshy, from the third, fourth, and fifth ribs, near their cartilages, becomes round, thick and narrower, as it ascends obliquely, and is *inserted* by a short flat tendon into the point of the coracoid process of the scapula; its action is to bring the scapula forwards and downwards; or, when the scapula is fixed by other muscles, to raise the ribs, and assist difficult respiration.

Q. Describe the origin, and insertion of the *Biceps flexor cubiti*?

A. It *arises* by two heads; the long one from the upper margin of the glenoid cavity by a strong tendon, which passes over the round head of the humerus within the capsular ligament of the joint; descends in the groove of the os humeri, inclosed by a membranous sheath formed by the tendons of adjacent muscles: the short head *arises* from the coracoid process of the scapula, along with the coraco-brachialis, joins the former head a little below the middle of the humerus, forming a fleshy belly, which sends off a strong tendon down the

fore part of the elbow-joint, and is *inserted* into the tubercle of the radius.

Q. Describe the origin and insertion of the *Latissimus dorsi?*

A. It *arises* tendinous from the spinous processes of the os sacrum, the lumbar, and seven dorsal vertebrae, from the posterior part of the spine of the ilium, and from the extremities of the four inferior false ribs; it forms a broad thin muscle, the inferior fibres of which run upwards and outwards, and the superior ones transversely over the inferior angle of the scapula, and near the axilla, converge, and form a flat tendon, twisted similar to the pectoralis major; and is *inserted* into the inner edge of the bicipital groove.

Remarks.

Q. Since the SHOULDER-JOINT is so well secured by ligaments and muscles, as we have just seen, *is it often dislocated?*

A. Its motions are very free and extensive; and as the arm is always used as a defence, or safety, in cases of danger and accidents, the shoulder joint is much exposed, and frequently dislocated.

Q. *In what positions* can the head of the humerus be forced out of the glenoid cavity of the scapula?

A. It can scarcely be forced upwards; it may be lodged in the axilla downwards, under the pectoral muscle forwards, or under the spine of the scapula backwards.

Q. What prevents the head of the humerus from being *dislocated upwards?*

A. The corocoid, and acromion processes; the conoid and trapezoid ligaments extending from the coracoid process to the end of the clavicle; the anterior triangular ligament of the scapula, extending from the external surface of the coracoid to that of the acromion process, confines the tendon of the supraspinatus down in situ; the long head of the biceps flexor cubiti; the capsular ligament; the deltoid; the coraco-brachialis; the supra-

spinatus particularly, and the infraspinatus, and subscapularis in a considerable degree, counteract any force thrusting the head of the humerus upwards.

Q. What prevents the head of the humerus from being *luxated downwards*, in the axilla?

A. The capsular ligament; the teudon of the long head of the hiceps; the supraspinatus, in a particular manner, and the upper part of the pectoralis major; the teres minor, the teres major, the latissimus dorsi, and the long head of the triceps extensor cubiti, also contribute in preventing luxation downwards.

Q. What muscles prevent the head of the humerus from *passing forward* on the application of a force producing luxation under the pectoral muscle?

A. The capsular ligament; the tendon of the hiceps; the subscapularis; the supra and infra-spinati; the teres minor and major, and the pectoralis minor.

Q. What opposes the head of the humerus in being forced *backwards in luxation?*

A. The capsular ligament; the tendon of the biceps; the pectoralis major; and the supraspinatus; the tendons too of the infraspinatus, and teres minor, lying close upon the capsular ligament, may have some effect in preventing the head of the humerus from passing under them.

Q. When the *head of the humerus is forced forwards* under the pectoral muscles in luxation, *what muscles are most upon the stretch?*

A. The supra and infra spinatus, the teres minor, and the subscapularis; the tendon of the hiceps; the latissimus dorsi also, and teres major, to a certain degree, keep the arm down and backwards, with the elbow outwards, and the fore-arm bent by the tendon of the hiceps being pulled upwards.

Q. Does any *rupture* of parts happen in such a dislocation?

A. The capsular ligament must be ruptured, and perhaps also the sheath of the tendon of the biceps: the tendons of the muscles of the scapula have been supposed

to be ruptured also in luxation of the head of the humerus forwards; but this seems improbable, from the situation of the parts; the supra and infra-spinatus are very much overstretched, but the position of the scapula, and that of the humerus render it very probable, that the head of the humerus is generally dislocated forwards under the pectoral muscle without any rupture of their tendons having taken place; a rupture of them indeed is possible, and may happen in some cases.

Q. When the head of the humerus is lodged under the pectoral muscles, what are the *means* necessary *to reduce it?*

A. The patient being laid on his opposite side, the fore-arm should be kept bent to relax the biceps; and a towel should be applied round the humerus under the insertion of the pectoralis, near the axilla, and given to an assistant. Being now ready, the surgeon should raise the humerus gradually upwards, till it be nearly in a line with the superior costa of the scapula, to relax the supra and infra-spinatus; and in proportion as he raises it, he should pull gently, keeping the fore-arm in the same position, in order to disentangle the head of the humerus, and to bring it within the capsular ligament. Having attained this, he should next order his assistant to pull the humerus outwards from the side of the trunk, by means of the towel under the axilla, while the surgeon, keeping his pull, should use the fore-arm as a lever to rotate the humerus outwards, in order to favour the relaxation and action of the supra and infra-spinatus, and teres minor, to draw it towards its socket. When these muscles are first relaxed as much as possible, and the head of the humerus brought into a favourable situation, the assistant must keep a steady pull, and the surgeon should bring down the humerus to the patient's side, rotating it inwards; during which the muscles generally bring the head of the humerus into the glenoid cavity of the scapula.

Q. When the *head of the humerus is dislocated back-*

wards under the spine of the scapula, what muscles are kept too much stretched?

A. The pectoralis major is very much stretched; the supraspinatus, subscapularis, teres major, and latissimus dorsi, are considerably overstretched.

Q. What means are necessary *to reduce such a luxation?*

A. The patient is to be laid on his opposite side, and a towel put round the humerus and given to an assistant, as in luxation forwards, the surgeon is to keep the fore-arm in the same degree of flexion, and the humerus in the same position of rotation, while he pulls gently downwards by a hold above the condyles, and, at the same time, orders his assistant to pull gradually increasing the force outwards from the trunk. Having thus brought the head of the humerus from under the spine of the scapula, and within the capsular ligament, he is now to raise the arm gradually, rotating the fore-arm forwards and rather outwards, the assistant all the while keeping a firm and steady pull; he is next to order his assistant to keep a strong steady pull, while he himself brings down the humerus to the patient's side, with the fore-arm bent obliquely forwards on the abdomen: during which, the different muscles being brought into action will draw the head of the humerus into the glenoid cavity.

OF THE HUMERUS.

Q. What muscles are situated ON THE HUMERUS?

A. Two before, the Biceps flexor cubiti, and the Brachialis internus; and two behind, the Triceps extensor cubiti, and the Anconēus.

Q. Are the muscles of the arm covered by an *Aponeurosis*?

A. The greater part of the superior extremity is covered by a tendinous membrane, or aponeurosis, which arises from the bones and muscles of the shoulder; it incloses the flexors and extensors of the fore-arm, and

adheres to the ridges and condyles of the humerus; at the bend of the elhow it receives additions from the tendons of the biceps and triceps. It binds the muscles in their relative situations.

Q. Recapitulate the origin, insertion, and use of the *Biceps?*

A. It arises by two heads, the long one *arises* tendinous from the upper margin of the glenoid cavity, and the short head *arises* from the coracoid process of the scapula; they unite and form a thick fleshy helly a little below the margin of the humerus, and it sends off a strong tendon, which is *inserted* into the tuhercle of the radius; it is an extensor, and ahductor of the humerus, a flexor of the elhow-joint, and a supinator of the hand.

Q. Describe the origin, insertion, and use of the *Brachiālis internus?*

A. It *arises* fleshy from each side of the insertion of the deltoid, covering all, and adhering to most of the fore part of the humerus; it runs over the elhow-joint, adhering to the capsular ligament, and is *inserted* hy a strong short tendon into the coronoid process of the ulna; it hends the elbow-joint, and prevents the capsular ligament from heing pinched.

Q. Describe the origins, insertion, and use of the *Triceps extensor cubĭti?*

A. The *long head arises* hroad and tendinous from the inferior costa of the scapula near its cervix; the *short head arises* from the hack part of the humerus a little below the large tuhercle; the *third head*, called Brachialis externus, *arises* from the back part of the humerus near the insertion of the teres major; these heads unite ahout the middle of the hone and cover the whole of its posterior part, adhering to it in its course; the muscle forms a strong thick tendon, which is *inserted* into the *Olecranon* and partly into the condyles, adhering to the capsular ligament; it extends the fore-arm.

Q. Describe the origin, insertion, and use of the *Anconēus?*

A. It *arises* tendinous from the posterior part of the

external condyle of the humerus, becomes triangular and fleshy, receives an accession of fibres from the triceps, and is *inserted* into the ridge on the posterior and outer part of the ulna, a little below the olecranon; it assists the triceps in extending the fore-arm.

OF THE FORE-ARM.

Q. How are the MUSCLES OF THE FORE-ARM classed?

A. They may be divided into four classes, namely, flexors, extensors, supinators, and pronators.

Q. What muscles are *Flexors?*

A. *Three* for the carpus, viz. the palmaris longus, flexor carpi radialis, and flexor carpi ulnaris; *two* long flexors, and the lumbricāles for the fingers; namely, the flexor digitorum sublimis vel perforatus, flexor profundus vel perfŏrans.

Q. What muscles are *Extensors?*

A. *Three* for the hand, namely, the extensor carpi radialis longior, and brevior, and the extensor carpi ulnaris; and *one* for the fingers, viz. the extensor digitorum communis.

Q. What muscles are *Supinators* of the hand?

A. *Four;* the biceps flexor cubiti, the supinator radii longus, and brevis, and the extensor secundi internodii pollicis.

Q. What muscles are *Pronators* of the hand?

A. *Two* chiefly; the pronator radii teres, and pronator radii quadratus; and these three also assist the former, viz. the palmaris longus, flexor carpi radialis, and flexor digitorum sublimis.

Q. What *muscles arise* from the *Internal* or *Ulnar Condyle* of the humerus?

A. *Six;* the palmaris longus, flexor carpi radialis, flexor carpi ulnaris, flexor digitorum sublimis vel perforatus, pronator radii teres, and the flexor longus pollicis manus.

Q. What *muscles arise* from the *External* or *Radial Condyle* of the os humeri?

A. *Six;* the extensor carpi radialis longior; extensor carpi radialis brevior; extensor carpi ulnaris; extensor digitorum communis; supinator radii longus; and supinator radii brevis.

Q. What muscles *arise from the Body of the Radius?*

A. *Two,* from its body; part of the flexor longus pollicis manus, and part of the extensor ossis metacarpi pollicis.

Q. What muscles arise *from the Body of the Ulna?*

A. *Six;* the flexor digitorum profundus vel perforans; pronator radii quadratus; part of the extensor ossis metacarpi pollicis; extensor primi internodii pollicis; extensor secundi internodii; and the indicator.

Q. Are the muscles of the fore-arm covered by a *Fascia?*

A. Yes; on removing the integuments, we see a strong fascia continued from the intermuscular ligaments, which pass downwards to the condyles of the os humeri; it receives additions from the tendons of the triceps and biceps, forms a strong covering to the muscles, gives off partitions among them, and is spent upon the hand.

Q. Describe the origin, insertion, and use of the *Palmaris longus?*

A. It *arises* by a muscular mass in common with other muscles from the internal condyle of the humerus, becomes fleshy, sends off a long slender tendon, which is *inserted* into the ligamentum carpi annulare anterius, and aponeurosis palmaris; it bends the wrist, and brings the hand to pronation, and stretches the palmar aponeurosis.

Q. What are the origin, insertion, and use of the *Flexor carpi radialis?*

A. It *arises* from the inner condyle and upper part of the ulna, forms a long tendon, which passing in a groove or fossa of the os trapezium, is *inserted* into the thenal and upper part of the metacarpal bone of the forefinger; it bends the wrist, and assists in pronation of the hand.

Q. What are the origin, insertion, and use of the *Flexor carpi ulnaris ?*

A. It *arises* from the inner condyle and side of the olecranon, runs down the internal side of the ulna, from which it receives part of its origin, sends down a strong tendon, which is *inserted* into the os pisiforme; it bends the wrist.

Q. Describe the origin, insertion, and use of the *Flexor digitorum sublimis vel perforatus ?*

A. It *arises* from the inner condyle of the humerus, and root of the coronoid process of the ulna, and fore part of the radius; becoming fleshy, it sends off four tendons before it passes under the ligamentum carpi annulare, which at the extremity of the first phalanx of the fingers are split to form a passage for the tendons of the perforans, and are *inserted* into the anterior and upper part of the second phalanx; it bends the second, and then the first phalanges of the fingers.

Q. What are the origin, insertion, and use of the *Pronator radii teres ?*

A. It *arises* from the inner condyle, and coronoid process, runs obliquely across the upper part of the flexors of the wrist, and is *inserted* into the middle of the radius on its posterior part; it rolls the radius inwards, and brings the hand to pronation.

Q. Describe the origin, insertion, and use of the *Flexor longus pollicis manus ?*

A. It *arises* from the fore part of the radius below its tubercle, from the interosseous ligament, and inner condyle, and sends off a tendon, which passes under the annular ligament, and is *inserted* into the extreme phalanx of the thumb; it bends the most distant joint of the thumb.

Q. Let us now turn our attention to the muscles which arise from the *Radial* or *External Condyle* of the humerus; and, in the first place, describe the *Extensor carpi radialis longior ?*

A. It *arises* from the lower part of the external ridge

of the humerus and upper part of its condyle, forms a thick short belly, which passes over the side of the joint, and about the middle of the radius forms a tendon, which runs through a groove in the back part of the distant extremity of the radius, and is *inserted* into the upper and posterior part of the metacarpal bone of the fore finger; it extends the wrist, and assists in bending the elbow-joint.

Q. Describe the *Extensor carpi radialis brevior?*

A. It *arises* tendinous from the under and back part of the external condyle, in a mass with the extensor longior, and from the external lateral ligament, forms a thick belly, which sends down a tendon, that accompanies the former in its course through the groove, and under the annular ligament, and is *inserted* into the upper and back part of the metacarpal bone of the middle finger; it extends the wrist, and draws the hand *radiad*, or towards the thumb.

Q. Describe the origin, insertion, and use of the *Extensor carpi ulnaris?*

A. It *arises* tendinous from the upper part of the external condyle, and fleshy from the posterior part of the ulna, where it passes over it, sends down a strong tendon, which passes through a groove in the back and lower end of the ulna, and is *inserted* into the posterior and upper part of the metacarpal bone of the little finger; it extends the wrist, and draws the hand *ulnad*, or towards the little finger.

Q. Describe the origin, insertion, and use of the *Extensor digitorum communis?*

A. It *arises* from the external condyle, passes down the back part of the arm, adheres to the ulna where it passes over it, and terminates in four flat tendons, which pass under the annular ligament in a depression on the back, and under part of the end of the radius, and are *inserted* into the posterior part of all the bones of the fingers by a tendinous expansion; it extends all the joints of the fingers.

Q. Describe the origin, course, insertion, and use of the *Supinator radii longus?*

A. It *arises* from the ridge, nearly as high as the middle of the humerus, leading to the external condyle, forms a thick fleshy belly where it passes over the side of the elbow-joint, becomes tapering, and sends off a round tendon, which running along the outer edge of the radius, is *inserted* into the outer side of the carpal end of the radius; it rolls the radius outwards, and performs supination of the hand; it is also a flexor of the elbow-joint.

Q. Describe the *Supinator radii brevis?*

A. It *arises* from the external condyle, from the ridge below the coronoid process of the ulna, and from the interosseous ligament, passes over the external and upper part of the radius, and is *inserted* into the upper and outer edge of its tubercle, and into the ridge descending obliquely from it; it rolls the radius outwards, and brings the hand into the supine position.

Q. What are the origin, insertion, and use of the two muscles, the *Flexor longus pollicis manus*, and the *Extensor ossis metacarpi pollicis*, which partly arise from the *body* of the radius?

A. The former we have described; the latter *arises* from the posterior part of the middle of the radius, ulna, and the interosseous ligament, runs down obliquely over the radius, and sends off one or two tendons, which pass through an annular sheath in a groove at the outer side of the extremity of the radius, and are *inserted* into the os trapezium, and upper and back part of the metacarpal bone of the thumb; it extends the metacarpal bone outwards from the fingers, and assists in bending the wrist radiad.

OF THE ULNA.

Q. Describe the muscles which arise from the ANTERIOR, OR THENAL, ASPECT OF THE ULNA; and, first,

the origin, insertion, and use of the *Flexor digitorum profundus* vel *perfŏrans ?*

A. It *arises* from the external and upper part of the ulna, from its anterior part, and the interosseous ligament, forms a thick mass, which sends off four tendons, that pass together under the annular ligament of the wrist, separate, then go through the slits in the tendons of the flexor sublimis, and are *inserted* into the anterior and upper part of the third phalanx of the fingers; it bends the last joint of the fingers.

Q. Describe the origin, insertion, and use of the *Pronator radii quadratus ?*

A. It *arises* hroad, tendinous, and fleshy, from the inner edge and under end of the ulna, ahout two inches in length, runs transversely, adhering to the interosseous ligament, and is *inserted* into the lower and anterior part of the radius opposite to its origin; it turns the radius inwards, and hrings the hand into pronation.

Q. Describe the muscles also, which arise from the BACK, OR ANCONAL ASPECT, OF THE ULNA, heginning with the *Extensor primi*, and *secundi internodii pollicis ?*

A. These muscles *arise* from the hack part of the ulna, the *primus* helow its middle, and the *secundus* ahove it; and from the interosseous ligament, each sends down a tendon, which passes through a groove at the inner and back part of the radius; the tendon of the *primus* is *inserted* into the posterior part of the first hone of the thumb; that of the *secundus* into the posterior part of the last bone; they extend the respective hones of the thumb.

Q. As we have described the *Extensor ossis metacarpi pollicis*, which partly arises from the anconal aspect of the ulna; describe, lastly, the *Indicator ?*

A. It *arises* from the hack and middle part of the ulna, and interosseous ligament, sends down a tendon, which passes through the annular ligament of the wrist, together with the extensor digitorum communis, and is *inserted* into the posterior part of the fore-finger.

Remarks.

Q. What muscles are *extensors of the elbow joint?*

A. *Two;* the Triceps extensor cubiti, and the Anconēus.

Q. What muscles are *flexors of the elbow-joint?*

A. *Eight;* the biceps flexor cubiti, brachialis internus, palmaris longus, flexor carpi radialis, flexor carpi ulnaris, supinator radii longus, pronator radii teres, and the flexor digitorum sublimis.

Q. Do the flexors of this joint appear more powerful than the extensors?

A. The same general law of the system holds in this elbow-joint as well as in others; the extensors, though few, are strong, and act with a long and powerful lever; the flexors are numerous, and co-operate in the performance of their action; some act with the longest lever, or the greatest power, at the commencement of the flexion; others have their lever or power of action, increased, as the flexion is continued: the power of the extensors too at the commencement of flexion is inconsiderable; but it increases as the flexion becomes greater, in consequence of their lever becoming longer by the olecranon projecting farther from the centre of motion.

Q. In how many different ways can the ELBOW-JOINT BE DISLOCATED?

A. It may happen in *three ways;* the olecranon may be fractured, and the humerus displaced forwards, which is rather uncommon; or the ulna and radius may be forced backwards, when the extensors and also the flexors pull the ulna upwards, and place the coronoid process in the cavity, which the olecranon naturally occupies in extension of the fore-arm: or the radius may be displaced from the humerus, and the ulna forced out of the trochlea upon the outer articular surface, which the radius naturally occupies.

Q. What *symptoms* denote the fracture of the olecranon, and the ends of the ulna and radius *dislocated forwards?*

A. The elbow is lost, the back part is concave, and the fore-arm is bent backwards contrary to the natural flexion; while the olecranon is sometimes separated, pulled up, and forms a bump on the humerus behind the condyles.

Q. What *symptoms* denote a *luxation* of the ulna *backwards*, when the coronoid process slips into the olecranon-cavity of the humerus?

A. The fore-arm is much shorter; is kept a little bent; cannot be moved without exciting great pain; the olecranon projects considerably, and is much farther up the humerus than natural.

Q. Is the *coronoid* process not *fractured* in such a luxation?

A. Sometimes it is; but a luxation of this kind can happen without a fracture of bones.

Q. What are the *symptoms* of a *luxation laterally*, when the ulna occupies the place of the radius?

A. The distance between the internal condyle of the humerus and the olecranon is much greater than natural; the head of the radius may often be felt projecting; the motions of flexion and extension are imperfect and painful; and rotation is very imperfect and difficult.

Q. How is the first *dislocation*, viz. of the ends of the bones forwards, and the fractured olecranon, to be *reduced?*

A. The fore-arm should be gently pulled, and, in the mean time, the articular surface of the humerus should be replaced in the sigmoid cavity of the ulna; and the fore-arm should then be fully extended, and a bandage applied round the under part of the humerus to keep down the fractured olecranon in contact with the end of the ulna, whence it had been torn.

Q. When the *luxation* is *backwards*, and the coronoid

process is in the posterior cavity of the humerus, how is the *reduction best accomplished?*

A. The humerus is to be kept down near to the patient's side, that the triceps extensor may be more relaxed; the fore-arm is to be kept nearly in the same state of slight flexion; and the upper end of the ulna is to be pulled gently anconad, while a gentle distending force is applied to the fore-arm to pull down the ulna; when the ulna is thus disengaged, and brought down, the fore-arm should be suddenly bent, and the flexors will bring in the joint; care being taken at this time to keep the ulna well towards the internal condyle of the humerus, lest it should be placed on the outer surface naturally occupied by the concave apex of the head of the radius.

Q. How is the *lateral luxation to be reduced*, when the sigmoid cavity of the ulna occupies the outer surface, on which the radius naturally plays?

A. By keeping the fore-arm slightly bent, that both the extensors and flexors may be as much relaxed as possible; by using a slight distending force in that position to disengage the surfaces of the articulating bones; and, at the same time, to pull the ulna towards the internal condyle, or ulnad; and when opposite to its proper situation, to bend the fore-arm, immediately stopping the distension, that the joint may be replaced: if flexion and extension can be performed, the joint is properly reduced; the head of the radius should also be put into its proper semilunar cavity; and if rotation can be easily performed, it is rightly placed.

Q. What *muscles extend the wrist* anconad?

A. *Five;* the extensor carpi radialis longior, and brevior, extensor secundi internodii pollicis, indicator, and extensor digitorum communis.

Q. What muscles *bend the wrist thenad?*

A. *Six;* the flexor carpi radialis, flexor carpi ulnaris, palmaris longus, flexor digitorum sublimis, flexor digitorum profundus, and flexor longus pollicis.

Q. What muscles *draw the hand radiad*, or towards the thumb?

A. *Five;* the flexor longus pollicis; extensor primi internodii; extensor carpi radialis longior, and brevior; and the flexor carpi radialis.

Q. What muscles *draw the hand ulnad*, or towards the little finger?

A. *Six;* the extensor carpi ulnaris, abductor minimi digiti, extensor digitorum communis, flexor carpi ulnaris, flexor digitorum sublimis, et profundus.

Q. In what aspects can the bones of the carpal-joint be *dislocated?*

A. The wrist may be luxated either backwards, anconad; or forwards, thenad; but scarcely ever laterad.

Q. In what manner is *luxation* either forwards or backwards to be *reduced?*

A. Extension of the joint with a gradually increased pulling force will disengage the ends of the bones, and when in a proper position, the muscles will replace the carpal bones in the articular cavity of the radius.

Q. Why is the carpal joint seldom, if ever dislocated to one side?

A. The styloid process of the radius projecting on the one side, and the strong lateral ligament attaching it to the os scaphoides; the styloid process of the ulna projecting on the other side of the articulation, and the strong lateral ligament also attaching it firmly to the cuneiform and pisiform bones, prevent the oval articular surface of the carpal bones, viz. the os scaphoides and lunare, from being forced either to the one side, or to the other.

Q. May not one of the styloid processes be fractured, the lateral ligament ruptured, and the carpal-joint be dislocated to one side?

A. Yes; but the position of the hand to one side will point out the nature of the injury.

Q. Is a lateral luxation of that kind to be reduced as the other forwards, or backwards?

A. A gradually increased distending force is first to be employed, and in the mean time, when the bones are disengaged, their articular surfaces are to be brought together, by bringing the hand straight into its natural position, and replacing the fractured process.

OF THE THUMB.

Q. How many muscles bas tbe THUMB?

A. *Eight;* namely, three flexors, three extensors, an abductor, and an adductor.

Q. Having described the *flexor longus pollicis* formerly; mention now tbe origin and insertion of the *Flexor brevis pollicis manus?*

A. It *arises* from the ossa, trapezoides, magnum, and unciforme; is divided into two portions by the tendon of tbe flexor longus pollicis, and is *inserted* into the first bone of tbe thumb, and ossa sesamoidea.

Q. Describe the origin and insertion of the *Flexor ossis metacarpi pollicis* vel *opponens pollicis?*

A. It *arises* from the os trapezium and ligamentum carpi annulare anterius, and is *inserted* into the under and anterior part of the metacarpal bone.

Q. Having already described the extensors of the thumb; mention now the origin, insertion, and use of the Abductor.

A. The *Abductor pollicis manus arises* from the ligamentum carpi annulare, and os trapezium, and is *inserted* into the outer side of the root of the first bone of the thumb, which it draws from the fingers.

Q. Describe the origin, insertion, and use of the *Adductor pollicis?*

A. It *arises* from nearly the whole length of the metacarpal bone of the middle finger, crossing that of the fore-finger, it converges into a short tendon, which is *inserted* into the inner part of the root of the first bone of the thumb, which it draws towards the fingers.

Q. Having previously considered the Indicator, describe now the *Abductor indicis?*

A. It *arises* from the os trapezium, and upper and inner part of the metacarpal bone of the thumb, and is *inserted* by a short tendon into the back and outer part of the first bone of the fore-finger, which it draws towards the thumb.

OF THE FINGERS.

Q. How many muscles are peculiar to the LITTLE FINGER?

A. *Three;* an abductor, adductor, and a flexor.

Q. Describe the origin, insertion, and use of the *Abductor minimi digiti?*

A. It *arises* from the os pisiforme and ligamentum carpi annulare near it, and is *inserted* into the inner or ulnar side of the upper end of the first bone of the little finger; which it draws from the rest.

Q. Describe the *Adductor metacarpi minimi digiti manus?*

A. It *arises* from the os unciforme and ligamentum carpi annulare next it, and is *inserted* into the fore and inner part of the metacarpal bone of the little finger.

Q. Describe the origin, insertion, and use of the *Flexor parvus minimi digiti?*

A. It *arises* from the outer side of the os unciforme, and annular ligament near it, and is *inserted* by a round tendon into the inner and anterior part of the base of the first phalanx of the little finger.

Q. What muscles are comprehended by the *Interossei interni?*

A. *Four;* the prior indicis, posterior indicis, prior annularis, and interosseus auricularis.

Q. Describe the Prior and Posterior Indicis?

A. The *Prior indicis arises* from the upper and outer; the *Posterior indicis* from the upper and inner part of the metacarpal bone of the fore-finger; and they are *inserted* into the tendinous expansion of the extensor digitorum.

Q. What are the origin, and insertion of the *Prior annularis?*

A. It *arises* from the outside of the metacarpal bone of the ring-finger, aud is *inserted* into the outer side of the tendinous expansion of the same finger.

Q. Describe the *Interosseus auricularis?*

A. It *arises* from the outside of the metacarpal bone, and is *inserted* into the outside of the tendinous expansion on the back part of the little finger.

Q. How many *Interossei externi* are there?

A. Three; the *prior medii digiti* which *arises* from the contiguous sides of the metacarpal bones of the fore and middle fingers; the *posterior medii digiti*, from the corresponding metacarpal bones of the middle and ring fingers; and the *posterior annularis* from those of the ring and little fingers, and are *inserted* into the tendinous expansion of the extensor digitorum communis.

Q. When the joints of the fingers, or thumb are *dislocated*, how are they to be *reduced?*

A. The finger, or thumb, which is luxated, should be gently pulled, and placed in its natural position, and if properly reduced, the joint will move easily in flexion aud extension.

MUSCLES OF THE TRUNK.

Q. What muscles are situated on the POSTERIOR PART *of the trunk*, besides those already mentioned as attached to the cervical vertebrae, or arising from the scapulae?

A. The rhomboidēus, longissimus dorsi, spinalis dorsi, semispinalis dorsi, and multifidus spinae.

Q. Describe the origin, insertion, and use of the *Rhomboidēus?*

A. It *arises* from the spinous processes of the four or five superior dorsal, and the three inferior cervical vertebrae, and from the ligamentum nuchae; and descending obliquely, it is *inserted* into the whole length of the base of the scapula; which it draws upwards and backwards.

Q. What are the origin, insertion, and use of the *Longissimus dorsi?*

A. It *arises* in common, with the sacro-lumbalis from the side of the os sacrum, and all its spinous processes, from the posterior part of tbe spine of tbe ilium, and from all the spinous and transverse processes of tbe lumbar vertebrae; their common bead fills the space between the ilium and sacrum, and also the hollow of the loins, and that between tbe spine and angles of tbe ribs; and it is *inserted* into the transverse processes of all the dorsal vertebrae, and into the lower edge of eacb of the ribs near tbeir tubercles; the two inferior ribs excepted; it extends the trunk and depresses the ribs.

Q. Describe tbe *Spinalis dorsi?*

A. It *arises* by five tendinous slips from the spinous processes of the two upper lumbar, and three lower dorsal vertebrae; it ascends incorporated witb the longissimus dorsi, and is *inserted* into the spinous processes of the eigbt uppermost dorsal vertebrae, except the first by as many tendons; it extends and keeps the trunk erect.

Q. What are the origin, insertion, and use of the *Semispinalis dorsi?*

A. It *arises* by distinct tendons from the transverse processes of the seventh, eighth, ninth, and tenth dorsal vertebrae, and is *inserted* into the spinous processes of the six or seven uppermost dorsal, and two lowest cervical vertebrae by as many tendons; it also extends tbe spine, and keeps it erect.

Q. Describe the *Multifidus spinae?*

A. It *arises* from the side and spinous processes of the os sacrum, and posterior part of the ilium, from all the oblique and transverse processes of the lumbar vertebrae, from all the transverse processes of tbe dorsal, and of the four inferior cervical vertebrae, by as many distinct tendons; and is *inserted* by distinct tendons into all the spinous processes of tbe lumbar, dorsal, and cervical vertebrae; it extends the spine obliquely to a side, or, with its fellow, directly backwards.

OF THE THORAX.

Q. What muscles, besides those already mentioned, are situated on the ANTERIOR and LATERAL PARTS OF THE THORAX?

A. The subclavius, serratus magnus, the intercostales externi, and interni, and sternocostalis.

Q. Describe the origin, and insertion of the *Subclavius?*

A. It *arises* tendinous from the cartilage which joins the first rib to the sternum, and is *inserted* into the inferior part of the clavicle as far laterad as the coracoid process of the scapula.

Q. Describe the origin, insertion, and use of the *Serratus magnus?*

A. It *arises* from the nine superior ribs by an equal number of fleshy digitations, runs up and backwards, and is *inserted* into the whole length of the base of the scapula; it pulls the scapula downwards and forwards, or, this being fixed, it elevates the ribs.

Q. Describe the *Intercostales externi?*

A. The fibres of the external intercostals *arise* from the inferior edge of each rib, excepting the twelfth, run obliquely down and forwards from the spine to the cartilage, from which to the sternum a membrane is extended; and are *inserted* into the upper edge of each rib immediately below.

Q. What are the origin, direction, and insertion of the *Intercostales interni?*

A. The internal intercostals *arise* from the inferior margin also of the same ribs, beginning at the sternum, run backwards and downwards, decussating the former muscles, as far as the angle of the ribs where they cease; they are *inserted* into the upper edge of the inferior rib.

Q. What is the use of the Intercostal muscles?

A. The external and internal contract their fibres at the same time, and elevate the ribs in the diagonal of

their forces; by which they enlarge the cavity of the thorax.

Q. Describe the *Sternocostalis*, or *Triangularis?*

A. It *arises* from the edges of the Cartilago ensiformis, and sternum near it, within the thorax, and directing its fibres upwards and outwards behind the cartilages of the ribs, is inserted into the cartilages of the third, fourth, and fifth ribs, by as many angular terminations.

OF THE BACK.

Q. What muscles situated on the POSTERIOR PART OF THE TRUNK ARE ATTACHED TO THE RIBS?

A. The serratus posticus superior, serratus posticus inferior, sacro-lumbalis, longissimus dorsi, and quadratus lumborum.

Q. Describe the origin, insertion, and action of the *Serrātus postīcus superior?*

A. It *arises* by a broad thin tendon from the ligamentum nuchae at the three inferior cervical, and two superior dorsal spinous processes, running obliquely downwards; is *inserted* by four fleshy slips into the second, third, fourth, and fifth ribs under the scapula; it elevates the ribs, and dilates the thorax.

Q. Describe the *Serrātus postīcus inferior?*

A. It *arises* by a common tendon with the latissimus dorsi from the spinous processes of the two inferior dorsal, and three superior lumbar vertebrae; and is *inserted* by four fleshy slips into the lower edges of the four inferior ribs, near their cartilages; it depresses the ribs and diminishes the cavity of the thorax.

Q. What are the origin, insertion, and use of the *Sacro-lumbālis?*

A. It *arises* in common with the longissimus dorsi, tendinous without and fleshy within, from the side and spinous processes of the os sacrum, from the posterior part of the spine of the ilium, and from all the spinous and transverse processes of the lumbar vertebrae; at the last rib it sends off flat tendons, which are *inserted* into

the angles of all the ribs, increasing in length as they ascend; it assists in keeping the trunk erect, and in depressing the ribs.

Q. What did you say was the termination of the *Longissimus dorsi?*

A. It is *inserted* by a tendinous and fleshy slip into the inferior part of all the ribs, except the two lowest, between their tubercle and angle; and also into all the dorsal transverse processes by double tendons.

Q. Describe the origin, insertion, and use of the *Quadrātus lumbōrum?*

A. It *arises* broad, tendinous, and fleshy from the posterior half of the spine of the os ilium, and from the superior transverse ligament of the pelvis, extending between the ilium and the transverse process of the last lumbar vertebrae; and is *inserted* into the transverse processes of all the lumbar vertebrae, into the lowest rib near the spine, and into the side of the last dorsal vertebra by a small tendon; it draws the loins to one side, depresses the rib, and with its fellow bends the loins forwards.

OF THE ABDOMEN.

Q. What muscles are ATTACHED TO THE RIBS TOWARDS THE ABDŌMEN?

A. The abdominal muscles, being four on each side; the obliquus descendens externus, obliquus ascendens internus, the transversālis, and rectus.

Q. Describe the origin, and insertion of the *Obliquus Descendens externus?*

A. It *arises* by seven or eight fleshy slips from the lower margin of the eight inferior ribs near their cartilages, and from the spine of the os ilium; its fibres run downwards and forwards, and terminate in a thin broad tendon, whose fibres are continued in the same direction over the fore part of the abdomen, to its middle line, called *linea alba;* and it is *inserted* into its fellow of the opposite side, during the whole length of the linea

alba, extending from the cartilago ensiformis to the os pubis.

Q. Describe the under part of the tendon of the *Obliquus Descendens externus?*

A. The tendon becomes thicker and stronger near its under part, where it *extends* from the superior anterior spinous process of the ilium over the flexor muscles, great blood-vessels and nerves of the thigh, to its *insertion* into the symphysis and angle of the os pubis. This part of the tendon has been termed POUPART'S, or FALLOPIUS', or *inguinal* ligament; as it is not so tense below, it forms a curve behind over the vessels, and is frequently called the *crural arch.*

Q. What forms the *Linea alba?*

A. The junction of the tendons of the muscles of the opposite sides; it is broadest at the umbilīcus, and decreases in breadth towards its extremities at the cartilāgo ensiformis, and symphўsis pubis.

Q. What forms the *Linea semilunaris?*

A. It is formed by the tendons of the external and internal oblique and transversalis uniting at the edge of the rectus muscle.

Q. What forms the *Lineae transversae?*

A. These are three, or sometimes four, in number, running across from the linea semilunaris to the linea alba, and are formed by the tendinous intersections of the rectus muscle on each side, shining through their sheaths.

Q. What are the origins, and insertions of the *Obliquus Ascendens internus?*

A. It *arises* from the back part of the os sacrum, from the spinous processes of the three lowest lumbar vertebrae by a tendon common to it, and to the serratus postīcus inferior, from the whole spine of the ilium, and from the inside of Poupart's ligament: at the middle of which it sends off a fasciculus of fibres to form the Cremaster muscle. Its fibres run in a radiated manner; those originating from the back run obliquely upwards, and are *inserted* into the cartilages of all the false ribs, and en-

siform cartilage; the fibres from the spine of the ilium run more transversely, and become tendinous at the linea semilunaris, where it is *divided* into two layers; the *anterior* adhering firmly to the tendon of the external oblique, runs over the Rectus, and is *inserted* into the whole length of the linea alba: the *posterior layer*, thinner than the former, adheres to the tendon of the transversalis, runs behind the rectus, and is *inserted* into the linea alba; but about half way between the umbilicus and os pubis, this posterior layer ceases, and the whole tendon passes before the rectus; the inferior edge of it extends in nearly a straight line over, or before the spermatic cord, and is *inserted* into the angle of the pubis.

Q. What are the *uses* of the external and internal Oblique muscles?

A. Their fibres are disposed so as to decussate each other; when both on one side act, they draw the trunk obliquely to one side; when those on both sides act at the same time, they bring the trunk directly forwards in the diagonal of their forces; while they pull down the ribs, diminish the capacity of the thorax, and compress the viscera of the abdomen.

Q. Describe the origins, and insertions of the *Transversalis abdominis?*

A. It *arises* tendinous, but soon becomes fleshy, from the inner surface of the cartilages of the six or seven lower ribs, where it intermixes with the fibres of the diaphragm and intercostals; from the transverse processes of the last dorsal, and four superior lumbar vertebrae; from the whole inner edge of the spine of the ilium, and from the inner surface of Poupart's ligament. At the linea semilunaris, its tendon adhering to the posterior layer of the internal oblique, passes behind the rectus, and is *inserted* into the ensiform cartilage and whole length of the linea alba. In the middle between the umbilicus and os pubis, a slit is formed in the tendon of the transversalis, through which the rectus muscle passes, and between this and the pubis the whole of the

tendon of the transversalis passes before, or on the outside of the rectus to its insertion in the linea alba.

Q. What is the *use* of the transversalis abdominis?

A. It, together with its fellow, supports and compresses the abdominal viscera.

Q. What lies within the Transversalis muscle?

A. Its interior surface is lined by the peritonēum.

Q. Is there not a *fascia* between it and the peritonēum?

A. Yes; the *Fascia Transversalis* arising from the crural arch, and from the under part of a tendinous expansion reflected over the iliacus internus, ascends between the tendon of the transversalis and peritonēum, adhering firmly to both, nearly as high as the umbilicus; it is strong below, and becomes gradually thinner in its ascent.

Q. Is there any *Aperture* through the *fascia transversalis?*

A. Yes; its fibres form a *slit* about half way between the spine of the ilium and symphysis pubis, through which the spermatic cord, or round ligament in the female, passes; this slit is the internal abdominal ring, or upper abdominal aperture, which is about an inch in the direction of the anterior superior spinous process above the under abdominal aperture, or external ring.

Q. Is there any other *fascia* connected with the transversalis muscle?

A. Yes; a *tendinous aponeurōsis arising* from the inside of the crural arch, being firmly interwoven with the fibres of the fascia transversalis, and from the spine of the ilium, is reflected upwards over the Iliacus internus and Psoas magnus, which it binds down and protects.

Q. Describe the *Rectus abdŏmĭnis?*

A. It *arises* by a flat tendon from the fore and upper part of the os pubis, soon becomes fleshy, and flat, ascends parallel to the linea alba, and is *inserted* into the cartilages of the three inferior true ribs, and extremity of the sternum; and it often intermixes with the under edge of the pectoralis major. In its course, it has three

or four tendinous intersections, where its anterior surface adheres firmly to its sheath; one intersection at the umbilicus, a second where it runs over the cartilage of the seventh rib, and a third in the middle between these, and it has commonly a half intersection below the umbilicus; these form the *lineae transversae.*

Q. What other muscle is connected with the abdominal?

A. The *Pyramidalis,* which is often awanting, *arises* from the symphysis pubis, ascends between the rectus and linea alba in the sheath of the rectus, and *terminates* in the linea alba and inner edge of the rectus, nearly half way to the umbilicus.

OF THE DIAPHRAGM.

Q. What muscle separates the abdomen from the thorax?

A. The DIAPHRAGM, which is commonly described in two portions, called the *superior* and *inferior* muscles of the diaphragm.

Q. Describe the origin, and insertion of the *Superior* or *greater muscle* of the *Diaphragm?*

A. It *arises* by distinct fleshy indentations from the ensiform cartilage, from the cartilages of the seventh, and of all the inferior ribs on both sides: its fibres run in a radiated manner, and are *inserted* into a cordiform tendon, situated in the middle of the diaphragm, and in which the fibres of the opposite sides are interlaced.

Q. Describe the *Inferior,* or *smaller muscle* of the *Diaphragm?*

A. It *arises* by four pairs of heads, of which one pair in the middle, called its tendinous crura, are the longest. They arise from the fore part of the fourth lumbar vertebra, and adhere to the bodies of those of the loins above this; in their ascent they leave an oval opening for the passage of the Aorta, and Thoracic Duct. The other heads arise from the third and second lumbar vertebrae, and are placed more laterally. From these dif-

ferent heads, the fleshy fibres run upwards, and in the middle form two fleshy columns, or crura, which decussate and leave an opening for the Œsophăgus, and are *inserted* by strong fleshy fibres into the posterior edge of the middle, or cordiform tendon.

Remarks.

Q. What is the *situation of the Diaphragm* in expiration and inspiration?

A. The diaphragm is placed obliquely with its anterior part as high as the sternum, while its posterior crura are much farther down; it is convex towards the thorax, and its middle part reaches as high within it as the fourth pair of true ribs; it is concave below. During expiration it is relaxed, and rises up into the thorax; during inspiration, its fibres contract, and bring it down nearly to a plane towards the abdomen.

Q. What are the *uses* of the diaphragm?

A. It forms a complete septum between the thorax and abdomen; in expiration, the abdominal and other muscles depress the ribs, and compress the intestines, which are pushed upwards against the diaphragm, which being relaxed, yields before them, and rises into the thorax: in inspiration other muscles raise the ribs, during which the diaphragm contracts its fibres, and descends nearly to a plane surface. The diaphragm is usually the antagonist of the abdominal muscles; but it acts along with them in vomiting, and in expelling the faeces; and the foetus in parturition.

Q. What *perforations* are observable *in the diaphragm?*

A. *Three;* one large triangular hole in the cordiform tendon, with its margin near to the mesial line, and its diameter towards the right side, for the passage of the *Vena Cava* inferior: between the long or tendinous crura, there is a large oval hole, through which the *Aorta* and *Thoracic Duct* pass: a little above, rather before the perforation for the aorta, and somewhat to the left side of the mesial line, there is a third hole for the *Œso-*

phăgus formed by the decussations of the fleshy columns of the smaller muscle of the diaphragm.

Q. What organs are attached to the diaphragm below?

A. The *liver* adheres firmly to the cordiform tendon on the right side of the hole for the passage of the vena cava; and, excepting at this attachment, the whole of its inferior surface is covered by the *peritonēum*.

Q. What parts are attached to the superior surface of the diaphragm?

A. The inferior end of the Mediastīnum is attached nearly to its middle, but rather inclined to the left side of the cordiform tendon; the Pericardium too is attached to its left side; the Pleura covers its fleshy convexities on both sides of the mediastīnum.

Q. What *muscles dilate* or *enlarge* the *thorax?*

A. The intercostales, together with those fibres which pass over the ribs, termed supra and infra-costales, and diaphragm, usually act in the inspirations; but when respiration is rendered difficult, the serrāti postīci superiores, the serrati magni, the pectorales, the latissimi dorsi, the scalēni, and sterno-mastoidei, assist in elevating the ribs, when the head is fixed, and the scapulae are raised during inspiration.

Q. What *muscles depress the ribs*, and diminish the capacity of the thorax in expiration?

A. The sterno-costales, recti, oblīqui externi, and interni abdominis, and transversāles, in common act in expirations: but in difficult respiration the serrati postici inferiores, longissimi dorsi, sacro-lumbales, and quadrati lumborum, assist the former.

Q. What other *muscles arise* WITHIN THE ABDOMEN?

A. Three pairs; the psoas parvus, psoas magnus, and iliăcus internus, on each side.

Q. Describe the origin, insertion, and use of the *Psoas parvus?*

A. It *arises* fleshy from the sides of the last dorsal, first and second lumbar vertebrae, sends down a slender tendon, which running on the inner side of the psoas

magnus, is *inserted* thin and flat into the brim of the pelvis at the junction of the ilium and pubis. This muscle is sometimes wanting.

Q. Describe the origin, insertion, and use of the *Psoas Magnus?*

A. It *arises* fleshy from the side of the bodies, and transverse processes of the last dorsal, and of all the lumbar vertebrae by as many slips, which uniting, form a thick strong muscle, that bounds the upper part of the side of the pelvis; it passes down over the os pubis under POUPART'S ligament, and is *inserted* into the trochanter minor and upper part of the os femoris; both the Psoae bend the loins forwards, and this last bends the thigh forwards, and turns the toes outwards.

Q. Describe the origin, insertion, and use of the *Iliăcus Internus?*

A. It *arises* fleshy from the transverse process of the last lumbar vertebra, and from the inner edge of the spine and downwards, and from most of the hollow part of the os ilium, and from an aponeurosis covering it, which is sent up from the inner side of Poupart's ligament and spine of the ilium; it joins the psoas magnus, where it becomes tendinous on the pubis, and is *inserted* along with it into the trochanter minor, and body of the os femoris immediately below it; it assists in bending the thigh, and rotating it outwards.

Remarks.

Q. Describe the *formation* of the *External Abdominal Ring?*

A. The inguinal ligament of the external oblique extending from the superior anterior spinous process of the ilium to the pubis, is separated into an upper and under column or pillar, about two inches from the symphysis pubis: the upper slip, which forms the upper column, goes directly to the symphysis pubis, and even beyond it, where it is inserted: the lower slip, which forms the under column or pillar, turns, or is twisted inwards behind,

gets under the upper one, and is inserted into the os pubis within and behind the upper pillar: the inferior edge of the lower column being a little loose, forms an arch over the muscles and vessels, commonly called the *crural arch.*

Q. Is the Aperture formed in the ligament like a Ring?

A. It is a slit of a triangular form, with its base towards the pubis, of an inch in length, terminated at each end by transverse tendinous fibres; the more the external oblique and abdominal muscles are stretched, the closer do the columns of the aperture approach.

Q. Where does the *Internal Abdominal Aperture* commence?

A. On the internal surface, about an inch upwards and outwards, nearer the spinous process of the ilium than the external aperture; the peritonēum exhibits a slight depression where the spermatic cord enters.

Q. What forms the internal and upper aperture?

A. The fibres of the *Fascia Transversalis,* which arises from the posterior edge of the inguinal ligament, and ascends between the transversalis muscle and the peritonēum for four or five inches, are separated, and an opening formed to admit the spermatic cord in the male, and the round ligament of the uterus in the female.

Q. Describe the *Inguinal Canal* between the internal and external apertures?

A. The internal aperture is through the fascia transversalis, which at this part has the obliquus internus and transversalis muscles exterior to it, or is covered by them; the canal passes downwards and inwards towards the pubis, over the fascia covering the iliacus internus; at first, having the fascia transversalis and peritonēum within, and the transversalis, internal, and external oblique muscles without; then, having passed down on the surface of the psoas and iliacus internus about half an inch, the canal gets under the lower edge of the transversalis and obliquus internus, has their edge for its superior margin, the fascia transversalis and peritonēum

between it and the abdomen, and the inguinal ligament between it and the integuments; and, lastly, the canal descends to the external aperture, where it has the united tendon of the transversalis and obliquus internus muscles, and the fascia transversalis behind, or between it and the abdomen. The whole of this inguinal canal is about an inch in length.

Q. How is the junction of the transversalis and obliquus internus above without, and below within the inguinal canal?

A. They decussate each other; the lower margin of these muscles arises from the upper half of POUPART'S ligament, and is inserted into the pubes behind the external ring; and, of course, runs directly transverse; while the inguinal canal runs winding like an italic *f*, somewhat twisted downwards, towards the pubis, and forwards; and crossing the inferior edge of the muscles, gets before them, at the external aperture.

A. What does the *Spermatic Cord* consist of, and how does it direct its course?

A. The spermatic artery, vein, and nerves, involved in cellular membrane, form the cord placed behind the peritonēum, it descends from the loins over the surface of the psoas and iliacus internus, adhering to them by loose cellular substance, comes to the internal aperture, where the Vas Deferens, arising by the side of the pelvis from the neck of the bladder, is added to the cord, which makes a sudden bend into the aperture of the canal; about the middle of the canal, when passing under the fleshy margin of the transversalis and obliquus internus, it receives a fasciculus of muscular fibres, which form the Cremaster muscle, by which the cord is enlarged, and passing down it comes out by the external aperture, and descends into the scrotum.

Q. What fixes the Spermatic Cord in the canal?

A. The parts composing the cord are connected together by cellular substance, which also fixes it to the margin of the apertures, and to the canal through which it passes, and fills up the whole space around it.

Q. When *Hernia* is protruded by the external inguinal aperture, how is the *sac situated ?*

A. The *Sac* is situated above the spermatic cord, at its entrance into the internal aperture ; and before it at its exit from tbe external aperture.

Q. How is tbe *Hernial Sac* situated with respect to the cremaster muscle ?

A. The *Cremaster* muscle, arising from the under edge of the obliquus internus, surrounds tbe cord, is inserted into the outer surface of tbe tunica vaginalis testis, and partly into the cellular substance of the scrotum ; and, as the bernial sac insinuates itself at the upper aperture between the tunica vaginalis and the cord, it, of course, bas both the tunica vaginalis, and the cremaster, spread upon its outer surface, surrounding, and external to, the Sac.

Q. How happens tbe hernial sac to insinuate itself between the tunica vaginalis and the spermatic cord ?

A. Because in the foetal state, when the testicle descends from the abdomen into the scrotum, it pushes down a portion of the peritonēum before it, which includes the testicle, and forms its tunica vaginalis, and also gives a coat to the cord. In hernia the sac being within the peritonēum, which in cases of great relaxation probably adheres but imperfectly to the cord at the internal aperture, is forced into the canal, and it must be between the peritoneal or vaginal coat of the cord, and the cord itself in the canal ; and between that of the testicle, in the scrotum and its tunica albuginea. For without a rupture of the peritonēum it can get into no other situation.

Q. In Hernia of long standing, do the inner and outer apertures of the ring change their relative situations ?

A. Yes ; the external aperture is fixed, and remains always in the same situation ; but the internal is more lax, dilates, yields to the distending power of the hernial sac, and is, by degrees, brought down nearly opposite to the external aperture.

Q. Have the goodness to enumerate the *parts that lie under the* CRURAL ARCH?

A. Under it the psoas magnus, and iliacus internus muscles, the external iliac artery, and the anterior crural nerve with some small branches, pass out; the large femoral vein, and trunks of the lymphatics of the leg, pass under it in their course into the abdomen.

Q. How do these organs lie with respect to each other under the crural arch?

A. The great femoral vein lies nearest to the os pubis; the great external iliac, or rather femoral artery, lies close by its outer side; and the large anterior crural nerve lies the outermost or most lateral; the iliacus internus and psoas, united here, partly lie under the artery and nerve, and partly occupy the outer half of the space under the crural arch.

Q. Are these parts inclosed by any membrane or sheath?

A. Yes; they are enveloped in cellular substance, in the same manner as vessels are in other parts of the body: and, besides, the psoas parvus sends down an aponeurosis, which covers the psoas magnus and iliacus internus, and descends behind the large vessels, through the external aperture, and has been named the *fascia iliaca*, which is firmly attached to the pubal fascia lata, and forms part of the crural sheath; the external portion of the fascia lata, arising from the inguinal ligament, between the spine of the ilium and the inner side of the femoral vein, covers the vessels just below the crural arch: the internal or pubal portion passes behind the femoral vessels, which lie between these portions of the fascia lata in an oval depression. Besides, a superficial fascia descending from the abdomen covers all these, and interlaces them together.

Q. What part of the crural arch is most favourable for the *descent of Hernia?*

A. Between the great vein and the insertion of the under column of the inguinal ligament into the pubis, there is a triangular space, occupied by cellular substance,

fat, and lymphatic vessels, through which Femoral Hernia protrudes.

Q. Whether are males, or females, most liable to Femoral Hernia, and why?

A. Females are most subject to femoral hernia; because the dimensions of their pelvis are greater than those of the male pelvis; hence the extent of the inguinal ligament is longer, and the triangular space between the external iliac vein and the pubis is larger; in consequence, their predisposition to Hernia must be greater.

Q. Describe these different parts in the *order of dissection?*

A. Under the common integuments are cellular substance, lymphatic glands, superficial veins, and nerves, and the superficial fascia, which covers the obliquus externus, the groin, and the upper and fore part of the thigh; it consists of several layers of cellular membrane, which at the bend of the thigh separate and include the superficial inguinal glands and fatty matter; it descends over the spermatic cord, adhering to the tunica vaginalis, and to the crural arch, and covers the large vessels below the arch.

Q. When this superficial fascia is carefully removed, what parts come into view?

A. We find the *superficial fascia* intimately connected with the parts below by loose cellular tissue, in which are the deep seated lymphatic or inguinal glands, the large vena saphēna, and small nerves; under all which is the fascia lata, very thick and strong on the outside of the thigh, but becoming much thinner on the inside near to the crural arch.

Q. Does the *Fascia Lata* cover the crural arch and large vessels emerging from under it?

A. The internal portion of the fascia lata covers the sartorius and rectus femoris muscles, and is attached to POUPART'S ligament from the anterior superior spine of the ilium, to the inner side of the femoral vein; as we said before, it covers the crural arch, forming a lunated margin with its end at the pubes, and proceeding down-

wards, called the semilunar or crescent-shaped fold, or falciform process; the superior end of this crescent portion of the fascia lata is in front of, and covers the femoral artery and part of the vein, just below the crural arch; the vena saphēna major passes over the falciform edge of the ilial fascia, and terminates in that part of the femoral vein uncovered; the pubal portion of the fascia lata covers the pectinalis, and triceps adductor muscles, next the os pubis, and passing behind the femoral vessels, is inserted into the iliac fascia and os pubis; and a little below the termination of the vena saphēna, it is united to the ilial portion.

Q. Where is the *Hernial Sac* situated in respect to the parts just mentioned?

A. The hernial sac always descends through the crural arch at the inner or pubal side of the femoral vein; and lies on the hollow in the external surface of the fascia lata, in front of the pectinālis muscle, and as the tumour increases in bulk, its fundus rises on the falciform portion of the fascia lata, and sometimes even upwards over the crural arch.

MUSCLES OF THE MALE GENITALS.

Q. What MUSCLES are counected with the ORGANS OF GENERATION in the male?

A. *Four* muscles on each side; namely, the cremaster, erector penis, accelerātor urinae, vel ejaculator sem̆nis, and the transversus perinēi.

Q. Describe the origin, insertion, and use of the *Cremaster?*

A. This muscle, as we have already observed, *arises* from the under fleshy edge of the obliquus internus, surrounds the spermatic cord, passes with it through the ring of the external oblique, and stretching down to the testicle, is *inserted* into the external surface of the tunica vaginalis testis, and into the cellular substance of the scrotum; in coitu it elevates and compresses the testicle, and assists in evacuating its secretion.

Q. What are the origin, insertion, and use of the *Erector penis?*

A. It *arises* from the inner side of the tuberosity of the ischium, ascends increasing in breadth, and embraces the whole crus penis; and is *inserted* by a thin tendon into the strong tendinous membrane, which covers the corpora cavernosa penis as far as the union of the crura: it compresses the crus, by which the blood is propelled into the fore part of the corpora cavernosa, and the penis thereby is more completely distended; and with its fellow keeps the penis in its proper direction.

Q. Describe the origin, insertion, and use of the *Accelerator urinae?*

A. It *arises* fleshy from the sphincter ani, and membranous part of the urethra, and tendinous from the crus and beginning of the corpus cavernosum penis; its fibres run obliquely transverse, and are *inserted* into its fellow by a tendinous middle longitudinal line, they cover the whole bulb of the urethra; it propels the urine and semen forwards.

Q. Describe the origin, insertion, and use of the *Transversus perinēi?*

A. It *arises* from the inside of the tuberosity of the ischium, runs transversely, and is *inserted* into the back part of the accelerator urinae, and adjoining part of the sphincter ani; it dilates the bulb of the urethra, prevents the anus from being too much protruded, and retracts it after the discharge of faeces.

OF THE FEMALE.

Q. What muscles are peculiar to the FEMALE ORGANS of *generation?*

A. *Three;* namely, the erector clitorĭdis on each side, and the sphincter vaginae.

Q. Describe the origin, insertion, and use of the *Erector clitorĭdis?*

A. It *arises* from the inside of the tuber and ramus

ischii, and ramus pubis, ascends and covers the crus of the clitŏris, and is *inserted* into its upper part, and into the body of the clitŏris; it and its fellow draw the clitŏris downwards and backwards, compress its crura, and propel the blood into its body; by which it is rendered more tense and erect.

Q. Describe the *Sphincter Vagīnae?*

A. It *arises* from the sphincter ani, and posterior part of the vagīna near the perinēum, and thence runs round the sides of the vagina near its orifice, covers the corpora cavernosa vaginae, and is *inserted* into the union of the crura clitorĭdis; it contracts the orifice of the vagina.

OF THE ANUS.

Q. What *muscles* are connected with the ANUS?

A. The sphincter, and one on each side, viz. the levator ani.

Q. Describe the *Sphincter Ani?*

A. It *arises* from the extremity of the os coccȳgis, and skin and fat around the anus, forms a flat oval muscle, which surrounds the extremity of the intestinum rectum, and is *inserted* by a narrow tendinous point into the accelerātōres urīnae, and transversi perinei; it shuts the anus, and also pulls down the bulb of the urethra, and assists in ejecting the urine and semen.

Q. Describe the origin, insertion, and use of the *Levator ani?*

A. It *arises* from the inside of the os pubis at the upper edge of the foramen thyoidēum, from the aponeurosis covering the obturātor internus and coccygēus, and from the spinous process of the os ischium; from these circular origins its fibres descend, as radii to a centre, to meet its fellow, and are *inserted* into the sphincter ani, accelerātor urīnae, and under and fore part of the os coccȳgis; it and its fellow surround the neck of the bladder, prostate gland, part of the vesicŭlae seminales, and the whole extremity of the rectum, representing the shape of a funnel: it and its fellow support the contents

of the pelvis, draw the rectum upwards after the evacuation of faeces, assist in shutting it, in ejecting the urine and semen, and even faeces; and, as it appears to some Anatomists, they compress the veins, and assist in the distension and erection of the penis.

Q. What *muscles* are connected with the OS COCCYGIS?

A. *One* on each side, namely, the coccȳgēus.

Q. Describe the origin, insertion, and use of the *Coccygeus*?

A. It *arises* from the spinous process of the os ischii, becomes broader, covers the inside of the posterior sacro-ischiatic ligament, and is *inserted* into the extremity of the os sacrum, and nearly into the whole length of the side of the os coccygis; it draws the coccyx forwards, and assists the levator ani in raising and supporting the end of the rectum.

OF THE THIGH.

Q. What *muscles* are employed in the MOVEMENTS OF THE THIGH?

A. Their number is *twenty-three*, or, by considering the triceps adductor three distinct muscles, *twenty-six*.

Q. Enumerate the muscles connected with, or arising from, the FORE PART OF THE PELVIS, and *inserted* into the OS FEMORIS?

A. They are eight in number, supposing the triceps three distinct muscles, namely, the tensor vaginae femoris, psoas magnus, iliacus internus, pectinalis, triceps adductor femoris divided into the adductor longus, brevis, and magnus, and the obturator externus.

Q. Describe the origin, insertion, and use of the *Tensor vagīnae femŏris*?

A. It *arises* from the external part of the anterior superior spinous process of the ilium, runs down and backwards, becoming fleshy, inclosed in a doubling of the aponeurosis forming the vagina, and is *inserted* into the inner surface of the fascia lata, a little below the trochanter

major; it stretches the fascia, assists in abduction, and in rotation inwards or tibiad.

Q. Having formerly described the Psoas magnus, and Iliacus internus; mention the origin, insertion, and use of the *Pectinālis?*

A. It *arises* broad and fleshy from the upper and fore part of the os pubis, just above the foramen thyroidēum, runs down and outwards at the inner side of the psoas magnus, and is *inserted* by a short flat tendon into the linea aspĕra, immediately below the trochanter minor; it bends the thigh upwards and inwards, rotating it outwards.

Q. Describe the *Triceps adductor femoris?*

A. This muscle is generally described under three distinct heads. The *Adductor longus femoris arises* by a tendon from the upper and fore part of the os pubis, near the symphysis, at the inner side of the pectinalis, and is *inserted* into the middle of the linea aspera, by a broad flat tendon.

Q. Describe the second head of the triceps, the *Adductor brevis?*

A. It *arises* tendinous from the pubes at the side of its symphysis below the former, runs obliquely outwards, and is *inserted* by a short flat tendon into the linea aspera between the trochanter minor and the insertion of the former.

Q. Describe the origin, insertion, and use of the *Adductor magnus?*

A. It *arises* from the side of the symphysis pubis below the former, and downwards from the ramus of the pubes, the ramus and tuberosity of the os ischium, its fibres run outwards and downwards, spreading wide, and are *inserted* into the whole length of the linea aspĕra, into the ridge leading to the inner condyle, and by a long round tendon into the upper part of that condyle: these three adductors draw the thigh inwards, and upwards, and rotate it a little outwards.

Q. Describe the *Obturator externus?*

A. It *arises* by a semicircular margin from the fore

parts of the pubis and ischium, composing the anterior half of the foramen thyroidēum, and from the membrane which fills up that foramen; its fibres are collected as radii to a centre, pass outwards around the back part of the cervix of the os femoris, and it is *inserted* by a strong round tendon into the cavity at the inner and back part of the root of the trochanter major, adhering in its course to the capsular ligament; it rotates the thigh outwards, and prevents the capsular ligament from being pinched.

Q. What muscles arising from the BACK PART OF THE OS INNOMINATUM are inserted into the FEMUR?

A. *Seven;* the glutēus maxĭmus, medius, and minĭmus, pyriformis, gemĭni, obturator internus, and quadratus femŏris.

Q. What are the origin, insertion, and use of the *Glutēus maxĭmus?*

A. It *arises* fleshy from the back part of the spine of the ilium, from the lateral surface of the sacrum, from the os coccȳgis, and from the posterior sacro-sciatic ligament; its strong fleshy fibres run obliquely forwards and downwards, and converging, form a strong flat tendon, which slides over the posterior part of the trochanter major, and here sends off a quantity of tendinous fibres, which are inseparably connected with the fascia lata; and it is *inserted* by a strong, thick, broad tendon, into the upper and outer part of the linea aspĕra, and partly into the fascia lata: it extends the thigh, draws it outwards, and turns the toes fibulad.

Q. Describe the origin, insertion, and use of the *Glutēus medius?*

A. It *arises* fleshy from all the spine of the ilium unoccupied by the gluteus maximus, from the upper part of the dorsum of the bone, and from the aponeurosis, which covers this muscle, and joins the fascia of the thigh; its fibres converge into a broad tendon, which is *inserted* into the outer and posterior part of the trochanter major; it draws the thigh outwards, a little backwards, and assists in rotation fibulad.

Q. What are the origin, insertion, and use of the *Glutēus minĭmus?*

A. It *arises* fleshy from the lower half of the dorsum of the ilium, from a ridge continued from the superior anterior spinous process to the great sciatic notch; its fibres converge, like radii, to a flat, strong tendon, which is *inserted* into the fore and upper part of trochanter major; it assists the former in pulling the thigh outwards, backwards, and in rotating it inwards or tibiad.

Q. Describe the *Pyriformis?*

A. It *arises* within the pelvis by three tendinous and fleshy heads from the second, third, and fourth false vertebrae of the os sacrum, and becoming round and tapering, it passes out of the pelvis along with the sciatic nerve through the great notch of the ilium, from which it receives some fleshy fibres, and is *inserted* by a roundish tendon into the upper part of the cavity at the inside of the root of the trochanter major; it assists in abduction of thigh, and in rotation of it outwards or fibulad.

Q. Describe the origin, insertion, and use of the *Gemĭni?*

A. They are two distinct muscles; the superior head *arises* from the spinous process; the inferior one from the tuberosity of the os ischium, and from the anterior surface of the posterior sacro-sciatic ligament, they unite and form a sheath around the tendon of the obturator internus, and are *inserted* into the cavity at the inner side of the root of the trochanter major; they rotate the thigh fibulad or outwards, assist in extension, and prevent the tendon of the obturator internus from starting out of its place.

Q. What are the origin, insertion, and use of the *Obturātor internus?*

A. It *arises* within the pelvis by a semicircular fleshy margin from the anterior half circumference of the foramen thyroidēum, and from the obturator ligament; its fibres converge, and send off a flattish round tendon, which passes over the sinuosity between the spine and tuber of the ischium, as a rope over a pulley, goes over

the capsular ligament, inclosed in the sheath of the gemini, and is *inserted* into the large pit at the root of the trochanter major; it rotates the thigh outwards, and assists in its extension.

Q. Describe the origin, insertion, and use of the *Quadratus femoris?*

A. It *arises* from the outside of the tuber ischii, runs transversely outwards, and is *inserted* fleshy into the rough ridge between the roots of the greater and smaller trochanter; it rotates the thigh outwards, and assists in its extension.

OF THE LEG.

Q. What *muscles arise* from the BONES OF THE PELVIS, and are inserted into *those of the* LEG?

A. *Six* muscles pass along the femur without being attached to it, excepting the short head of the biceps; namely, the sartorius, gracilis, rectus femoris, on the anterior aspect; and the semitendinosus, semimembranosus, and biceps flexor cruris, on the posterior.

Q. Describe the origin, course, insertion, and use of the *Sartorius?*

A. It *arises* tendinous from the superior anterior spinous process of the ilium, becomes fleshy, runs obliquely downwards and inwards upon the rectus, and in a spiral manner over the vastus internus, and about the middle of the thigh over part of the triceps, and descending between the tendon of the adductor magnus and that of the gracilis, behind the inner condyle; it is *inserted* by a broad thin tendon into the inner side of the tibia near the under part of its tubercle; it bends the thigh, but especially the knee-joint, and brings the leg across the other, is a rotator tibiad.

Q. Describe the origin, course, and insertion of the *Gracilis?*

A. It *arises* by a thin tendon from the os pubis near its symphysis, and soon becoming fleshy, descends on the inside of the thigh in a direct course, and is *inserted* ten-

dinous into the tibia immediately below the sartorius ; it assists in bending the thigh, and drawing it inwards, but it is chiefly a flexor of the knee-joint.

Q. Describe the origin, insertion, and use of the *Rectus femŏris ?*

A. It *arises* fleshy from the inferior anterior spinous process of the ilium, and tendinous from its dorsum just above the acetabŭlum, descends directly over the anterior part of the cervix of the femur, along its fore part, increasing in size as far down as its middle, and then decreasing ; it has a longitudinal tendon, from which the fleshy fibres run off like the plumage of a feather ; it is *inserted* into the upper part of the patella ; it assists in bending the thigh, but is chiefly an extensor of the leg.

Q. Does part *of its tendon* not *pass over* the surface of the *patella*, to be inserted into the tibia ?

A. Yes ; the greater part of the strong flat tendon terminates at the patella ; but a strong tendinous aponeurosis is sent over it, and another one under it to be connected with the strong ligament of the patella which is inserted into the upper and fore part of the tibia.

Q. Does the *Patella* seem to perform the office of a *sesamoid bone* to the tendon of the Rectus femoris ?

A. Yes ; the bone of the patella fixed like a sesamoid bone between expansions of the tendinous fibres of the rectus, strengthened by those of the vasti muscles on each side, plays in the anterior and inferior depression between the condyles of the femur, as a rope over a pulley, in the motions of the knee-joint : hence it may be said that the rectus femoris terminates in the tibia.

Q. Describe the origin, course, insertion, and use of the *Semitendinōsus ?*

A. It *arises* in common with the long head of the biceps, from the posterior part of the tuberosity of the ischium ; its fleshy belly runs down superficially between the biceps and gracilis, on the back part of the thigh, and sends off a long roundish tendon, which passes by the inner side of the knee, and becoming flat, is *inserted* into the inside of the tibia, a little below its tubercle ; it

assists in extending the thigh, but is chiefly a flexor of the knee-joint, and a rotator of the thigh inwards.

Q. Describe the origin, course, insertion, and use of the *Semimembranōsus ?*

A. It *arises* by a broad flat tendon from the upper and back part of the tuberosity of the ischium, becomes fleshy, with its fibres running obliquely towards a tendon at its inner side, runs at first on the fore part of the biceps, and then lower down between it and the semitendinosus, and is *inserted* tendinous into the inner and back part of the head of the tibia; it assists in extending the thigh, but chiefly is a flexor of the knee-joint.

Q. Describe the origin, course, insertion, and use of the *Biceps flexor crūris ?*

A. It *arises* by two distinct heads, the long one *arises* in common with the semitendinosus by a short tendon from the upper and back part of the tuberosity of the ischium, runs just under the fascia between the vastus externus and semitendinosus; the short head *arises* fleshy from the linea aspera just below the insertion of the glutēus maximus, becomes broader and joins the long head a little above the external condyle; their fleshy belly sends off a strong tendon, which is *inserted* into the upper part of the head of the fibula; its long head assists in extending the thigh; but it is chiefly a flexor of the knee-joint, and slightly an adductor, and rotator outwards.

Q. Which of these muscles by their tendons forms the internal, and which the external *hamstrings ?*

A. The tendons of the semitendinosus, and semimembranosus chiefly; and the tendons of the sartorius and gracilis also, form the inner hamstring: and the tendon of the biceps alone forms the outer one.

Remarks.

Q. What *muscles bend the thigh ?*

A. The *flexion* of the hip-joint is performed by the combined action of *eleven muscles*, namely, the tensor vaginae, sartorius, gracilis, pectinalis, abductor longus,

ad. brevis, ad. magnus, iliacus internus, psoas magnus, obturator externus, and the gluteus minimus; all of which are also adductors or abductors, and rotators.

Q. What *muscles extend the thigh?*

A. Extension is also performed by the combined action of *ten muscles*, viz. the gluteus maximus, part of the gluteus medius, pyriformis, obturator internus, gemini, quadratus femoris, part of the adductor magnus, long head of the biceps, semitendinosus, and semimembranosus: of which the first five are also abductors, and rotators of the toes fibulad, or outwards; the last five are also adductors and rotators fibulad; the two last of them, however, have very little rotatory power.

Q. What muscles are *adductors*, or pull the one thigh towards the other?

A. *Adduction* is performed by the combined action of *twelve muscles*, namely, the pectinalis, adductor longus, ad. brevis, ad. magnus, quadratus femoris, gracilis, semitendinosus, semimembranosus, long head of the biceps, obturator externus, psoas magnus, and iliacus internus; of which all are besides either flexors or extensors, and nine are also rotators fibulad; and the remaining three, the gracilis, semitendinosus, and semimembranosus, are rather rotators tibiad.

Q. *What muscles* pull the one thigh from the other, or *perform abduction?*

A. *Abduction* of the thigh is effected by the combined action of *eight muscles*, namely, the tensor vaginae, gluteus maxĭmus. g. medius, g. minimus, pyriformis, sartorius, obturātor internus, and gemĭni; of which all are also either flexors, or extensors, and rotators fibulad; except the tensor vaginae, and sartorius, which rotate tibiad.

Q. *What muscles are rotators* of the toes outwards, or *fibulad?*

A. *Thirteen*, namely, the gluteus maxĭmus, part of the gluteus medius, pyriformis, gemĭni, obturātor internus, obturātor externus, quadratus femŏris, iliăcus internus, psoas magnus, adductor longus, ad. brevis, ad.

magnus, and biceps in the extended state of the leg; by which various other motions are also performed.

Q. What muscles perform *rotation inwards, or tibiad?*

A. *Six;* the tensor vaginae, part of the gluteus medius, gluteus minimus; and in the extended state of the leg, the sartorius, gracĭlis, and semitendinōsus; all of which perform other actions besides rotation.

Q. Can these numerous muscles move the thigh in any other directions?

A. Yes; they co-operate so with one another, that they can move the thigh, and fix it in every possible direction between the four aspects just enumerated; and besides, they can perform combined, alternate and reciprocal actions, by which the leg, when extended, is moved round, so as to describe the circumference of a cone; the head of the femur being the apex, and the foot the base of the cone described.

Q. Enumerate the means provided for *protecting the hip-joint from luxation?*

A. Within the joint the round ligament attaches the head of the femur firmly to the bottom of the acetabulum; the deepness of the osseous and cartilaginous brim of the acetabŭlum itself; the double transverse ligament stretched across the notch at its under and anterior part, where it is least exposed; the muscles which lie close upon the circumference of the joint, namely, on the posterior part, the quadratus, the tendons of the obturator externus, of the gemini and obturator internus, and of the pyriformis in that order of succession from below upwards: on the upper part the gluteus minimus, and gluteus medius: on the anterior part the rectus femoris and sartorius; on the inferior part the tendons of the psoas magnus and iliacus internus, lie close to the capsular ligament: besides these, the gluteus maximus covers all the muscles above and behind, and gives great additional security to the joint.

Q. In consequence of the *hip-joint* being guarded, and secured in that manner, *is it often dislocated?*

A. The strongly formed and guarded state of the hip-joint certainly renders its dislocation difficult; but the freedom of its motions, the superincumbent weight of the body, and the accidents to which it is unavoidably exposed, render it subject to occasional dislocation.

Q. In what way can the *hip-joint be dislocated?*

A. In *three* different positions; the most frequent is when the head of the os femoris is forced downward and forwards on the obturator foramen: the next in frequency is, when the head of the femur is forced upward and outwards on the dorsum of the os ilium with the trochanter major forwards: the most rare position is when the head of the femur is forced on the dorsum of the ilium with the trochanter major projecting backwards.

Q. When the *head of the femur* is thrust down *into the foramen thyroidēum obturatōrium*, what muscles are overstretched?

A. The three glutei, the rectus femoris, psoas magnus and iliacus internus, are very much overstretched; the pyriformis, pectinalis, sartorius, and gracilis, are also much upon the stretch; the semitendinosus, semimembranosus, and long head of the biceps are considerably stretched too.

Q. What *parts seem to be injured* in such a luxation?

A. The capsular ligament of the hip-joint although naturally wide and roomy, the round ligament within the joint, and the double cartilaginous ligament stretched across the notch on the fore part of the acetabulum must be ruptured; also various connexions by cellular substance must be destroyed.

Q. In what manner is such a *luxation to be reduced?*

A. By relaxing the muscles most upon the stretch, so as to give them power to act, and by bringing their antagonists into action, the head of the femur may be replaced in the acetabulum with a very small degree of mechanical force.

Q. By what means are the overstretched muscles to be relaxed?

A. Of these muscles *six* are situated on the anterior aspect, namely, the psoas magnus, iliacus internus, rectus femoris, pectinālis, gracĭlis, and sartorius: and *four* on the posterior aspect of the acetabulum, viz. the three glutēi, and pyriformis: and three below, arising from the back of the tuberosity of the ischium, namely, the semitendinosus, semimembranosus, and long head of the biceps. In order that the two first classes of muscles may be relaxed at the same time, the thigh must be raised towards the trunk in the diagonal between flexion and abduction, at first keeping the leg in the same degree of rotation, in which it remained after the injury. After the leg is raised as far as the muscles attached to the ischium will permit, rotation inwards, or tibiad, should be gradually and steadily made in the act of raising it by the Surgeon; while an assistant, with a towel put round the inside of the thigh below and near to the trochanter minor, should pull steadily outward from the other thigh in the same diagonal aspect, in order to disengage the head of the femur. When the surgeon has raised the limb as far as he can, and rotated it tibiad in the meantime to rather more than its natural position, while the assistant keeps his steady pull, he should bring the leg suddenly, and rather forcibly, if necessary, to a state of complete adduction; during which, the combined action of all the muscles of the joint will reduce the head of the femur into the acetabulum.

Q. When the *head of the femur* is forced upwards and outwards *on the dorsum of the ilium* with the trochanter major forwards, what muscles are overstretched?

A. *Eight muscles* seem to be very much stretched, viz. the obturator externus, obt. internus, gemini, quadratus femoris, and the triceps adductor, composed of three distinct muscles, the adductor longus, add. brevis, and add. magnus.

Q. What *parts* seem to be *injured by the luxation upwards?*

A. The round and capsular ligaments must be rup-

tured; part also of the gluteus minimus near to the ace tabulum must be torn from the dorsum of the ilium and the part of it stretched over the head of the femu will be greatly distended.

Q. In what manner can this *luxation upwards* b most *readily reduced?*

A. Attention should first be paid to the situation o the muscles most overstretched, and the thigh shoul be brought into a state of close adduction, crossing th other, and half flexion, in order to relax the muscle as much as possible. This being done, an assistan should have a towel put round the inside of the thigh as near to the trochanter minor as possible, anothe towel bound round above the condyles of the femu should be given to another assistant or two; the knee joint to be bent, so that the leg may be at a right angle The assistants should be instructed to act at the sam time; at a word given by the surgeon, the assistant a the trochanter should pull strongly and steadily out wards, so as to raise and disengage the head of the fe mur from behind the brim of the acetabulum, whil the assistants at the towel fixed above the condyle should pull steadily and strongly in the direction o the femur, which is in a state of great adduction crossed over the other leg and half flexion, in order t bring down its head over the brim of the acetabulum the surgeon himself, in the meantime, using the le half bent as a lever, should favour the relaxation of th muscles by rotating the thigh outwards, which he mus accomplish by repeated progressive attempts, in propo tion as the other forces employed by the assistants a in execution. By these means, the muscles most tens are relaxed, and fitted for action, while those relaxe are brought into a condition for acting; the head o the femur, being first brought into a favourable situa nion by the mechanical forces employed, is ultimatel replaced in the acetabulum by the combined natura contraction of the muscles themselves.

Q. When the *head of the femur* is forced up on th

dorsum of the ilium with the trochanter major backwards, what muscles are overstretched?

A. The quadratus femoris, obturator externus, gemini, obturator internus, and pyriformis, are greatly distended.

Q. What steps are necessary towards the *reduction* of such a luxation?

A. The patient should be laid upon the opposite side, inclined towards his back; one assistant should have hold of a towel put round the inside of the thigh, to be ready to pull the head of the femur from the dorsum of the ilium at a given word; another towel should be fixed round the thigh above the condyles, and given to two assistants, who should be instructed to make extension in the direction of the femur, also at the word given by the surgeon.

Q. When preparations have been so made, *how is the reduction* of the joint *to be accomplished?*

A. The surgeon having taken his station behind the dislocated limb, and observing that his assistants are all ready, should bend the knee joint to a right angle, that he may use the leg as a lever, and then should give orders to his assistants to pull in their respective directions; in proportion as the femur is moved from its luxated position, he should rotate the femur outwards, and bring it into adduction at the same time; by which the muscles, previously too tense, are relaxed; and others, previously too much relaxed, are brought into their sphere of action; by which means, the head of the femur is replaced in the acetabulum.

OF THE FEMUR.

Q. What *muscles arise* FROM THE BODY *of the femur?*

A. *Three;* the crurālis, vastus externus, and vastus internus.

Q. Describe the origin, course, insertion, and use of the *Crurālis* or *Crurēus?*

A. It *arises* fleshy from between the trochanters, but nearer the minor, and from all the fore part of the femur

to near its under extremity ; its sides are connected with the vasti muscles, it lies behind the rectus, and is *inserted* tendinous into the upper part of the patella ; it assists in extending the knee-joint.

Q. Describe the *Vastus externus ?*

A. It *arises* broad, tendinous, and fleshy, from the outer part of the root of the trochanter major, and downwards along the outer side of the linea aspĕra to near the external condyle, by fleshy fibres which run obliquely forwards, and are inserted into a middle tendon ; this muscle occupies the whole flat external surface of the femur, and is *inserted* into the outer and upper part of the patella : it is joined to the edge of the tendon of the rectus ; part of its tendon sends an aponeurosis over the joint, and is firmly attached to the head of the tibia ; it assists in extending the leg.

Q. Describe the *Vastus internus ?*

A. It *arises* tendinous and fleshy from between the fore and upper part of the os femoris, and the root of the trochanter minor ; and also along the whole inside of the linea aspĕra, by fibres running obliquely forwards ; it lies on the flat inside of the bone, and is *inserted* into the inner and upper edge of the patella ; and it also sends down an aponeurosis over the inside of the joint, to be attached to the upper part of the tibia ; it assists in extending the leg.

Q. Are these large muscles of the thigh quite distinct, or much interlaced with each other ?

A. The rectus femoris is pretty distinct, being tendinous behind, where it plays on the cruralis and vasti ; but the cruralis and the vasti near their origin seem to form one large fleshy mass on the surface, but deeper they are distinct ; two or three inches above the condyles they again join into an inseparable mass, whose tendinous expansion, joined to that of the rectus, embraces the patella, and is firmly attached to the head of the tibia.

Q. What *muscles arise* FROM THE CONDYLES of the *os femoris ?*

A. *Three;* the poplitēus, gastrocnēmius externus, and plantāris.

Q. Describe the origin, insertion, and use of the *Poplitēus?*

A. It *arises* by a small round tendon from the outer and inner part of the external condyle, and from the back part of the capsular ligament, becomes fleshy, spreads out, runs obliquely inwards and downwards, and is *inserted* thin and fleshy into a ridge at the upper and inner edge of the tibia, a little below its head; it assists in flexion, and rotation inwards or tibiad, and prevents the capsular ligament from being pinched in flexion of the joint.

Q. Describe the *Gastrocnēmius externus?*

A. It *arises* by two distinct heads, the one tendinous from the upper and back part of the internal condyle, and from the oblique ridge above it; the other head also tendinous in like manner, from the upper and back part of the external condyle; they meet a little below the joint, and form a large fleshy mass with a middle tendinous line; below the middle of the tibia it sends off a broad thin tendon, which becoming narrower, is united with that of the gastrocnemius internus, a little above the ankle.

Q. Describe the *Plantaris?*

A. It *arises* thin and fleshy from the upper and back part of the external condyle, and from the capsular ligament, forms a tapering belly three or four inches in length, which sends down a long slender tendon between the external and internal gastrocnemii; and where their tendons unite, it passes obliquely over to the inner side of the tendo ACHILLIS, where it descends, and is inserted into the inner and posterior part of the os calcis, below the insertion of the tendo Achillis.

Remarks.

Q. Having now described all the muscles connected with the Knee-joint, describe also the *Internal* or *Crucial ligaments of it?*

A. There are *two* crucial or internal ligaments; the *anterior*, arising from the semilunar notch between the condyles running obliquely forwards, is inserted into a pit before the rough protuberance in the middle of the articular surface of the head of the tibia; the *posterior*, arising similar to the former, passes behind it, and is inserted behind the protuberance; they attach the femur and tibia firmly together, while they allow the motions of the joint, and rotation tibiad, but not fibulad.

Q. Describe the *Semilunar Cartilages* of the Knee-joint?

A. The head of the tibia is divided by a middle ridge; on each side of which is a cavity corresponding to the condyles of the femur; each cavity is deepened by a crescent-formed cartilage, thick on the outer convex, and thin on the inner concave side; the circumference of these two cartilages adheres to the capsular ligament; their inner points or cornua are connected by a small transverse ligament, and are attached to the middle protuberance of the tibia.

Q. Are the condyles of the femur and the articular surfaces of the tibia covered?

A. Yes; they are all covered by cartilage, and well lubricated for facilitating the motions of the joint.

Q. What muscles are EXTENSORS *of the Knee-joint?*

A. *Six;* the anterior part of the tensor vaginae, and of the glutēus maximus connected with it, the rectus femoris, vastus internus, vastus externus, and cruralis.

Q. What muscles are FLEXORS *of the Knee-joint?*

A. They are *ten;* the posterior part of the tensor vaginae and of the glutēus maximus attached to it, the sartorius, gracilis, semitendinosus, semimembranosus, biceps cruris, gastrocnemius externus, plantaris, and poplitēus.

Q. Has the Knee-joint much *rotatory motion?*

A. No; its motions are chiefly flexion and extension: a slight degree of rotatory motion of the toes tibiad and fibulad can be performed at the knee; but the crucial ligaments check it from going far tibiad.

Q. What is the *use of the* PATELLA or ROTULA under the tendons of the four most powerful extensor muscles?

A. It is lined below by cartilage, and well lubricated; by which means it moves round the cavity between the condyles in flexion and extension with great facility; it removes the tendons farther from the centre of motion, and thus increases their power of action.

Q. Is it ever *fractured* or *dislocated?*

A. Yes; it is occasionally fractured across, when the joint is half bent: it is also sometimes forced out of the hollow pulley between the condyles to one side, generally outwards.

Q. Is the *Knee-joint ever* DISLOCATED?

A. Very seldom; the strong lateral ligaments, the thick capsular, and strong crucial ligaments, the tendinous aponeurosis, and tendons of muscles lying close upon the capsular ligament, prevent its dislocation, unless the force applied be sufficient to rupture some of these strong natural guards and securities, and to displace the joint.

OF THE FOOT.

Q. What muscles are EXTENSORS OF THE FOOT?

A. *Eight;* the gastrocnemius externus, and plantaris already described, the gastrocnemius internus, the tibialis postĭcus, the peronēus longus, and brevis, the flexor longus digitorum pedis, and the flexor longus pollicis, which two last, though principally flexors of the toes, are also extensors of the foot.

Q. Describe the *Gastrocnēmius internus,* vel *Solēus?*

A. It *arises* by two heads; the external, by much the larger, fleshy from the back part of the head, and upper and back part of the body of the fibula; the internal from the back part of the tibia, running inwards along the under edge of the poplitēus, it receives fleshy fibres from the inner side of the bone for a considerable way down; they unite and form a large belly, which, covered by the tendon of the gastrocnemius externus,

descends fleshy and tapering near to the ankle; then it sends off a tendon, which joins that of the gastrocnemius externus, and their united round tendon, called *tendo* ACHILLIS, is *inserted* in the upper and back part of the os calcis; these two muscles raise the heel, and extend the foot.

Q. Describe the *Tibialis posticus?*

A. It *arises* fleshy from the upper and fore part of the tibia, passes through a fissure in the interosseous ligament, and continues its origin from the posterior part of the tibia, fibula, and interosseous ligament, down to their middle; its fibres run obliquely to a middle tendon, which becoming round passes through a groove behind the inner ankle, and is *inserted* by separate tendinous slips into the upper and inner part of the os naviculare, and partly into the inner surface of the tarsal bones.

Q. Describe the *Peronēus longus?*

A. It *arises* from the fore part of the head of the fibula, and from its outer part downwards for two-thirds of its length; its fibres run in a penniform manner to a long tendon, which becoming round is inclosed in a sheath, passes behind the outer ankle through a groove in the lower extremity of the fibula, is reflected to the sinuosity of the os calcis, runs along a groove in the os cuboides, and then obliquely across the sole of the foot, and is *inserted* into the outside of the base of the metatarsal bone of the great toe, and partly into the os cuneiforme internum.

Q. Describe the *Peronēus brevis?*

A. It *arises* from the outer part of the fibula from its middle down to the outer ankle; its fibres run obliquely outwards to a tendon, which becomes round, passes behind the outer ankle, is included in the same sheath with the peroneus longus, crosses behind it, and running forwards in a sheath proper to itself, is *inserted* into the root and external part of the metatarsal bone of the little toe.

Q. Describe shortly the *Flexor longus digitorum pedis?*

A. It *arises* from the back part of the tibia at the under edge of the popliteus, and is continued down the

inner edge of the bone by fleshy slips terminating in its tendon; also from the outer edge of the tibia, and between this double order of fibres the tibialis posticus is inclosed; about two inches above the ankle, it sends off a round tendon, which passes behind the inner ankle in a groove of the tibia, under two annular ligaments, and through a sinuosity at the inside of the os calcis; about the middle of the sole it receives a tendon from the flexor longus pollicis, and then divides into four tendons, which pass through the slits of the perforatus, and are *inserted* into the base of the third phalanx of the four small toes.

Q. Describe the *Flexor longus pollĭcis?*

A. It *arises* from the back part of the fibula, a little below its head, and continued down nearly to its under extremity by a double order of oblique fibres, which terminate in a tendon that passes under the annular ligament behind the inner ankle through a groove in the tibia, then in the astragalus; in the sole it crosses the tendon of the flexor longus digitorum, to which it gives a tendinous slip; it next passes between the sesamoid bones, and is *inserted* into the last joint of the great toe.

Q. What muscles are FLEXORS OF THE FOOT at the ankle-joint?

A. *Four;* the tibialis antĭcus, extensor longus digitorum pedĭs, extensor proprius pollĭcis, and the peronēus tertius of ALBINUS.

Q. Describe the *Tibialis antĭcus?*

A. It *arises* tendinous from the tibia between its tubercle and articulation with the fibula; runs down fleshy on the outside of the tibia, adhering to it and to the upper part of the interosseous ligament: near the under part of the leg it sends off a strong round tendon, which crosses obliquely from the outside to the fore part of the tibia, passes through a ring under the annular ligament near the inner ankle, runs over the astragalus and os naviculare, and is *inserted* into the middle of the os cuneiforme internum, and base of the metatarsal bone of the great toe.

Q. Describe the *Extensor longus digitorum pedis?*

A. It *arises* from the upper and outer part of the head of the tibia, and from the head and nearly the whole length of the anterior spine of the fibula, from the aponeurosis, which covers the upper and outer part of the leg, and from the interosseous ligament; below the middle of the leg it splits into four round tendons, which pass under the annular ligament, become flat, and are *inserted* into the base of the first phalanx of the four small toes, and are expanded over their upper surface as far as the last phalanx; it extends the small toes, and assists powerfully in bending the ankle-joint. A portion of this muscle is called by some, peronēus tertius.

Q. What are the origin, course, and insertion, of the *Peronēus tertius?*

A. It *arises* in common with the former muscle, from the middle downwards near to the malleŏlus externus of the fibula; sends its fleshy fibres forwards to a tendon, which passes under the annular ligament in the same sheath with the extensor longus digitorum, and is *inserted* into the base of the metatarsal bone of the little toe.

Q. Describe the *Extensor proprius pollicis?*

A. It *arises* acute, tendinous, and fleshy, from the fore part of the fibula, a little below its head, and downwards near to the malleŏlus externus; its fibres run obliquely forwards to a tendon, which passes over the forepart of the astragălus and os navicŭlare, and is *inserted* into the base of the first and second phalanges of the great toe; it extends the great toe, and assists in bending the ankle-joint.

Remarks.

Q. Besides flexion and extension, has not the ankle-joint other motions?

A. Yes; the toes can be turned outwards or fibulad, and inwards or tibiad, to a small extent; and by the combined alternate action of flexors, extensors, adductors, and abductors, the foot can be made to describe a

sort of rotatory motion, describing an imperfect cone, with its apex at the ankle, and its base at the toes.

Q. What muscles perform the *motion of abduction fibulad?*

A. *Four;* the peronēous longus, peroneus brevis, peroneus tertius, and the extensor longus digitorum pedis.

Q. What muscles perform the *motion of adduction tibiad?*

A. *Four;* the tibialis posticus, extensor proprius pollicis, flexor longus digitorum, and flexor longus pollicis.

Q. What parts secure the *ankle-joint against injuries?*

A. It is secured, in the first place, by the construction of the bones, the inferior end of the tibia being hollow, covered and deepened on its brim, by being surrounded with cartilage, for the reception of the astragalus; defended on the inside by its own depending process, which forms the malleŏlus internus; defended on the outside by the extremity of the fibula, which forms the malleŏlus externus: in the second place, by strong ligaments, namely, the capsular ligament; the anterior and posterior superior, and the interosseous ligaments, which bind the tibia and fibula together; the anterior, perpendicular or middle, and posterior ligaments, which bind the malleŏlus externus firmly to the astragălus and os calcis; and the deltoid ligament, which binds the malleŏlus internus very firmly to the astragalus, os calcis, and os naviculare: and in the third place, by the strong tendons of the muscles; viz. by the tendons of the tibialis anticus, flexor longus digitorum pedis, flexor longus pollicis, and of the tibialis posticus, passing close upon the joint just behind the inner ankle; by the tendons of the peroneus longus, and peroneus brevis, passing close upon the joint immediately behind the outer ankle; by the tendons of the extensor longus digitorum pedis, peroneus tertius, and of the extensor proprius pollicis, spreading and passing on the fore part of the joint, and most firmly bound down upon it by the strong tendinous annular ligament of the tarsus; and by the tendo Achillis, and the plantaris behind.

Q. In consequence of such security, is the *ankle-joint* rarely *dislocated ?*

A. It is much exposed by its frequent exercise to numerous accidents, and it is frequently dislocated inwards, more seldom outwards, and very rarely forwards, by too much extension.

Q. When *dislocation* happens *inwards* or *tibiad*, what parts are generally injured ?

A. The process of the tibia forming the internal ankle is fractured; the capsular and external lateral ligaments, attached to the malleolus externus, are ruptured; and the tendons of the peroneus longus and peroneus brevis are overstretched.

Q. How is *such a luxation* to be *reduced ?*

A. By gently pulling the foot in the direction of the tibia, and replacing the bones of the tarsus in the socket of the tibia; and by the easy flexion and extension of the joint afterwards, we are certain of it being properly reduced. A bandage and splints may be necessary to retain it in its situation until the ligaments adhere.

Q. When the *ankle* is *dislocated outwards*, what parts are generally injured ?

A. The capsular and deltoid ligaments are ruptured; the fibula about an inch or two above the malleolus externus is fractured; and the tibialis anticus and posticus, the flexor longus digitorum, and the flexor longus pollicis, whose tendons pass behind the inner ankle, are tense and overstretched.

Q. How is *reduction* in such a case *performed ?*

A. By gently pulling the foot in extension, and replacing the astragalus in its socket, as in the last case; and afterwards by applying a splint on each side of the leg, and bandaging the joint in its proper situation.

Q. When the *ankle* is *dislocated by too great extension*, and the convexity of the astragalus thrown forward between the malleoli, what parts seem to be injured ?

A. The capsular, lateral, and anterior annular ligaments are all ruptured; and the gastrocnemii are in a state of over-distension.

Q. How is *such a luxation* of the ankle-joint to be *reduced?*

A. The overstretched muscles should be relaxed as much as possible by bending the knee-joint, and then, while an assistant keeps the knee in that position, the surgeon, with one hand holding the heel, and with the fingers of the other placed over the fore part of the tarsal bones, should pull pretty forcibly in a line with the tibia, and then attempt to replace the astragalus in its socket by bending the toes and foot *rotulad.*

OF THE TOES.

Q. How many MUSCLES are employed in the *motions* OF THE GREAT TOE?

A. Seven; *two extensors,* viz. the extensor brevis digitorum, and extensor proprius pollicis; *two flexors,* the flexor brevis pollicis, flexor longus pollicis, assisted by the diagonal forces of the abductor and adductor pollicis; the *adductor* assisted by the transversalis, and the *abductor* pollicis.

Q. Describe the *Extensor brevis digitorum?*

A. It *arises* fleshy and tendinous from the outer and fore part of the os calcis, forms a fleshy belly, which is divided into four portions, each of which sends off a tendon, which crosses obliquely over the upper part of the metatarsal bones under the tendons of the extensor longus digitorum, and is *inserted* into the tendinous expansion of the long extensors on the inside of all the toes, except the little one.

Q. We have described the extensor proprius pollicis, and also the flexor longus pollicis, as arising from the fibula; therefore pass on to describe the *Flexor brevis pollicis?*

A. It *arises* tendinous from the under and fore part of the os calcis, and from the cuneiforme externum, divides into two heads, between which runs the tendon of the flexor longus; their tendons are *inserted* into the

external sesamoid bone, and base of the first bone of the great toe.

Q. Describe the *Adductor pollicis?*

A. It *arises* by a long thin tendon from the under part of the os calcis, os cuboides, and os cuneiforme externum, and from the root of the metatarsal bone of the second toe; it divides into two fleshy portions, which are *inserted* into the external sesamoid bone, and base of the metatarsal bone of the great toe.

Q. Describe the *Transversalis?*

A. It *arises* tendinous from the upper and fore part of the metatarsal bone of the great toe, and from the internal sesamoid bone of the first joint, forms a fleshy belly, runs transversely between the metatarsal bones and tendons of the flexors, and is *inserted* tendinous into the under and outer part of the anterior extremity of the metatarsal bone of the little toe, and ligament of the one next it.

Q. Describe the *Abductor pollicis?*

A. It *arises* fleshy from the anterior and inner part of the protubcrance of the os calcis; and tendinous from the same bone, where it joins the os naviculare; it is *inserted* tendinous into the internal sesamoid bone and base of the first bone of the great toe.

Q. What *muscles* are *peculiar* to the LITTLE TOE?

A. *Two;* the abductor minimi digiti, and the flexor brevis minimi digiti.

Q. Describe the *Abductor minimi digiti pedis?*

A. It *arises* from the under part of the protuberance of the os calcis, and from the base of the metatarsal bone of the little toe, sends off two small tendons; the one is *inserted* into the base of the metatarsal bone, the other into the outside of the base of the first phalanx.

Q. Describe the *Flexor brevis minimi digiti?*

A. It *arises* from the os cuboides, and from the outer and back part of the metatarsal bone, and is *inserted* into the anterior end of the metatarsal bone, and into the base of the first phalanx of the little toe.

Q. What muscles *Extend the toes?*

A. The extensor longus digitorum, and the extensor brevis digitorum, the little toe excepted, which we have already described.

Q. What muscles *Bend the small toes?*

A. The flexor longus digitorum, (profundus vel perforans), flexor brevis digitorum, (sublimis vel perforatus); in the little toe, the flexor brevis minimi digiti, and abductor minimi digiti, all of which we have already described, also the lumbricales, and interosseĭ.

Q. Describe the *Lumbricāles?*

A. They *arise* from the tendons of the extensor longus digitorum just where it divides, are four in number, run forwards through the digitations of the palmar aponeurosis to the first phalanx, creep over the convexity of the bones, unite with the long extensors, and are *inserted* into the inside of the first phalanx, and into the tendinous expansion on the upper part of the toes; they assist in flexion and adduction of the toes.

Q. Is the *Flexor digitorum accessorius*, (vel massa carnea Jacobi Sylvii) connected with the lumbricales?

A. No; this fleshy mass *arises* from the sinuosity at the inside of the os calcis, and tendinous from the fore and outer part of it; and forming a square belly, is *inserted* into the tendon of the flexor longus, just where the lumbricales commence from it; it assists the flexor longus.

Q. How are the *Interosseĭ* muscles divided?

A. Into three internal, and four external.

Q. Describe the *Interosseĭ interni?*

A. They *arise* tendinous and fleshy from the inner and under part of the metatarsal bones of the small toes, and are *inserted* into the base of the first phalanx of the three small toes.

Q. Describe the *Interosseĭ externi*, or bicipĭtes?

A. They *arise* by two slips from the contiguous sides of all the metatarsal bones, are situated on the back of the foot, and are *inserted* into the sides of the base of the first phalanx of the small toes; so that their tendons, the tendons of the lumbricales, of the extensor longus, and of the extensor brevis, all unite upon the sides and back

of the toes, and form an aponeurotic sheath on the upper part of each toe.

OF THE BURSAE MUSCOSAE.

Q. What are you to understand by a Bursa Mucosa?

A. It is a bag or shut sac, placed most frcquently under the tendons of muscles, when they require space to play in.

Q. What is the general shape of the Bursae?

A. They are generally either round, or oval; hence they have been arranged under two great classes, the *Spherical*, and the *Vaginal Bursae*.

Q. What is the *structure* of a *bursa mucosa?*

A. The internal membrane of a bursa is thin, smooth, and lubricated by a fluid in all respects similar to synovia; its structure is the same as that of the internal layer of the capsular ligaments, of the pleura, periosteum, and of other serous membranes: the external membrane is common cellular substance, which unites the bursa to the neighbouring parts.

Q. What secretes the *lubricating fluid* in the bursae?

A. Within the bursae lie very small masses of fat, with fimbriae appended to them, and covered by a continuation of the internal membrane of the bursa; upon these masses numerous small ramifications of arteries are distributed, which make their colour of a pale red hue. By these, and the vessels of the internal membrane itself, the fluid is secreted.

Q. Have the Bursae any *lymphatics* and *nerves?*

A. Yes: the fluid secreted is absorbed by the lymphatics, and a constant renewal of it maintained; if this were not the case, they would become dropsical and burst: their lymphatic vessels, however, have hitherto eluded observation. In consequence of the extreme thinness of the coats of the bursae, nerves cannot be traced in them, and they seem in their healthy state possessed of but little sensibility, but when the bursae be-

ome inflamed, the great pain sufficiently demonstrates he presence of nerves in their structure.

Q. In what parts of the body are the bursae mucosae ost frequent?

A. They are chiefly to be found in the extremities, etween the tendons and bones, or ligaments, between endons which rub against each other, between tendons id their sheaths; and, in short, between all parts where ie necessary motions of the body occasion friction.

Q. What are the *uses* of the bursae mucosae?

A. They afford room for the parts coming in contact move easily; and the gelatinous mucus, which they ontain, lubricates those parts copiously, facilitates their ovements, and prevents the effects of friction.

OF THE BRAIN, AND ORGANS OF THE SENSES.

THE INTEGUMENTS AND ORGANS OF TOUCH.

Q. Of what parts do the common integuments of the dy consist?

A. Of *three;* the cuticle, rete mucosum, and cutis.

Q. Describe the *Cuticle*, or *Epidermis*, as shortly as ossible?

A. It is a thin, semi-transparent, insensible membrane, squamous and furrowed externally, and smooth ternally; it covers the whole surface of the body, except under the nails, and is reflected inwardly to line the ifferent passages; it is also perforated by the exhalant id absorbent vessels; by excretory ducts, and by the irs.

Q. What is the *use* of the Cuticle?

A. It protects the subjacent sensible parts; renders e sense of touch tolerable and pleasant; defends the dy from noxious substances; and regulates the exhaion and absorption of the skin.

Q. Describe the situation and structure of the *Rete Mucōsum?*

A. It is situated under the cuticle, which it connects with the cutis vera: it is composed of extremely minute vessels passing between the cutis vera and cuticle, and of fine cellular substance binding them together: it is not found under the nails.

Q. Is not the Rete mucōsum the seat of colour?

A. Yes: the cellular texture contains a mucilaginous viscid matter, which gives the native colour to different tribes and nations.

Q. What is the situation, and texture of the *Cutis Vera?*

A. It is situated under the corpus mucōsum, surrounds the whole body, is composed of fibres running in different directions, and intimately interwoven with each other; it is elastic, capable of great distension, and of recovering its former dimensions: its external surface is firm and dense, and its internal degenerates into cellular substance; it has innumerable perforations for the passage of exhalants, absorbents, sebaceous ducts, and hairs.

Q. Is the *cutis vera* furnished with many blood-vessels and nerves?

A. Yes: it is supplied with innumerable blood-vessels and nervous filaments, so that it cannot be punctured with the sharpest pointed instrument, without occasioning bleeding and pain; indicating the presence of a blood-vessel and nerve in the point punctured.

Q. Is the Cutis equally thick in all parts of the body?

A. No; it, like the cuticle, is thicker in the palms of the hands, and soles of the feet; thinner in the eye-lids, and lips, &c., where the sense of touch is most acute.

PHYSIOLOGY OF THE SKIN.

Q. What organs constitute the SENSE OF TOUCH?

A. The *nervous papillæ*, which are situated on the external surface of the cutis vera.

Q. Describe those *Papillæ Nervōsæ?*

A. They are small conical eminences, each composed of a fasciculus of nervous filaments, of an exhalant and an absorbent vessel, or perhaps of more: their bases sit upon the cutis, and their apices pierce the thin smooth membrane of the internal surface of the cuticle, and terminate under the squamous rough apparatus of its external surface: hence the extremities of the nerves are near to the objects of touch, an easy egress afforded to the perspirable matter from the exhalants, and a ready entrance of the fluid to be absorbed into the open mouths of the absorbents, provided the skin be naturally relaxed.

Q. Is the sense of touch augmented by any particular arrangement of the Papillae?

A. Yes; the cutis forms innumerable ridges, upon which the papillae are placed in double rows; these are disposed in a circular, winding, or parallel manner, very conspicuous in the points of the fingers, palms, lips, &c.

Q. What circumstances render the sense of touch more distinct and acute?

A. The thinness of the cuticle; number of the papillae present; flexion of the part, by which innumerable papillae come in contact with the object of touch; attention of the mind; and frequent exercise of the organ: hence the hand, tongue, lips, &c. are best fitted for touch, and have this sense in greatest perfection.

Q. Of what things are we enabled to judge by the sense of Touch?

A. By it we judge of the qualities of bodies, such as hardness, softness, roughness, smoothness, hotness, coldness, size, figure, distance, pressure, and weight.

Q. By what vessels is the PERSPIRATION thrown out on the surface of the body?

A. By the minute extremities of arteries, called exhalants, opening in the cuticle under the scales of its external surface.

Q. Is the halĭtus or insensible perspiration, and sweat

or sensible perspiration, the same, and emitted by the same vessels?

A. Physiologists are not agreed upon this point; but it is extremely probable that the sensible and insensible perspiration are emitted by the same exhalant vessels, and possess the same general qualities.

Q. What circumstances render *Perspiration* more copious?

A. A high temperature of the atmosphere, exercise, exhilarating emotions of the mind, good general health, and sometimes sudden fear, and debility of constitution.

Q. What purposes in the animal economy does *perspiration* serve?

A. It is one of the Emunctories, by which things useless, or hurtful to the body, are thrown out of the mass of blood: it carries off superfluous animal heat, and, by its quantity, so regulates the temperature of the body, that in every climate it is nearly uniform: and it thus prevents the occurrence of many inflammatory diseases.

Q. On what principles can *perspiration* carry off the *superfluous animal heat*, and cool the body?

A. On the *Chemical Principles of Evaporation:* for when a fluid is converted into vapour, it must have an increase of caloric to support it in that state: hence the fluid perspired receives an increase of caloric, which instantly converts it into vapour, from the surface of the body. While perspiration continues, the evaporation of the fluid on the surface of the body abstracts its superfluous heat, and thus maintains its temperature uniform.

Q. How can perspiration maintain nearly the same degree of temperature of the blood in every climate?

A. In northern regions, the perspiration is very inconsiderable, in consequence of the cold corrugating the texture of the skin, and contracting the exhalants: nay, fleecy warm clothing, which conducts caloric most slowly, is absolutely necessary to prevent the circumambient cold air from abstracting caloric from the ani-

mal body too rapidly, in its natural tendency to establish an equality of temperature among bodies: hence the superabundance of animal heat generated in the system is abstracted by the cold atmosphere alone. In tropical regions, however, the atmospherical temperature is high, producing copious perspiration, which being suddenly converted into vapour, abstracts caloric from the surface of the body, and maintains a constant refrigerating effect; whilst the moisture on the skin, in the form of sweat, and the temperature of the atmosphere being lower than that of the human body, co-operate in abstracting caloric from the body, and thus assist the refrigerating powers of evaporation of the perspired fluid; by which means, the temperature of the human body is kept pretty nearly the same in both these extremes of climate.

Q. Where are the *extremities* of the CUTANEOUS ABSORBENTS to be found?

A. In the cuticle: their extremities are situated under the scaly texture of its external surface, but they are so very minute, that they have not yet been distinctly seen in the human body, even by the assistance of glasses of great magnifying power. They are supposed, however, to commence there with their patulous extremities, or mouths open.

Q. How can it be proved that there are such vessels?

A. They have been seen in fishes, and experience has taught us, that various substances, as Opium, Turpentine, Mercury, and Camphor, can be taken into the system, when applied to its surface with gentle friction.

Q. Has Cutaneous Absorption not been denied by some eminent physiologists?

A. Yes; but it has been proved by others equally respectable.

Q. How could it then be denied?

A. They found that when the body, or a part of it,

say an arm, was simply immersed in a fluid, such as oil of Turpentine, the breath and urine did not communicate any of its odour, as they would have done, had absorption of Turpentine taken place. Besides the anatomist can handle and work among putrid parts of a subject, without receiving any injury from the absorption of putrid matter; a proof that none of it had been absorbed.

Q. Have not many Medical Men fallen *victims* to the absorption of putrid matter in time of dissection?

A. Yes: but in those instances the cuticle had been scratched, cut, or otherwise injured; and then absorption can take place most easily; as we know from inoculation either with Variolous, or Vaccine matter.

Q. Is the Cuticle, then, when entire, to be considered a defence against absorption; or does the cuticle prevent it from happening on the surface of the body?

A. The Cuticle, when sound, has certainly great power in defending the system against the absorption of noxious substances; but that power is limited, and depends upon certain circumstances; such as the temperature of the dissector's hands, the temperature and acrimony, or stimulating power of the fluid to be absorbed, &c, : for, if the hands of the Dissector are cold, or the fluid in which they are immersed is cold and of a bland quality, the texture not only of the cuticle, but also of the cutis, is constringed and corrugated, by which the mouths of the absorbents are contracted and completely shut; of course no absorption can take place. Again, if the fluid is acrid and stimulant, it forces the vessels to contract, and to shut their mouths; but a continuation of the stimulus applied may wear out and exhaust the contractile power of the vessels, and then absorption may happen.

Q. If the temperature of the Dissector's hands and the putrid fluid in which they are immersed, be nearly equal, could absorption take place?

A. Yes; particularly if the temperature be so high as the 60° or 70°; for then the texture of the skin is

relaxed, and the mouths of the absorbents are open, and ready to take in whatever mild fluid comes in contact with them.

Q. In ordinary cases, when Mercurial ointment is rubbed upon the surface, is its absorption owing to an abrasion of the cuticle, or what?

A. It has been supposed to be in consequence of abrasion of it; but were the cuticle abraded by the friction used, the stimulus of the mercury would excite great pain, and a contraction of the mouths of the absorbents in the part; whereas neither pain nor contraction of the vessels seems to take place. In order to promote absorption, the common temperature of the body, which keeps the texture of the skin relaxed, and gentle friction, which may insinuate the mercury under the numerous scales of the cuticle, that it may be brought into direct contact with the open extremities of the absorbents, are only necessary.

OF THE NAILS, AND HAIR.

Q. Whether do the NAILS belong to the Cuticle or Cutis?

A. They are appendages of the cuticle, they grow from it, and are removed along with it by maceration, or boiling water.

Q. What is the *structure of the nails?*

A. They are fixed to a semilunar fold of the cutis vera at their roots, which are covered by a reflection of the cuticle adhering to them; they are composed of longitudinal fibres disposed in lamellae; they are insensible, have no evident vessels, and derive their nourishment from the vessels of the cutis, to which they firmly adhere.

Q. What purposes do the nails serve?

A. They defend the extremities of the fingers and toes, and assist us in laying hold of minute bodies.

Q. Where are the *roots* of the HAIR situated?

A. Their roots, or bulbs, are situated under the cutis in the cellular substance.

Q. Describe the *bulbs* of the hair?

A. They are of various forms, and have blood-vessels dispersed upon them: each bulb is said to have two capsules or membranes, containing an oily fluid between them, from which the hairs derive their colour.

Q. What is the *structure* of the hair?

A. Different opinions have been entertained: some have thought that each hair is made up of a number of smaller ones inclosed in a membrane derived from the cuticle; others that each hair is a tube, through which the only fluid flows, which gives the hair its peculiar colour.

Q. What uses do the hairs serve?

A. They seem destined for warmth, ornament, and protection.

Q. What is the situation of the SEBACEOUS FOLLICLES?

A. They are situated under the cutis vera, and are most numerous in parts exposed to the air, and attrition.

Q. What is their *use?*

A. They secrete an oily fluid, which is carried by the sebaceous ducts to the surface of the body, and poured out for the purpose of lubricating the skin.

Q. Where is the ADIPOSE SUBSTANCE deposited?

A. The Fat or adipose matter is deposited in the cellular substance, and contained in small vesicles, that are surrounded by a net-work of blood-vessels; by which the oily matter composing the fat is supposed to be secreted.

Q. Do these vesicles communicate with each other, and with the common cellular substance?

A. They neither have any communication with each other, nor with the cellular substance.

Q. Have they excretory ducts for removing the fatty matter; or how is it supposed to be renewed?

A. No ducts have yet been perceived to come from them; the fat is supposed to transude from the vesicles, and to be taken up by the absorbents; for it, like other parts of the body, must be constantly changing, and renewed.

Q. Is *fat* deposited in all parts of the body?

A. No; it is wanting in the substance of the viscera, such as the brain, lungs, heart, liver, spleen, kidneys; and in other parts, as the scrotum, penis, eye-lids, and about the joints, where its bulk would have been inconvenient, but it surrounds some of them.

Q. What purposes does the fat serve?

A. It fills the interstices of various parts, gives beauty and form to them, defends delicate organs embedded in it; lubricates and facilitates the motions of various parts, as the external surface of the intestines, and affords nourishment to the system in various diseases, and to some animals during their dormant state.

Q. What is the situation and texture of the CELLULAR MEMBRANE?

A. It is a fine membrane, composed of many thinner layers irregularly joined together, which form innumerable cells communicating freely with one another. It binds the skin to the subjacent parts, is a general covering to the whole system; and, in short, forms a part of almost every organ.

Q. What are the purposes of its cells?

A. They admit of a considerable degree of motion to the contiguous parts, contain the adipose substance, and are every where moistened by an interstitial fluid.

Q. What is the *use* of the Cellular Membrane?

A. It connects the various soft parts of the system together, insinuates itself between the muscular fibres, and affords attachment to them: when more condensed, it forms the fasciae and tendons of muscles, and sheaths for them to play in; also the various membranes through-

out the body; the periosteum which covers the bones the ligaments and cartilages, which connect them.

OF THE BRAIN.

Q. How many membranes surround the brain?

A. *Three:* the dura mater, tunica arachnoidea, and pia mater.

Q. What is the texture of the *Dura Mater?*

A. It is very dense, is composed of tendinous-like fibres running in various directions, is the thickest and strongest membrane of the body.

Q. Does the *Dura Mater* adhere to the internal surface of the bones of the cranium?

A. Yes; it adheres firmly to the cranium by a number of blood-vessels and cellular threads, but more intimately at the Sutures, where the vessels are much more numerous.

Q. Does the inner surface of the Dura Mater adhere to the coat immediately within?

A. No; excepting at the Sinuses, where the veins enter: its internal very smooth surface is well lubricated by a fluid emitted from its exhalant vessels.

Q. What *processes* does the Dura Mater form?

A. It forms the falx major, the falx minor, and the tentorium cerebelli super-extensum.

Q. Describe the *Falx Major?*

A. The falx cerebri is composed of a doubling of the dura mater, is situated longitudinally between the two hemispheres of the brain, arises from the middle of the sphenoid, and crista galli of the ethmoid bone, adheres to the middle of the frontal, to the junction of the parietal; and, lastly, to the middle of the occipital bone; it becomes gradually larger, and terminates in the tentorium.

Q. Describe the *Tentorium cerebelli?*

A. It is formed by a duplicature of the dura mater, is connected with the transverse ridge of the occipital bone, with the ridges of the petrous portions of the tem-

poral bones, and with the posterior clinoid processes of the sphenoid bone: the posterior end of the falx major is attached to its middle.

Q. Describe the *Falx minor*, or *falx cerebelli?*

A. It descends from the middle of the tentorium, and from the under and back part of the falx major between the hemispheres of the cerebellum, is attached to the middle perpendicular ridge of the occipital bone, and terminates at the edge of the foramen magnum.

Q. Are any other parts formed by the Dura Mater?

A. The dura mater lines the superior orbitary fissures, and the different foramina of the cranium, and also forms a sheath for the spinal marrow.

Q. Does the Dura Mater form the sinuses?

A. Yes; the dura mater forms them in a doubling of its layers, which are stretched tensely and make a triangular canal between them and the bone.

Q. Enumerate the different SINUSES?

A. The principal are four, the superior longitudinal, the two lateral, and the torcular Herophĭli: besides these, there are other ten smaller sinuses, the inferior longitudinal, the circular sinus of RIDLEY, the two cavernous, two superior and two inferior petrōsal, the perpendicular occipital, and the anterior superior, and anterior inferior occipital sinuses.

Q. Is the Dura Mater supplied with many blood-vessels?

A. Yes; it must receive blood for its own nourishment, for part of that of the bones of the cranium, to which it forms an internal pericranium, and for the constant exhalation of the fluid, which moistens its internal surface.

Q. From what sources do its *arteries* arise?

A. Its principal arteries are the two Meningeal sent off from the internal maxillary: it receives branches also from the inferior pharyngeal, the ophthalmic, the occipital, and the vertebral arteries.

Q. Is the Dura Mater possessed of much *sensibility?*

A. In its healthy and sound state it is insensible;

which has been proved by experiments of pricking and injuring it, and by mechanical and chemical stimulants, without animals shewing any signs of pain: in its inflamed state, however, excruciating headach, and often delirium, are complete indications of its morbid sensibility.

Q. Where are the *glandulae* PACCHIONI situated?

A. Some flesh-coloured granulations are situated upon the external surface of the dura mater near to the longitudinal sinus, and have formed corresponding pits in the internal surface of the bones: others of a whiter colour are situated upon its internal surface and contiguous parts of the brain near the longitudinal sinus.

Q. What is the use of these bodies?

A. The use of these glands is quite unknown: it has been conjectured that they belong to the lymphatic system.

Q. What is the structure, and situation of the *Tunica Arachnoidēa?*

A. It is a very thin, transparent membranc, spread uniformly over the surface of the brain, and adhering closely to the pia mater by fine cellular substance, without insinuating itself between the convolutions.

Q. Is it sensible and vascular?

A. The tunica arachnoidēa is so thin and delicate, that neither blood-vessels, nor nerves have been seen in it: its sensibility and vascularity, therefore, must be very inconsiderable.

Q. Describe the texture, and situation of the *Pia Mater?*

A. The Pia Mater is a tender, thin, semi-transparent membrane, extremely vascular; which enters double between the convolutions of the cerebral substance, and also lines the different ventricles.

Q. What is the *use* of the Pia Mater?

A. It tends to support the tender substance of the brain, and to keep its blood-vessels in their relative situations, and to allow them to be divided into very minute branches.

Q. Whence does the Pia Mater receive its blood for nourishment?

A. From the branches of the internal carotid, and vertebral arteries.

Q. Is there any peculiarity in the course of *the veins* of the Pia Mater?

A. Its veins are similar to those in other viscera; but are peculiar in not accompanying their arteries, as veins of other parts do, for they all terminate in the sinuses of the brain.

Q. Describe the situation, and the divisions of the CEREBRUM?

A. The Cerebrum, situated in the fore and upper part of the cranium, is divided into two hemispheres by the falx: and each hemisphere is subdivided into three lobes, an anterior, a middle, and a posterior.

Q. What is conspicuous on the surface of the brain?

A. Its substance is disposed in various turnings and windings, termed *convolutions*, which are of different sizes and lengths.

Q. Describe the appearance of the substance of the brain after having made a horizontal section nearly on a level with the corpus callōsum, and having removed the upper part?

A. The exterior substance is of a greyish ash colour, and termed *cineritious*, or *cortical*: the interior is white, and called *medullary*. The cineritious surrounds the medullary substance, and enters deep between its convolutions.

Q. What is called the *Centrum ovale* VIEUSSENII?

A. The medullary nucleus of an oval form in this section.

Q. Describe the *Corpus Callōsum*?

A. The corpus callosum is medullary substance, situated in the longitudinal middle line under the falx, and composed of transverse fibres, which unite the two hemispheres, meet and form a longitudinal *raphè* in its middle. It gradually becomes broader towards the posterior end.

Q. Describe the situation, and structure of the *Septum Lucidum?*

A. It is placed immediately under the raphè of the corpus callosum, to which it is connected above, and it rests upon the fornix below. It is transparent, hroader before, curved at its under edge, and becoming narrow behind: it is composed of two laminae, a little separated from each other at its anterior part.

Q. Where is the *fissure* or *fossa of* SYLVIUS situated?

A. That fissure, also called the *sinus* of the septum lucidum, or *fifth ventricle*, is situated between the laminae at the anterior part of the Septum Lucidum.

Q. Does that fissure or fossa communicate with the other ventricles?

A. No: but in some Hydrocephalic cases, it, like the other ventricles, has been found full of fluid.

Q. How many *Ventricles* are there in the brain?

A. *Four:* two lateral, a middle, and an inferior one.

Q. Describe the *Lateral Ventricles?*

A. They are situated, one in each hemisphere, horizontally; are of an irregular winding figure, and have three cornua.

Q. How are these cornua situated?

A. The anterior are separated by the septum lucidum; the posterior are considerably distant, but approach nearer at their posterior extremities; the inferior cornua wind downwards and forwards in the middle lobes of the brain.

Q. What parts are to be seen *in the bottom* of the Lateral Ventricles?

A. The corpora striata, thalămi nervorum opticorum, taenia semicircularis of HALLER, choroid plexus, the fornix, and pedes hippocampi or cornua ammōnis.

Q. Describe the situation, and structure of the *Corpŏra striāta?*

A. They are situated near the anterior part of the ventricles, and recede from each other posteriorly; their structure is cineritious externally, and mixed with striae of medullary substance within.

Q. Describe the structure, and situation of the *Thalămi Nervorum Opticorum?*

A. Their structure is medullary on the surface, and striated within; their anterior parts are placed between the corpora striata; the Thalami lie with their flat inner sides contiguous, and are covered above by the commissūra mollis; the posterior parts of the Thalămi turn downwards and outwards, forming two white cords, called *tractus optĭci.*

Q. Where is the *Taenia Semicircularis of* HALLER, or the *Centrum Semicirculāre Geminum of* VIEUSSENS, situated?

A. In the groove between the corpus striatum and the thalămus optĭcus of each hemisphere.

Q. What is the situation, and nature of the *Choroid Plexus?*

A. It is spread over the thalami nervorum opticorum, and consists of a congeries of tortuous blood-vessels.

Q. Does the Plexus Choroides of the one lateral ventricle communicate with that of the other?

A. Yes; the plexus of each side communicates through the foramen Monroianum; and at the posterior and inferior part of the fornix, where the impression of the vessels form the lyra.

Q. Where is the *Foramen* MONROIANUM situated?

A. It is situated under the body, and near to the anterior crura of the fornix; and seems to be occupied by the vessels of the choroid plexus in the living subject, so as to admit of no foramen, but in the dead subject these vessels are empty, and the slender adhesions of cellular substance, which confined them in situ, are destroyed by putrefaction; hence an opening is manifest by the blowpipe.

Q. How can it be proved that the vessels of the Choroid Plexus fill up the space, called foramen Monroianum, in the living subject?

A. Because dissection has shewn one lateral ventricle to be full of effused fluid, while the other was empty.

Q. Is not the effusion, or extravasation of blood, more frequently in both lateral ventricles?

A. Yes; in Apoplexy, and in other diseases wherein effusion occurs, a rupture of a vessel may take place in one lateral ventricle, and produce a distension sufficient to rupture the adhesions of the cellular substance around the vessels of the choroid plexus in the foramen Monroianum, and thus force a passage into the other.

Q. What is the situation of the *Fornix?*

A. It is situated in the mesial line immediately under the Septum Lucidum, and by some considered a continuation of the corpus callosum.

Q. Describe the *Fornix?*

A. It has a body, two anterior crura, and two posterior.

Q. Describe the *body* of the Fornix?

A. It is somewhat triangular, narrow anteriorly, and broader behind, where it is united to the corpus callosum.

Q. What is the direction, and termination of the *anterior crura* of the Fornix?

A. The anterior crura being near together, form an angle at the anterior Commissure, bend downwards behind it, and either terminate in the Corpora Albicantia in the base of the brain, or wind round the Thalami, and terminate in the crura cerebri.

Q. Describe the direction of the *posterior crura* of the Fornix?

A. They are prolongated, and follow the curvature of the inferior cornua of the lateral Ventricles, form a part of the Pedes Hippocampi or Cornua Ammonis, and their inner, or concave, margin is fimbriated, and called Corpus Fimbriatum.

Q. Describe the Pedes Hippocampi?

A. They are composed of medullary matter externally, mixed with cineritious internally, commencing from the posterior crura, or pillars as they are sometimes called, of the Fornix; and from the sides of the posterior extremity of the Corpus Callosum, they are rather small at first, but increase in size towards their farther extremity.

Q. Describe the *anterior Commissure?*

A. It is a medullary cord, which unites the anterior and inferior parts of the Corpora Striata; it is convex anteriorly, and its extremities are lost in the middle lobes of the brain near the fossa Sylvii.

Q. Where is the situation of the *Lyra?*

A. It is an impression made on the inferior and posterior surface of the Fornix by the vessels of the Tela Choroidēa; and it is best seen by reflecting the Fornix backwards.

Q. What is the situation of the *Commissūra mollis?*

A. It is the connexion of the two thalami optici above, where they form one contiuued medullary surface, called Commissura mollis, which covers the third Ventricle.

Q. Describe the situation of the *third Ventricle?*

A. It is in the form of a deep fissure, situated between the bodies of the Thalami optici, having the commissūra mollis above, and the crura cerebri and pons Tarīni below.

Q. Where is the situation of the *Infundibŭlum?*

A. Under the anterior part of the body of the Fornix at the foramen Monroianum, there is a passage called *foramen commune anterius, vulva, iter ad infundibulum*, or *iter ad tertium ventriculum*, from which the Infundibulum of considerable size descends obliquely forwards, gradually contracting, till it terminates in the Glandula Pituitaria.

Q. Does the third Ventricle communicate with the Infundibulum?

A. Yes; at its anterior and superior part.

Q. Describe the *Glandula Pituitaria?*

A. It is of an oval form, situated in the Sella Turcica; is cineritious without, and medullary within.

Q. What is the *use* of the pituitary gland?

A. Its use is unknown.

Q. What is the situation of the *posterior Commissure?*

A. It is something similar to a short cord, running

transversely at the back part of the third ventricle, above the iter ad quartum ventriculum, and before the tubercula quadrigemĭna.

Q. Describe the situation of the *Tubercula Quadrigemina?*

A. They are situated at the posterior part of the third Ventricle, and behind the Thalami Optici: when the posterior part of the fornix and tela choroidea are removed, they come into view; or they may be seen by lifting up, and turning forward the posterior lobes of the brain.

Q. Have these tubercles any other name?

A. The two superior are called *Nates*, of a cineritious colour, and of a rounder form than the two inferior, called *Testes*, of a medullary colour, and longer laterally.

Q. Where is the *Glandŭla Pineālis* situated?

A. The Pineal gland is situated on the posterior Commissure, over the nates, and under the back part of the fornix, it is of the size of a pea, and of a conical figure; its structure is cineritious.

Q. Where is the *Iter ad quartum Ventriculum*, Canalis medius, or Aquaeductus Sylvii, situated?

A. At the inferior and posterior part of the third Ventricle, that passage is found running backwards and downwards under the corpora quadrigemina into the fourth ventricle.

Q. What is the situation of the CEREBELLUM?

A. It is situated under the Tentorium in the fossae of the occipital bone.

Q. What is the general appearance of the Cerebellum?

A. It is roundish, but broader from side to side, is marked by numerous convolutions on its surface, and is divided by the Falx minor into two hemispheres.

Q. Does it consist of cineritious and medullary matter, as the cerebrum?

A. Yes; but the cineritious is more in proportion: the convolutions run transversely, and the alternations

of cineritious and medullary substance are beautiful on cutting the cerebellum vertically; the resemblance of a tree is strikingly correct, and it has been called *arbor vitae*.

Q. What composes the *Tuber Annulare*, or *Pons Varolii?*

A. The junction of the crura cerebri and cura cerebelli.

Q. Where is it situated?

A. The *Tuber Annulare* is situated on the back part of the sphenoid, and on the cuneiform process of the occipital bone.

Q. Where is the fourth Ventricle situated?

A. Between the Cerebellum, the under part of the Tuber annulare, and upper part of the Medulla Oblongata, the Valvula and Velum VIEUSSENII closes the intermediate spaces, and completes the cavity.

Q. What is meant by the *Medulla Oblongata?*

A. The medullary substance from the Tuber annulare to the foramen magnum becomes conical, and is generally called Medulla Oblongata.

Q. What is worthy of observation on the surface of the Medulla oblongata?

A. Four longitudinal eminences; the two *Corpora Pyramidalia* lying contiguous in the middle, and the two *Corpora Olivaria* on each side.

Q. Where does the medulla oblongata terminate?

A. Whenever it passes through the foramen magnum, it gets the name of *Medulla spinalis*.

Remarks.

Q. What is the *use* of the *Brain?*

A. It seems the medium through which the mind and body affect each other: it may be said to be the receptacle of sensation, and the instrument of thought; or the seat of the intellectual faculties.

Q. Have the various parts of the Brain their particular and individual functions to perform?

A. It is very probable that they have; as we see the nerves of the different senses arising from different parts of it; so the different portions of brain may contribute to the manifestations of mind.

Q. Have the different offices of particular parts of the brain been ascertained?

A. Various attempts have lately been made by Drs Gall, and Spurzheim, and their followers, to ascertain this; but we cannot with full confidence rely upon their conclusions being true; much observation is still wanted upon this head.

Q. Does the power of the intellectual faculties depend on the bulk of brain?

A. Brain in the human species bears a much larger proportion to the Spinal Marrow, than in animals; hence the superior intelligence of man must depend upon his quantity of brain.

Q. Does the difference of the quantity of brain then constitute the different degrees of intelligence among men?

A. No; a certain quantity of brain is essentially necessary; but it is on the just and requisite proportions of the different parts of brain to each other, and on the cultivation of the mental powers dependent upon these parts for their manifestation, that the different degrees of intellect seem to depend.

Q. Does intelligence, or even instinct, depend on a relative proportion between the brain and spinal marrow?

A. Yes, it seems so; for as the size of the brain diminishes, and that of the spinal marrow increases in animals; in the same ratio, instinctive intelligence decreases, while acuteness of feeling, and rapidity and strength of their motions increase.

ORIGIN OF THE NERVES.

Q. What is understood by a nerve?

A. It is a cord composed of cerebral substance cover-

ed by membranes, similar to those which surround the brain; thus its outer membrane is tough and fibrous in structure; its second coat is much thinner; and its third is vascular, and similar to the Pia Mater. Besides these coats, a membrane, called *Neurilēma*, divides its component filaments.

Q. Are nerves dependent on the brain for sensation and motion?

A. Yes; those which arise from it are, but they possess peculiar powers themselves, when they communicate with each other in plexuses or in ganglions, of giving an increase of substance and power to others proceeding from them; and when they arise from the spinal marrow, they are more independent of the brain.

Q. How many pairs of nerves arise within the cranium?

A. *Nine pairs*, together with the glosso-pharyngēus and accessorius, on each side.

Q. Describe the FIRST PAIR of nerves, called the Olfactory?

A. The *Olfactory nerves* arise by several striae from the corpora striata, run forward in a groove to the cribriform plate of the ethmoid bone, where each forms a bulb, from which various filaments are sent off, and pass through the cribriform plate, to be distributed upon the mucous membrane of the nostrils.

Q. Describe the origin and course of the SECOND PAIR, or Optic nerves?

A. The *Optic nerves* arise from the posterior part of the thalami optĭci, and partly from the tubercula quadrigemina: they converge and unite at the fore part of the sella Turcĭca; they afterwards separate, diverge, and each passes out of the cranium by the foramen opticum, into the orbit, in a winding manner, perforates the coats of the ball, and is expanded into the retina.

Q. Why does the optic nerve take a waving course in the orbit?

A. To prevent it from being overstretched in the different motions of the eye.

Q. Describe the THIRD PAIR of nerves, called Motores oculorum?

A. The *Motōres Oculorum* arise from the under, inner, and back part of the crura cerebri, by numerous threads, collected into their trunks; they perforate the dura mater at the sides of the posterior clinoid process, run along the upper part of the cavernous sinuses at the outside of the carotid arteries, and pass through the foramina lacera anteriora into the orbits, to be distributed upon all the muscles, excepting the trochlearis and abductor. It also reflects a small branch to assist in forming the opbthalmic ganglion.

Q. Describe the origin, and course of the FOURTH PAIR of nerves, the Trochleāres or Pathetĭci.

A. The *trochleares* are very slender, and arise from the Valvula cerebri behind the testes; each goes between the cerebrum and cerebellum, by the side of the pons Varolii, passes through the cavernous sinus, and out by the foramen lacĕrum anterius, and is entirely dispersed upon the trochlear, or superior oblique muscle.

Q. Describe the origin, and distribution of the FIFTH PAIR of nerves, or Par Trigemĭnum?

A. The Trigemĭni are large, and arise by an anterior and a posterior portion from the side of the Tuber annulare, where the crura cerebelli join it: each perforates the Dura Mater, enters the cavernous sinus, forms a plexus, which terminates in the GASSERIAN ganglion, out of which three branches are sent, namely, the ophthalmic, superior maxillary, and inferior maxillary.

Q. Describe the *Ophthalmic branch* of the fifth pair.

A. The Ophthalmic nerve at the side of the Sella Turcica, is connected by nervous substance with the trunk of the fourth pair, then rises a little, crosses over the third pair, goes out by the foramen lacerum into the orbit, and sends off three principal branches, the lachrymal, nasal, and supra-trochlear; while the trunk passes through the supra-orbitary hole or notch, ascends the forehead, and receives the name of frontal nerve.

Q. Does the Ophthalmic assist in the formation of the *ophthalmic* or *lenticular ganglion?*

A. Yes; a small filament is sent off from the nasal branch, or from the trunk itself, to join the branch of the third pair, in the formation of that ganglion.

Q. Is any other nerve reflected from the Ophthalmic?

A. Yes; the *nasal* branch very generally sends a *filament* through the foramen orbitarium internum anterius, which re-enters the cranium, rises upon the cribriform plate, passes out with the Olfactory nerve, and is dispersed upon the anterior part of the nostril.

Q. Describe the *Superior Maxillary Nerve?*

A. This second branch of the fifth pair passes through the foramen rotundum of the sphenoid bone, and then sends off two principal branches, viz. the spheno-palatine, or lateral nasal nerve, and the palato-maxillary, or palatine; while the trunk itself afterwards enters the canal under the orbit, and, issuing, forms the infra-orbitar nerve.

Q. What particular branches does the Spheno-palatine nerve send off?

A. *Two;* one of which, the *Pterygoid*, is reflected and sent through the foramen pterygoideum of the sphenoid bone, to communicate with the great sympathetic in the carotic canal: the other branch of which, the *Vidian*, enters the foramen innominatum of the petrous portion of the temporal bone, to communicate with the portio dura of the seventh pair in the aqueduct of FALLOPIUS.

Q. What is the distribution of the *infra-orbitar nerve?*

A. While in the canal under the orbit, it sends off several small filaments to the bones, to the antrum maxillare, and to the teeth; it passes out by the foramen infra-orbitarium, and is divided into branches, which are dispersed upon the cheek, nose, and palpebrae.

Q. Describe the third branch of the fifth pair, or *Inferior Maxillary nerve?*

A. It passes out of the cranium by the foramen ovale,

sends off some small twigs to the contiguous muscles, and one of considerable size, named the *Lingual*, or *Gustatory nerve;* directing its course between the pterygoid muscles, it enters the foramen maxillare posterius; and when running along the canal, it gives off nerves to the teeth and substance of the jaw, and at last emerges by the foramen menti, to be dispersed upon the chin and under lip.

Q. What is the distribution of the *Lingual* or *Gustatory* branch?

A. It runs forward between the pterygoid muscles, gives off some filaments to them, to the submaxillary and sublingual glands, and ultimately terminates near the apex of the tongue, being chiefly dispersed upon its papillae.

Q. Describe the origin, course, and distribution of the SIXTH PAIR of nerves, named *Abducentes?*

A. It arises between the tuber annulare and corpora pyramidalia, from the beginning of the medulla oblongata, is very small, runs forwards through the cavernous sinus between the ophthalmic nerve and carotid artery; on the surface of this artery it sends down two or three filaments, which constitute the origin of the Great Sympathetic nerve; it afterwards passes out of the cranium by the foramen lacĕrum superius, and is entirely dispersed upon the abductor muscle of the eye.

Q. Describe the origin of the SEVENTH PAIR *of nerves?*

A. The seventh pair is composed of two portions, a portio mollis, and a portio dura; the *portio mollis*, or proper *auditory nerve*, arises by transverse medullary striae from the anterior part of the fourth ventricle, and partly from the tuber annulare; the *portio dura*, called also sympatheticus minor, or the facial nerve, arises from that part common to the pons Varolii, crus cerebelli, and medulla oblongata, is situated on the mesial side of the portio mollis; the two portions are afterwards applied to each other; the portio mollis having a groove on its surface, receives the portio dura.

Q. Describe the *course*, and *distribution* of the *seventh pair?*

A. This pair directs its course to the foramen auditorium internum, which it enters, and at the bottom of the foramen, the *portio dura* separates, and enters the aqueduct of Fallopius hy the superior and anterior foramen, passes along the canal of the aqueduct, and comes out by the foramen stylo-mastoidēum to be distributed upon the face and side of the head: The *portio mollis*, heing much larger than the former, is separated iuto two fascicŭli of nearly equal size; one of which by a number of fihrillae passes through the crihriform plate, in the bottom of the meatus auditorius internus, and is dispersed on the parts of the Cochlea; the other fasciculus passing through the cribriform plate, in a similar manner by fihrillae, is dispersed upon the Vestible, and three semicircular Canals.

Q. What nerves does the *portio dura* receive and give off, while it is passing through the aqueduct of Fallopius?

A. It first receives the Vidian nerve, being a *branch reflected* from the superior maxillary, and then, after passing a short space, gives off the *Chorda Tympăni*; in its passage, it sends also twigs to the mastoid cells, and stapedius muscle.

Q. Describe the course, and termination of the *Chorda Tympăni?*

A. The chorda tympani crosses the tympanum hetween the handle of the malleus, and inferior crus of the incus, along the memhrana tympani, and, after running alone the outside of the Eustachian tube, it terminates in the lingual hranch of the fifth pair; in its passage, it gives twigs to the muscles and memhranes of the tympanum.

Q. Describe the origin, and exit from the cranium, of the EIGHTH PAIR of nerves, called *Pars Vaga?*

A. The pars vaga, or eighth pair, arises from the medulla ohlongata at the side of the base of the corpus olivare, together with the Glosso-pharyngēus, which, by

some anatomists, is considered a part of the eigbth pair; the nervus Accessōrius ad par octavum, arises a little farther down from the termination of the medulla oblongata, and beginning of the medulla spinalis; hence, these three nerves arise from the side of the medulla in this order, the glosso-pharyngēus above, the pars vaga in the middle, and the accessorius the lowest. They all pass out of the cranium by the foramen lacĕrum posterius, but are separated from each other, and from the lateral sinus behind, by small processes of the dura mater.

Q. What course does the *Pars Vaga* take, and what branches does it send off shortly after its egress from the cranium?

A. It frequently becomes enlarged for nearly an inch after its egress; it descends at the outer and back part of the common carotid artery, and is included with it in the same sheath of cellular substance. At the upper part of the neck it sends off the pharyngēus; and soon afterwards the laryngēus superior; near the top of the thorax it sends a filament or two to join the cardiac nerves, and afterwards enters the thorax.

Q. Describe the principal communications and termination of the *Glosso-pharyngēus*, or *Linguālis laterālis* as it is sometimes called?

A. Immediately after its exit from the cranium, it sends a branch backwards to join the digastric branch of the portio dura: a little lower, it sends small twigs to communicate with others from the pharyngēus, and from the great sympathetic, to form a plexus, which embraces the internal carotid artery, and sends branches down to the heart: still lower down, it sends filaments, which communicate with others from the pharyngēus, to be distributed upon the pharynx and stylo-pharyngēus muscle; it then gives twigs to the tonsil, pharynx, and membrane of the epiglottis, and is dispersed upon the root of the tongue.

Q. Describe the communications, and termination of the *Accessorius ad par octavum?*

A. It first sends a branch to the pharyngēus, another smaller to the pars vaga, and at the fore part of the sterno-cleido-mastoidēus, it joins the sub-occipital by an arch, and frequently the first cervical by another; it then passes through this muscle, give branches to its substance, and terminates in the trapezius.

Q. Describe the origin, and egress from the cranium of the NINTH PAIR of nerves, viz. the *Lingualis*, and its communications?

A. It arises from the under and lateral part of the corpus pyramidale on the fore side of the medulla oblongata by numerous filaments; it passes out by the superior condyloid foramen, and afterwards is attached to the eighth pair by cellular substance; it separates, and is joined by a cross branch to the sub-occipital, or to an arch, which connects it with the first cervical: it descends between the internal jugular vein and internal carotid artery; at the root of the occipital artery, it sends down the Descendens Noni, and then crosses over both carotids behind the facial and temporal veins, and over the root of the facial artery, and is dispersed upon the middle of the tongue.

OF THE INTERNAL EAR.

Q. What parts does the *Internal ear* comprehend?

A. The Tympanum, Labyrinth, and passages leading into them.

Q. Describe the *Tympănum*?

A. The tympănum is somewhat hemispherical, separated from the external ear by the membrana tympăni, and from the labyrinth by an osseous septum, in the middle of which is a promontory that forms the tympanum into an anterior and a posterior region.

Q. How many openings lead out of the tympanum?

A. *Four;* one anteriorly into the Eustachian tube; another backwards into the Mastoid cells; and two through the osseous septum, viz. the *fenestra ovalis* above the promontory leading into the Vestible, and the *fenes-*

tra rotunda at the under and back part of the promontory leading into the Cochlea.

Q. What is the use of the *Eustachian Tube?*

A. It forms a communication between the posterior opening of the nostril and the tympanum, by means of which an equilibrium is preserved between the air in the external and internal ear; and the vibrations of the membrana tympani are facilitated.

Q. What is the use of the *Mastoid Cells?*

A. These cells have many windings and turnings which communicate with each other, and which are lined with a periosteum internum: they reflect the sound.

Q. Describe the situation and connexion of the *Ossicŭla Audītûs?*

A. They are four in number, and stretch across from the membrana tympani to the labyrinth: the handle of the *Malleus* is fixed to the membrana tympani, its round head is articulated with the body of the *Incus*, the long process or crus of the Incus is fixed to the *Os orbiculare*, which is connected with the head of the *Stapes*, whose base rests in the fenestra ovalis.

Q. What is the *use* of the Ossicŭla Audītûs?

A. They receive and communicate the vibrations of the membrana tympani to the labyrinth through the medium of the membrane covering the fenestra ovalis, much more strongly than they could have been transmitted in any other manner.

Q. What parts does the LABYRINTH consist of?

A. Of *three;* the vestible, cochlea, and semicircular canals.

Q. Describe the *Vestible?*

A. It is of an oval figure, situated at the inner side of the osseous septum near the base of the stapes; it has several holes leading out of it, namely, the fenestra ovalis into the tympanum, another at the fore and under part into one of the canals of the cochlea; five behind into the semicircular canals, and four or five cri-

briform perforations into the meatus auditorius internus.

Q. Describe the situation, and parts of which the *Cochlea* is composed?

A. It is situated at the fore part of the Vestible, in the petrous portion of the temporal bone, with its base towards the meatus auditorius internus, and its apex forwards and outwards. It is composed of an axis, a lamina spiralis, and two canals or scalae, which are separated by tbe lamina spiralis.

Q. Describe the *Axis* or *central pillar* of the Cochlea?

A. It is situated nearly horizontally, and is composed of two hollow cones, viz. tbe *Modiŏlus* and *Infundibŭlum* joined together by their apices; the base of the modiŏlus lies at the base of the cochlea, and the base of the infundibŭlum is covered by the apex of the cochlea, called *Cupŏla*.

Q What occupies the *cavity of the axis*, or of the modiŏlus and infundibŭlum?

A. The *fascicŭlus of the portio mollis* of the seventh pair of nerves destined for the cochlea; the osseous substance of the modiŏlus and infundibŭlum is cribriform, or perforated with numerous small holes, through which twigs of the nerve pass into the Scalae, to be dispersed upon the membrane lining them.

Q. Describe the structure and situation of the *Lamĭna Spirālis?*

A. It is osseous and largest at the base of the cochlea, where it winds round the modiŏlus; towards the circumference it becomes cartilaginous and membranous. It is composed of two lamellæ, perforated for the passage of nerves into tbe scalae. It winds round the axis from the base to the apex of the cochlea, and terminates in a hamŭlus or hook in tbe base of the infundibŭlum.

Q. Describe the *Canals* or *Scalae* of the Cocblea?

A. The one canal, commencing by an open mouth from the fore part of the vestible, is called *Scala Vestibŭli;* the other, commencing from the fenestra rotunda

of the tympanum shut by a membrane, is called *Scala Tympăni;* they form two turns and a half round the axis in a spiral manner, and becoming gradually smaller, they unite and terminate in the apex of the cochlea.

Q. Describe the situation, and direction of the *Semicircular Canals?*

A. They are situated behind the Vestible; the *superior* or *verticle* is placed transversely with its convex side upwards; the *posterior* or *oblique* is farther back, with its convex side backwards; and the *exterior* or horizontal is placed next the tympanum, with its curvatures nearly upon the same plane. They form about three-fourths of a circle; at one extremity is an enlargement, called *ampulla:* one extremity of the superior and posterior unite; and the three canals, in consequence, form five orifices, which are not closed by a membrane, in the Vestible.

Q. What covers the internal surface of all these parts of the Labyrinth?

A. A periosteum internum lines the cavities; and besides, upon the internal surface of the periosteum, a pulpy membrane is spread, upon which the portio mollis is minutely dispersed.

Q. What fills the cavities of the vestible, cochlea, and semicircular canals?

A. An *Aqueous fluid,* similar to the aqueous humour of the eye.

Q. By what vessels is that *Aqueous fluid* effused?

A. It is secreted by the arteries of the periosteum of the Labyrinth: and it is kept in nearly the same quantity by a corresponding absorption of it.

Q. What *arteries* are sent to the Labyrinth?

A. One or two small branches from the vertebral arteries: the veins of which pass out of the labyrinth and terminate in the end of the lateral sinus.

Remarks.

Q. What is the use of the various parts of the *External Ear?*

A. The cartilaginous pinna collects the undulations of sound, and transmits them into the meatus auditorius externus, which in its turn conveys them to the membrana tympani.

Q. What is the use of the *Membrana Tympani?*

A. It forms a complete separation between the external and internal parts of the ear: it receives the undulatory movements of the air, by which it is made to vibrate: and its vibrations are communicated by the ossicŭla auditus, and by the air in the tympanum to the labyrinth of the internal ear.

Q. By what means is the membrana tympani kept in a state of tension proper for acute hearing?

A. By the muscles of the tympanum and ossicula, it accommodates itself to the strength of the impressions of the sonorous undulations; thus it is relaxed to receive strong impressions of the undulatory movements of the atmosphere, and by them too it is made tense to receive fainter and weaker impressions; while the Eustachian tube allows a free egress and ingress of air into the tympanum itself, by which the vibrating motions of the membrana tympani are kept free and easy.

Q. By what means are the undulations of sound transmitted to the whole internal ear?

A. The strongest impressions are communicated to the vestible by the connected medium of the ossicŭla, while weaker impressions are communicated to the cochlea through the fenestra rotunda.

Q. What seems to be the reason of the stronger impressions being given to the vestible, and the weaker ones to the cochlea?

A. Because, through the medium of the vestible, the undulations of sound are communicated to the three semicircular canals, and to the scala vestibŭli of the cochlea; while the undulations received through the medium of the air in the tympanum are communicated through the fenestra rotunda to the scala tympani of the cochlea only: hence the reason, why the base of the stapes is placed in the fenestra ovalis, through

which the stronger impressions must he sent to the Labyrinth, rather than in the fenestra rotunda, where much less strength of impression is required.

Q. Does the *Aqueous Fluid* in the labyrinth receive motion from the vibrations of the membrana tympani?

A. Yes; the *aqua labyrinthi*, by the vibrations of the membrane covering the fenestra ovalis, is put into undulating motions, which are conveyed through the vestible, round the semicircular canals, and along the scala vestibuli into the cochlea; while the fluid in the scala tympani, by the vibrations of the membrane covering the fenestra rotunda, is also put into undulating motions, which pass along the canal, and meet those of the scala vestibuli in the apex of the cochlea, where the two scalae of the cochlea are united.

Q. How is the *sensation of sound excited* by these means?

A. The portio mollis of the seventh pair of nerves is very minutely dispersed upon the internal surface of the pulpy membrane lining the cavities of the labyrinth with which the aqueous fluid is in contact. The delicate extremities of the nerves, therefore, receive impressions from the undulating motions of the fluid, which excite in the mind the sensation of sound.

Q. What are the ORGANIC DISEASES of the external parts *of the Ear?*

A. The pinna is sometimes divided: it is swelled in consequence of Erysipelas, Herpes, and other cutaneous eruptions: the meatus is sometimes obstructed by insects, extraneous bodies, or wax hardened and accumulated; or by Polypi growing from the membrana tympani, which is occasionally inflamed; sometimes a small phlegmon in the meatus produces Ear-ache. By all which deafness is produced.

Q. What are the *Organic Diseases* of the *internal Ear?*

A. The Tympanum is sometimes inflamed and ulcerated in consequence of injuries, and acute diseases,

as Small-Pox, Measles, Scarlatina, or of Lues Venerea; and the Ossicula situated across it are cast out. The Eustachian tube is occasionally obstructed by previous inflammation. The Portio Mollis is sometimes paralysed. Coagulable lymph has been found in the Vestible. Deafness, generally complete, is the consequence of these.

OF THE EYE.

Q. How many bones are concerned in the formation of the orbit?

A. The *Orbit* is composed of *seven bones*, namely, the frontal, sphenoid, ethmoid, lachrymal, palate, superior maxillary, and malar.

Q. Enumerate the *external appendages* of the eye?

A. The supercilia or eye-brows, palpebrae or eye-lids, tarsi, ciliary or Meibomian glands, and cilia or eye-lashes.

Q. What are the *Tarsi*, and where are they situated?

A. The tarsus is a thin cartilage, broadest in the middle, and becoming narrow towards its extremities, situated in the margin of each palpebra.

Q. Describe the situation and use of the *Ciliary Glands?*

A. These glands are numerous, and are placed between the tarsus and the membrane lining the eye-lid: they secrete an oily or sebaceous matter, which facilitates the motions of the eye-lids, and prevents them from sticking together during sleep.

Q. Enumerate the LACHRYMAL ORGANS?

A. The lachrymal gland, caruncŭla lachrymālis, valvŭla vel plica semilunaris, puncta lachrymalia, canaliculi lachrymales, lachrymal sac, and the nasal duct.

Q. Describe the situation, and nature of the *Lachrymal Gland?*

A. The lachrymal gland is situated in a sinuosity under the temporal end of the superciliary ridge of the

frontal bone; it is of the conglomerate kind, is oblong and a little flattened, has several excretory ducts, which terminate on the inside of the eye-lid near the outer angle of the eye; it secretes the tears which are poured out by its ducts upon the eye-ball. There is also a cluster of smaller lachrymal glands situated between the larger gland and the upper eye-lid.

Q. What is the *Caruncŭla Lachrymalis?*

A. It is a small conglomerate gland situated in the nasal angle of the eye between the palpebrae and ball: it secretes unctuous or sebaceous matter for lubricating those parts; it separates the two puncta lachrymalia, and it directs the tears into them when the eye-lids are closed.

Q. What is the *Valvŭla* or *Plica Semilunāris?*

A. It is a fold or doubling of the tunĭca adnāta, or conjunctīva, situated between the caruncula and ball, of a crescent form, and with its extremities towards the puncta lachrymalia, it directs the tears into them, and thus assists the caruncula.

Q. Describe the *Puncta Lachrymalia?*

A. These two puncta or orifices are situated near the inner angle of the eye, the one in the upper, and the other in the under eye-lid, at the extremity of the tarsus, exactly opposite to each other: each is surrounded by a cartilaginous circle, which keeps it open. They are simply the orifices of the canalicŭli lachrymales.

Q. Describe the *Canalicŭli Lachrymāles?*

A. These two small canals run in the direction of the edges of the eye-lids, between the puncta lachrymalia and lachrymal sac, in which they terminate.

Q. Describe the situation, and use of the *Lachrymal Sac?*

A. It is somewhat of an oval shape, situated just below the inner canthus or angle of the orbit, in a groove formed by the os unguis and os maxillare: it is composed of a tough mucous membrane of great vascularity, and is a little contracted at its lower end,

which communicates with the nasal duct. It receives the tears from the canaliculi lachrymales.

Q. Describe the *Nasal Duct?*

A. This duct, composed of the same mucous membrane which forms the lachrymal sac, is situated in a canal formed by the superior maxillary bone and os unguis; runs obliquely downwards and backwards, and terminates by a round aperture at the lower end of the inferior turbinated bone. It transmits the tears into the nostril.

Q. Describe the *natural course of the tears?*

A. The tears secreted by the lachrymal gland, and by the cluster of smaller glands situated near it, are poured upon the ball of the eye by the excretory ducts opening near to the templar angle: they pass across the eye towards the nose, are diffused by the motions of the palpebrae and eye-ball over the anterior surface of the eye, are absorbed by the two puncta lachrymalia, are carried by the two canaliculi lachrymales into the lachrymal sac, and thence pass down the nasal duct into the back part of the nostril.

Q. What is the *use of the Tears?*

A. They moisten the eye-ball, facilitate its motions, and carry off dust and other foreign bodies which may accidentally get under the palpebrae: and are expressive of the depressing passions.

Q. What *Artery* and *Nerve* are sent to the lachrymal gland?

A. The *Lachrymal Gland* receives its blood from a branch of the ophthalmic artery; and its nervous influence from a branch of the ophthalmic nerve.

Q. What are the *Chemical Constituents of the tears?*

A. They consist of water, albumen, mucus, muriate of soda, soda, phosphate of soda, and phosphate of lime. The saline parts however are very inconsiderable.

Q. Is the natural course of the tears ever obstructed?

A. Yes; in Catarrh, the mucous membrane of the nostrils is inflamed; and in some severe cases, the inflammation follows up the nasal duct, thickens its mem-

brane so as to obstruct the passage: the tears in consequence flow over the cheek at the nasal angle, irritate, inflame, and excoriate the part. This gives rise to the disease named FISTULA LACHRYMALIS.

Q. How many COATS has the eye-ball?

A. *Three;* the sclerotic, choroid, and retina.

Q. Has it no other coats besides these?

A. Some anatomists enumerate the tunica adnāta, or conjunctīva, cornea, and iris, as coats of the eye, but they are merely partial, and seem rather appendages of the other coats.

Q. Describe the *Tunica Adnāta?*

A. The Adnata or Conjunctiva is a reflection of the skin from the internal surface of the eye-lids extending over the anterior part of the eye-ball, where it becomes very thin and transparent. It adheres to the subjacent parts by cellular substance, in which numerous blood-vessels are dispersed; this therefore is the common seat of OPHTHALMIA.

Q. What is the *use* of the *Tunica Adnata* or *Conjunctīva?*

A. It fixes the eye-ball to the palpebrae and socket, and prevents extraneous bodies from getting into the back part of the orbit.

Q. Describe the *Tunĭca Sclerotĭca?*

A. It is an opaque, white, elastic, fibrous membrane, of unequal thickness, possessed of little sensibility, and has but few arteries in its substance; it surrounds the greater part of the eye-ball, and terminates at the margin of the Cornea.

Q. What is the *use* of the *Sclerotic Coat?*

A. It determines the shape of the eye, supports and defends the more delicate and useful parts within it. The tendons of the muscles of the eye are spread upon, and inserted into its anterior part, they shine through the tunica adnata, which by this means has been called, near the margin of the cornea, the *Tunica Albuginea.*

Q. Describe the *Cornea?*

A. It forms tbe anterior transparent part of the eye-ball; it consists of thin lamellae; its convexity differs in different people, but it is more convex than the sclerotic coat, i. e. it forms part of a smaller circle than that of the eye-ball. Some anatomists bave considered it a coutinuation of tbe sclerotic coat.

Q. By what means can it be proved that the Cornea is not a continuation of the sclerotic coat?

A. Its lamellated transparent structure is quite unlike the dense, hard, opaque structure of the sclerotic coat: it separates from the sclerotic coat by slight putrefaction: in the Wbale, the circumference of the Cornea is received into a distinct groove in the concave margin of the tunica sclerotica; and besides, the cornea is a segment of a smaller circle than the sclerotica, and of course it is more prominent and convex.

Q. Has the *Cornea* many *blood-vessels* and *nerves* dispersed in it?

A. In its sound state, no blood-vessels are seen in it, but tbey can be seen when it is inflamed; its nerves are too small to be traced, but yet it possesses very considerable sensibility, and they must exist in it.

Q. What is the *use of the Cornea?*

A. It receives and transmits tbe rays of light to the humours of the eye, protects the delicate parts within, and contains tbe aqueous bumour.

Q. Describe the *Tunica Choroidēa?*

A. It is situated immediately witbin the sclerotic coat, to which it is connected by fine cellular membrane, blood-vessels, and nerves; it is thin, and very vascular, of a brown colour, is villous internally, and covered by the pigmentum nigrum, wbich seems to be secreted by the vessels of its internal surface, and lies between the cboroid coat and the medullary pulp of the Retina.

Q. What is the nature, and use of tbe *Pigmentum Nigrum?*

A. Its nature is very peculiar, being neitber altered by heat, by immersion in alcohol, nor by chemical tests. It prevents the reflection of the erring rays of light, and,

in consequence, the formation of a second image on the retina.

Q. Is the *Pigmentum Nigrum* always of the same colour?

A. No; it is thickest and blackest near its anterior part; becomes gradually thinner behind, and fainter towards the entrance of the optic nerve: in old age also it becomes more diluted, and of a much lighter colour. In fishes, graminivorous animals, and in those which go in quest of prey in the night, the Pigment, called *Tapētum*, is of a light shining colour, to strengthen and reflect the rays of light upon the surface of the Retĭna, that their vision may be more perfect.

Q. Where does the *Choroid Coat* terminate?

A. It begins where the optic nerve enters the eyeball, and adhering to the sclerotic coat terminates near to the crystalline lens under the ciliary circle or ligament.

Q. What is the *Ciliary Ligament* or *Circle?*

A. It is composed of dense cellular membrane, of a dark brown colour, in consequence of being tinged with the pigmentum nigrum: it is formed by the termination of the Sclerotic and Choroid coats, and the margin or beginning of the Iris; their junction seems the cause of the circular enlargement.

Q. What are the *Ciliary Plicae?*

A. They are folds of the choroid coat about 60 or 70 in number across the ciliary ligament; their extremities form the Ciliary Processes.

Q. What are the *Ciliary Processes?*

A. These processes are the termination of the plicae or striae, two or more of which form each; they float in the aqueous humour in the posterior chamber at the inner side of the commencement of the Iris: they seem to be the extremities of exhalant and absorbent vessels.

Q. What is understood by the *Corpus Ciliare?*

A. It is the blackish ring about the sixth part of an inch in breadth, adhering to the fore part of the Retina

and vitreous humour; it comprehends the ciliary plicae and ciliary processes in its substance.

Q. Describe the situation, and nature of the *Iris?*

A. The Iris is situated a little behind the cornea, runs transversely, is convex before, concave behind, and perforated in the centre by the Pupil: it, in short, forms a part of the same circle as the choroid coat; and some anatomists have thought it a continuation of that coat; but its evident muscularity discountenances such an idea. Its internal, or rather posterior surface, is covered by a pigment of the same colour as that of the choroid coat, called *Uvea;* when this is washed off, the Iris exhibits two sets of muscular fibres, one set disposed in the form of *radii,* which are well situated for dilating the pupil; the other fibres form a very distinct *sphincter muscle,* which surrounds the inner edge of the pupil and contracts it. The Iris divides the aqueous humour into two portions. It is furnished with many nerves, and endowed with great sensibility.

Q. What is the *use* of the *Pupil?*

A. The pupil being a hole in the centre, or middle part of the Iris, admits the rays of light to the internal parts of the eye, and allows the iris to contract and dilate itself according to the stimulus of light imparted to it.

Q. What is the *use* of the *Iris?*

A. The Iris placed across the anterior part of the eye, by its circular set of fibres contracts the pupil and excludes the rays of light when divergent, or too intense; by its radiated set of fibres, it dilates the pupil, in order to admit a greater quantity of rays: it thus regulates the quantity of light sent into the internal parts of the eye.

Q. By what stimulus is the *Iris excited to action?*

A. The movements of the Iris in man are involuntary, and depend upon the quantity of light which falls on the Retina, for it acts in sympathy with the Retina: thus when the rays of light are strong and very stimulating to the retina, its stimulus is communicated to the

iris, which instantly contracts the pupil, excludes a great portion of the light, and renders vision tolerable.

Q. May not the rays falling on the *Iris itself* in a strong light stimulate it to contraction, independent of any sympathy with the retina?

A. It is true that many rays must fall upon the Iris itself, and may impart a stimulus sufficient for its contraction in the various degrees of intensity of light; but it is generally supposed that they produce no motion of it.

Q. Is not the *Iris sensible* in some cases of complete *Cataract*, when no light can be admitted to stimulate the Retina; and in some of complete blindness in *Amaurōsis*, when the retina is paralysed?

A. Yes; in some cases of blindness, the Iris contracts and dilates the pupil more or less, according to the intensity of light presented to the eye; hence it may act more by the stimulus of light upon itself, than upon the Retina, which can scarcely be stimulated.

Q. Describe the *Retina?*

A. The Optic Nerve being tortuous at the back part of the orbit and eye-ball, invested with the Dura and Pia Mater, and removed from the axis of the eye a little towards the nose, passes by numerous fasciculi through a cribriform part of the Sclerotic and Choroid coats, and is then expanded into the delicate pulpy membrane of the Retina, which forms the innermost coat of the eye, proceeds forwards between the choroid coat and capsule of the vitreous humour, without adhering to them, and terminates at the greater diameter of the Crystalline Lens under the Corpus Ciliare.

Q. What is the *use* of the *Retina?*

A. The Retina is confessedly the seat of vision, to which all the other parts of the eye are subservient.

Q. Is there any thing particular in the *bottom of the Retina?*

A. Yes; in the centre of the Optic Nerve, where it enters the eye, the Artery called *Centralis Retinae* enters, and is minutely ramified upon the inner surface of the Retina. In the back part of the retina too, and ex-

actly in the axis of the eye, there is a *central foramen* of a dark colour, but becoming paler and yellowish towards its circumference. The nature of this is unknown. In the ox, however, and other large quadrupeds, a lymphatic vessel is observed to go through it.

Q. How many HUMOURS does the globe of the eye contain?

A. *Three;* the aqueous humour, crystalline lens, and vitreous humour.

Q. What is the nature, and situation of the *Aqueous Humour?*

A. The aqueous humour is perfectly clear and limpid, and occupies the space between the cornea and crystalline lens.

Q. Is it not divided?

A. Yes; the iris divides it into two portions; that between the crystalline lens and the iris called the *posterior chamber*, and that between the iris and cornea the *anterior chamber*.

Q. Does the aqueous humour in the anterior chamber communicate with that in the posterior?

A. Yes; the pupil is the medium of communication through which the aqueous humour can flow from the one chamber into the other.

Q. When the aqueous humour is evacuated, can it be renewed?

A. Yes; very quickly renewed.

Q. By what vessels is it secreted?

A. Chiefly by the exhalant arteries in the ciliary processes, and partly by those in the fore part of the iris.

Q. What is the use of the aqueous humour?

A. It distends the cornea, collects the rays of light, facilitates the motions of the iris, and defends the internal parts from injurious pressure.

Q. Describe the *Crystalline Lens?*

A. It is of a lenticular form and a crystalline appearance; and though a solid, yet has been classed among the humours of the eye. It has two convex surfaces, of

which the anterior is the less, and the posterior surface the more convex.

Q. Describe the *situation*, and *structure* of the Crystalline Lens?

A. It is situated exactly behind the pupil, and its posterior part is imbedded in the vitreous humour. It is composed of concentric lamellae, which become more and more firm and compact towards the centre of the lens.

Q. Is the *Lens* surrounded by a *Capsule?*

A. Yes; a very pellucid capsule called *Tunica Aranea*, or *Crystallina*, surrounds the lens.

Q. Does the Lens adhere to its capsule?

A. Very slightly, if it adheres to it at all.

Q. What is the *use* of the Crystalline Lens?

A. Its peculiar form converges the rays of light into a point, or focus, at a short distance from its posterior surface, on the retina.

Q. Describe the situation, and form of the *Vitreous Humour?*

A. It is situated in the posterior part of the eye, is round externally, where it is covered by the retina; is concave before where it receives the crystalline lens; is transparent and viscid, like the albumen ovi.

Q. Is the *Vitreous Humour* contained in a capsule?

A. Yes; it is called *Tunica Vitrea*, *Hyaloidea*, or *Aranea*, which sends processes into the body of the humour, forming cells that communicate freely with one another. Its capsule, near the corpus ciliare, is divided into two laminae, the external of which, adhering to the retina, passes forwards, and is inserted into the capsule of the lens; this layer has been called *Zonŭla Ciliaris*, the ciliary zone: the internal layer goes behind the lens and adheres to its capsule.

Q. By what name is that circular cavity denominated?

A. The *Canal of* PETIT, which lies between the ciliary zone and the capsule of the vitreous humour and of the lens; it has some transverse fibres running through it.

Q. Have these humours any blood-vessels dispersed in their capsules?

A. In the adult they are invisible; but in the foetus vessels are seen carrying red blood both in the capsule of the lens, and through the vitreous humour.

Q. What is the *use* of the Vitreous Humour?

A. It expands the coats of the eye, and gives shape to it, keeps the lens at a proper distance from the retina, refracts the rays of light, and thus renders the focus more perfect.

Remarks.

Q. What are the *general laws of Refraction* of the rays of light?

A. When the rays of light pass out of a rarer into a denser medium, they are refracted towards the perpendicular; and vice versa, when they pass through a denser medium into a rarer one, they are turned from the perpendicular.

Q. In what position is the luminous object depicted on the retina?

A. In an *inverted position*; because all the rays of light not falling perpendicular to the middle of the crystalline lens, cross each other; i. e. those on the left are refracted to the right, and those on the right pass to the left.

Q. How then do we see things in their proper position?

A. We are supposed to acquire the real position of objects by habit alone.

Q. How happens it that we do not see objects double, since the image of the luminous body is depicted upon the Retina of both eyes?

A. The two eyes in their sound and natural state move alike; hence the image is formed exactly on the same part of both retinae, and in consequence the vision is single. Some physiologists, however, suppose that we see with one eye only at a time.

Q. When the cornea and crystalline lens are *too convex*, what happens?

A. In such an eye the focus of the rays is formed before it reach the retina; in consequence, such people are *short-sighted*, and require concave glasses to remedy the defect of the eye, in order that they may see objects distinctly at the ordinary distance.

Q. What is the state of vision on the contrary, when the cornea and lens are *too flat*, or when the refracting power of the humours is diminished?

A. The focus is not properly formed on the retina, but behind it at some considerable distance, of course the image of the object is imperfectly depicted on it, therefore the object must be removed to a greater distance from the eye than ordinary to render vision perfect; which happens commonly to persons of advanced age: hence convex glasses become indispensably necessary.

Q. How do the eyes accommodate themselves to see objects at different distances?

A. By habit, the muscles of the eye increase or diminish the length of its axis, or its focal distance, according to the distance of the objects beheld; and the iris too allows a greater, or smaller quantity of light to be thrown into the eye; by which means vision becomes distinct.

OF ORGANIC DERANGEMENTS OF THE EYE.

Q. What organic derangements are the EYE-LIDS subject to?

A. They are frequently the seat of chronic, and sometimes of acute inflammation; are subject to *Stye*, or a small phlegmon, to tumours and warts, to ulceration at the roots of the cilia. The palpebrae are also turned outwards, called *Ectropium*; or inwards, called *Trichiăsis*, when the cilia irritate the eye-ball.

Q. What *organic derangements* affect the CARUNCULA LACHRYMALIS?

A. It sometimes becomes enlarged and prevents the shutting of the eye-lids, called *Encanthis:* the inflamed tumour sometimes suppurates, or remains for years in an indolent state.

Q. When the NASAL DUCT is obstructed by previous inflammation, what is the consequence?

A. The passage of the tears into the nose is prevented, the lachrymal sac is distended, and a tumour raised at the nasal angle of the eye; by pressing which, a yellowish viscid fluid issues from the puncta lachrymalia; sometimes the lachrymal sac is ulcerated, and the os lachrymale becomes denuded and carious. This disease is called *Fistŭla Lachrymalis.*

Q. What *Organic derangements* is the CORNEA subject to?

A. To specks growing on it; to pustules, and suppuration; to opacity from lympb effused between its layers; to fleshy or fungous excrescences connected with it; sometimes, though very rarely, to partial ossification, or to hairs growing on it.

Q. What *organic diseases* are the COATS of the eye subject to?

A. To inflammation and subsequent suppuration.

Q. What organic derangements are the HUMOURS of the eye subject to?

A. The *Aqueous humour* is sometimes rendered turbid and opaque by the effusion of a yellowish glutinous fluid, the consequence of violence, or of inflammation.

Q. To what organic derangements is the *Crystalline Lens* or its *Capsule* subject?

A. The Crystalline Lens frequently becomes opaque, soft, and rather enlarged: sometimes, but much more rarely, it becomes harder and smaller; its Capsule sometimes becomes thickened, opaque, and adheres to the Iris. This forms *Cataract.*

Q. What are the organic derangements of the *Vitreous humour?*

A. It sometimes becomes turbid in consequence of inflammation, or is secreted in an unnatural quantity,

which causes the eye to protrude from its orbit; this is called *Dropsy* of the eye-ball.

Q. What are the organic derangements of the IRIS?

A. It frequently becomes inflamed, thickened, and changed in colour, by which the *Pupil* is either much contracted and immoveable or completely closed. When the inflammation of it is violent, lymph is effused from both sides of it, and produces opacity of the aqueous humour.

Q. What disease is the RETINA subject to?

A. Its diseases are not well ascertained; but when the retina loses its sensibility, or becomes paralysed, it constitutes the disease termed *Amaurosis*.

Q. Is the *Eye-ball* subject to any other organic diseases?

A. Yes; its organic structure is sometimes destroyed by *Cancer*, or by *Fungus Haematōdes*.

OF THE NOSE.

Q. What bones compose the Nose?

A. Fourteen; the two ossa nasi, two ossa maxillaria, and the os frontis on its upper and fore part; the os ethmoides, and two ossa unguis on its upper, inner, and lateral part; the two maxillaria superiora, two ossa palati, os sphenoides, two ossa spongiosa inferiora, and the vomer, on its under, inner, and back part.

Q. What parts are observable on the outer surface of the nose?

A. The *radix* or upper part, the *dorsum* or prominent ridge, the *apex* or point, the *alæ* or moveable lateral parts, and the *columna* or under part of the septum nearest the upper lip.

Q. Describe the number, and situation of the *Cartilages of the nose?*

A. The Cartilages of the nose are *five* in number: the middle one forms the anterior part of the septum narium; the two placed anteriorly form the tip, and the two posteriorly form the alae of the nose.

Q. What is the *use of the Cartilages* of the nose?

A. Their elasticity tends to defend the nose from external injuries, and to increase, or diminish the opening of the nostrils, by which the current of air inhaled through them may bring the odorous particles with more, or less force against the extremities of the olfactory nerves, and thus affect the sensation of smell.

Q. What parts are most deserving of observation in its internal surface?

A. The Nares, or Nostrils, commencing from the face, extend backwards to the fauces, upwards to the cribriform plate of the ethmoid bone, and to the body of the sphenoid; are separated by the septum composed of the nasal lamella of the ethmoid bone, of the vomer, and of the middle cartilage; and they contain the ossa spongiosa.

Q. With what parts do the posterior openings of the nostrils communicate?

A. They terminate in the fauces; receive the nasal duct, and eustachian tube on either side; and communicate with the maxillary, frontal, and sphenoidal sinuses.

Q. What membrane lines the cavity of the nostrils?

A. A thick spongy membrane, termed *membrana mucosa, pituitaria,* or *Schneideriana,* covers all the internal surface of the nostrils, enters also into the different sinuses, nasal ducts, eustachian tubes, fauces, and palate.

Q. Is this *Mucous Membrane* of the nostrils furnished with many blood-vessels and nerves?

A. Yes; it is very vascular and nervous; and being kept in a proper degree of moisture by the mucous emitted from the numerous follicles dispersed on its surface, it very considerably promotes *the sense of Smell.*

Q. From what sources does the *Nose* receive its blood-vessels?

A. Branches from the *facial,* and *internal maxillary arteries* are distributed upon the outer parts: and branches from the internal maxillary, and some twigs from the ocular arteries, are dispersed upon the internal parts of the nose.

Q. What *nerves* are dispersed upon the *nose?*

A. Filaments from the superior maxillary or second branch of the fifth pair; and from the portio dura of the seventh pair, are sent to the external parts of the nose: the whole of the Olfactory nerves, and some twigs from the first and second branches of the fifth pair, are distributed upon the mucous membrane of the internal parts. The Olfactory nerves very minutely spread on the surface of the pituitary membrane, constitute the *Organ of Smell*, while the other nerves supply the parts with their natural sensibility.

Q. Enumerate the ORGANIC DERANGEMENTS to which the *Nose* is subject?

A. In infants the nostrils is sometimes closed by a membrane stretched across them; its cartilages, and bones are sometimes destroyed by Cancer, or by Lues Venerea: it is exposed also to various external injuries; its mucous membrane frequently becomes inflamed and thickened, and gives origin to Polypi growing from it; its external surface is affected sometimes with an Herpetic eruption, which, when obstinate and corroding, is called *Noli me tangere*.

Q. Are the Sinuses connected with the nostrils the seat of organic derangements?

A. Yes: the inflammation of the mucous membrane of the nostrils is frequently communicated to that of the sinuses, and followed by ulceration and suppuration of these cavities. Sometimes tumours are found in them, accompanied with Caries and erosion of the surrounding bones. Cysts containing a watery fluid, or worms, have been found in the maxillary, and frontal sinuses.

OF THE MOUTH.

Q. What soft parts compose the mouth?

A. The lips, cheeks, gums, palate, velum palāti, uvŭla, and tongue.

Q. What membrane lines the mouth?

A. The common integuments reflected, and having

become extremely thin, line the internal surface of the mouth.

Q. Is the membrane changed when reflected into the mouth?

A. Yes; it is covered with fine villi, and constantly kept moist by Salīva and mucus.

Q. By what organs is the SALIVA secreted?

A. The salīva is secreted by the Parotid, Sub-maxillary, and Sublingual glands, on each side of the face.

Q. Describe the situation of the *Parotid Gland?*

A. It is somewhat of an oval form, situated between the meatus auditorius externus, mastoid process, and the angle of the lower jaw; it extends upwards to the zygōma, and forwards covering part of the massēter muscle.

Q. Describe the course, and termination of the *duct of the Parotid Gland?*

A. From different parts of the gland various ducts arise, which are united into one, named the *Parotid* or *Salivary Duct*, which passes from the upper and fore part of the gland transversely over the tendon of the masseter, and descending a little, perforates the buccinator, and opens into the mouth opposite to the space between the second and third molaris of the upper jaw.

Q. What is the situation of the *Sub-maxillary Gland?*

A. It is smaller and rounder than the parotid, is situated on the inside of the angle of the lower jaw, between it and the digastric and mylo-hyoidēus muscles.

Q. Describe the course, and termination of the *Duct* of the sub-maxillary gland?

A. The duct arises from its upper and fore part, passes forwards between the mylo-hyoidēus and genio-hyo-glossus, along the under and inner edge of the sublingual gland, to the side of the fraenum linguae, where it terminates in the form of a papilla behind the dentes incisores.

Q. What is the situation of the *Sub-lingual Gland?*

A. It is of a long, flat, and somewhat oval form, situated under the anterior part of the tongue, near the inferior maxilla; it is covered by the skin of the under

side of the tongue, its ducts terminate in several orifices on the sides of the fraenum near the gums.

Q. What circumstances promote the flow of *Saliva?*

A. The motions of the tongue and lower jaw in speaking and eating; the smell of savoury food; slight inflammation of the mucous membrane and throat; and the use of Mercury, &c.

Q. What is the *use* of the *Saliva?*

A. It moistens the mouth, facilitates the motions of the tongue, dilutes the food during mastication, and assists in its solution in the stomach.

Q. What are the CHEMICAL CONSTITUENTS of Saliva?

A. Saliva consists of a large quantity of water, Albumen, Mucilage, Muriate of Soda, and the Phosphates of Soda, of Lime, and of Ammonia.

Q. What *Organic Diseases* are the *Salivary Glands* subject to?

A. They are frequently inflamed, indurated, and considerably changed, or destroyed in their structure. Purulent matter, too, sometimes collects in the cellular substance connecting the lobules of the glands, or covering them.

Q. What are the *Diseases* of the *Salivary Ducts?*

A. The ducts are sometimes divided by wounds, or destroyed by ulceration, and then the saliva flows over the cheek, and occasions a fistŭla. They are sometimes dilated and obstructed by Concretions.

Q. What is the nature of the *Salivary Concretions?*

A. They are of a whitish colour, found generally in the ducts; but sometimes in the sub-lingual gland, and occasion Ranŭla. They consist of Phosphate of Lime united to coagulated Albumen.

OF THE TONGUE.

Q. What is the TONGUE?

A. It is a muscular mass, which is the principal organ of speech, and of taste, and has a considerable share in deglutition.

Q. What are its *connexions?*

A. The *Tongue* is firmly connected at the root to the Os Hyoides; at the sides by membranous ligaments to the styloid processes, and lower jaw; near the point by the fraenum to the parts below.

Q. Has the Tongue any thing peculiar in its texture?

A. Yes; its cuticle forms vaginae, which receive the apices of the Papillae; its corpus mucosum is thicker and more moist than in other parts of the body; its cutis vera is very copiously supplied with numerous blood-vessels, and nerves.

Q. How are the *Nervous Papillae* of the tongue divided?

A. Into three classes; the Papillae Maximae vel Capitatae; the Papillae Mediae; and the Papillae Minimae vel Villosae.

Q. In what parts of the tongue are these Papillae situated?

A. The *Papillae Maximae* are situated nearest the base of the tongue: the Papillae Mediae are scattered over its upper surface: the Papillae Villosae are the most numerous, and are most abundant near its apex; but they also occupy almost its whole inner surface.

Q. Has the Tongue any *mucous follicles* in its texture?

A. Yes; a great many are situated under its integuments, especially near its base.

Q. In what part of it is the *foramen caecum* of MORGAGNI?

A. At its root, and near its middle part, it is seen; it receives the terminations of several excretory ducts.

Q. What *arteries* are sent to the Tongue?

A. The *Arteriae Linguales*, one on each side sent off from the external Carotids.

Q. What *nerves* are sent to the Tongue?

A. The *two Gustatory nerves*, sent off from the Inferior Maxillary of the fifth pair, are distributed upon the *point* of the tongue; the ninth pair, the Linguales Medii, on each side terminate in its *sides* or middle parts;

and the Glosso-Pharyngēus on each side is dispersed upon its *raot*, and forms the Papillae Maximae.

Q. Enumerate the principal *uses of the Tangue?*

A. It is the principal organ of TASTE: it is the chief instrument of speech, hy articulating the voice; it turns the food in the mouth during mastication, and thrusts it backwards into the pharynx in deglutition; it is also useful in sucking and spitting.

Q. What *Organic Diseases* is the Tongue subject to?

A. It is inflamed, swelled, and ulcerated, from the irritation of Caries Teeth, of Lues, or of Mercury: it is sometimes covered hy Aphthae; or is cracked by deep fissures; or becomes cancerous; or scirrhous tumours grow in it, and degenerate into cancer.

OF THE PALATE.

Q. What separates the Mouth from the *Fauces?*

A. The *Velum Pendulum Palati* forms a partition which prevents the fluids we swallow from passing into the nostrils; and it conducts the fluid of the nostrils into the fauces.

Q. Where is the *Uvŭla* situated?

A. It hangs pendulous from the middle and posterior part of the Velum Palati, over the root of the tongue.

Q. How many arches does the Palate form?

A. Two on each side: the Anterior ones hegin from the side of the hase of the uvula, and are attached to the root of the tongue: the posterior extend also hetween the base of the uvula and the side of the pharynx.

Q. By what is the *Isthmus Faucium* formed?

A. By the two anterior arches of the palate.

Q. What are the *Organic derangements* of the *Palate?*

A. Its soft portion is often inflamed and ulcerated in Cynanche Tonsillaris, and eroded hy Lues Venerea, which also wastes its osseous portion. Polypi sometimes grow from it and hang into the pharynx.

Q. What are the *organic derangements* of the *Uvula?*

A. In inflammation of the fauces and palate, it is of-

ten swelled, relaxed, and elongated. Tumours sometimes grow from it.

OF THE TONSILS.

Q. What is the situation of the TONSILS, amygdălae, or almonds of the ear?

A. One is situated on each side of the fauces between the anterior and posterior arches of the palate.

Q. What is the *structure* of the *Tonsils?*

A. They are reddish-coloured oval-shaped glands, which have several openings on their surface, leading into cells communicating freely with each other.

Q. What do the *Tonsils secrete?*

A. They secrete a transparent mucus in their healthy state: but when inflamed, their secretion is whitish, and gives the appearance of a slough on their surface.

Q. What *organic diseases* are the *Tonsils* subject to?

A. They are very subject to inflammation, and its consequences, ulceration, and suppuration; very seldom to gangrene. They are sometimes so much enlarged that food or drink cannot be swallowed, or with very great difficulty. Calculi have been found in them.

OF THE PHARYNX.

Q. Describe the situation, and figure of the PHARYNX?

A. The Pharynx is somewhat of a conical figure, and is situated behind the tongue and nostrils, adhering to the bodies of the cervical vertebrae behind, and to the Larynx before; it terminates in the oesophăgus.

Q. What *communications has the Pharynx* with other cavities?

A. *Six;* two of which leads upwards and forwards into the nose; the orifice of the Eustachian tube on either side incircled by cartilage, and thereby kept always open, leading into the Tympăna; one forwards to the mouth, and two downwards, the anterior through the Larynx and Trachēa into the Lungs, and the pos-

terior directly down through the oesophăgus into the stomach.

Q. What is the *structure* of the Pharynx.

A. Its structure is muscular, consisting of different layers of fibres ; it is lined by a continuation of the mucous membrane of the mouth, perforated by the ducts of numerous glands and follicles, by which the mucus is secreted.

Q. What is the *use of the Pharynx ?*

A. The Pharynx receives the food from the mouth, and by the contraction of its muscles transmits it into the oesophăgus ; it also assists in modifying the voice.

OF THE LARYNX.

Q. What is the situation, and structure of the LARYNX ?

A. It is situated between the os hyoides and trachēa at the fore part of the pharynx, and is composed of five cartilages joined together by membranes, ligaments, and muscles.

Q. Describe the situation of these *Cartilages ?*

A. The *Thyroid* cartilage is the largest, and is situated at the upper and fore part, from its anterior and superior angle, a broad ligament ascends to fix it to the os hyoides ; and two round ligaments join its two ascending posterior and superior processes, or cornua, to the cornua of the os hyoides : the *Cricoid* cartilage is placed below the thyroid, where it is narrow, but rises up thick, broad, and strong behind the thyroid ; its under edge is horizontal, and firmly united to the commencement of the trachēa : the two *Arytēnoid* cartilages are small, and placed on the upper, posterior, and lateral parts of the cricoid at a small distance from each other : the *Epiglottis* is placed obliquely over the aperture of the glottis, it stands nearly perpendicular, and when the tongue is retracted, it is pressed down, and covers the passage into the larynx.

Q. Which of these cartilages contribute most to the tone of the voice?

A. The Arytēnoid and Epiglottis. The arytenoid cartilages are triangular, a little twisted, and bent backwards; their upper extremities are turned towards each other; their posterior surface is filled up by the arytēnoid muscles, their anterior is convex, with slight cavities, which are occupied by glands. They are connected to each other by the membrane of the larynx, and by muscular fibres; also to the Epiglottis by a membranous fold on each side, which form the sides of the aperture called *glottis*. The diminishing or enlarging of the glottis by its muscles, and the depressing or elevating of the Epiglottis by the movements of the tongue, change the tones of the voice.

Q. What *organic derangements* is the *Larynx* subject to?

A. Its cartilages sometimes become ossified, and its internal membrane is often inflamed and suppurated; the suppuration takes place in the sacculi laryngis, and there is a scrofulous thickening of the surrounding parts.

OF THE TRACHEA.

Q. What is the situation of the TRACHEA?

A. It descends from the under part of the cricoid cartilage in the fore part of the neck, between and behind the sterno-hyoidēi and sterno-thyroidēi muscles, passes into the thorax behind the curvature of the aorta, in the posterior mediastinum; opposite to the third dorsal vertebra, the trachea divides into two branches.

Q. Describe the *structure of the Trachēa?*

A. It has *four coats;* viz. a cellular, an elastic ligamentous, a muscular, and a mucous; the last of which is very irritable and vascular. The trachēa is also furnished with sixteen or eighteen cartilaginous rings incomplete behind, united together by an elastic ligamentous substance.

Q. Why are the cartilaginous rings of the trachēa incomplete behind, and at some distance from one another?

A. They are incomplete behind, that the trachēa may naturally occupy less space; but particularly that the membrane filling up the space between their extremities may give way to the bolus of food when passing down the œsophagus into the stomach; and that the tremors of these cartilages may be more considerable in the utterance of voice. They are at some distance from each other, that the length of the trachea may be varied in raising and depressing the chin for the utterance of acute and grave tones of the voice.

Q. Has the *muscular coat two layers* of fibres?

A. Yes; the external layer is circular between the cartilages and in the back part, where the cartilages are incomplete: the internal layer is longitudinal, and the fibres are collected into bundles.

Q. Is the innermost coat of the trachea kept always moist?

A. Yes; it is everywhere perforated by the ducts of mucous glands and exhalant arteries, which pour out much mucus and moisture upon its internal surface.

Q. What is the situation and use of the TRACHEAL GLANDS?

A. These glands are numerous and but small, situated in the posterior part, and between the cartilaginous rings of the trachēa; from them ducts issue, pouring their mucus upon the internal surface, which is thereby defended from the irritation of the inhaled air, or acrid particles carried in with it.

Q. What *organic derangements* is the Trachēa subject to?

A. Its internal membrane is frequently inflamed, and then throws out coagulable lymph, which is inspissated and formed into a layer of a yellowish pulpy matter, as frequently happens in *Croup*. The secretion from its glands too is much increased, and often mixed with pus, which greatly, and sometimes completely, obstructs the Trachēa and its branches. Its internal membrane has

been found thickened and tuberculated, and contracting its diameter for some inches. The cartilaginous rings of the trachea have been found ossified.

Q. How many *kinds of glands* are connected with the trachēa?

A. Three kinds; the thyroid, tracheal, and bronchial.

Q. What are the situation and structure of the THYROID GLAND?

A. It is situated beneath the larynx upon the fore part of the trachea, covered by the sterno-thyroid, sterno-hyoid, and omo-hyoid muscles, is composed of two distinct lateral lobes, united by a transverse portion, and these are made up of smaller lobules; it receives a great quantity of blood for its size, is of the conglomerate kind; and it is covered by a condensed cellular sheath.

Q. What is the *use of the Thyroid gland?*

A. The thyroid gland has a granulous appearance within, and a viscid fluid has sometimes been observed in it; anatomists have hitherto detected no excretory ducts coming from it; therefore its particular use is still unknown. It has been thought to lubricate the neighbouring parts.

Q. Is the thyroid gland often subject to disease?

A. Yes, particularly in some countries: this gland becomes greatly enlarged, and constitutes the disease called Bronchocēle, or Goitre.

Q. What change has been observed in the structure of the gland by Bronchocēle?

A. When the diseased gland was divided, a gelatinous fluid was found in its cells, or sometimes a bloody fluid. After unnatural enlargement from inflammation, ulceration has followed, and produced a scrofulous discharge. It is sometimes, though rarely, ossified; or dropsical; or indurated; or passes into Fungus Haematodes.

OF THE THORAX.

Q. How are the parts of the Thorax commonly divided?

A. Into the external and internal parts.

OF THE MAMMÆ.

Q. We have discussed the bones, and muscles of the thorax; describe now the situation, and structure of the *Mammæ?*

A. The mammæ are situated on the anterior and lateral parts of the thorax, adhering by cellular substance to the pectoralis major on each side. Their structure is whitish and glandular, being of the conglomerate kind: a great number of smaller glandular masses, separated by adipose substance, composes the mamma; and each of them has its lactiferous ducts, which unite with others, and form larger tubes that open in the papilla.

Q. What is the *nature of the Papilla*, or *Nipple?*

A. It is composed of tough cellular substance, enveloping the terminations of the lactiferous tubes opening upon its apex; it is red-coloured, and of a conical shape, its base is surrounded by the Areŏla, of a colour different from the rest of the skin.

Q. What is the *use* of the mammæ?

A. They ornament the breast of females, and secrete milk for their offspring.

Q. Do the mammæ differ in size at different periods of life?

A. Yes; in girls they are small; after puberty they become prominent; during utero-gestation they increase in size; after the cessation of the menses they become smaller, soft, flaccid, and pendulous.

Q. Does *Titillation* alter the size of the Nipples, or influence the secretion of the mammæ?

A. Yes; titillation of the nipple increases its size and distention; affections of the mind do the same. By titillating, handling, or applying a child frequently to the nipples, *milk* has been brought into the breasts both of young, and old women; nay, even into those of men.

Q. What *organic derangements* take place in the *Mammae?*

A. Their structure is frequently destroyed by inflammation and induration, or followed by suppuration; by scirrhous tumours; by cancer, &c.

INTERNAL PARTS OF THE THORAX.

Q. What are the internal parts of the thorax?

A. The pleura, mediastīnum, lungs, pericardium, heart, vessels, nerves, and thymus gland.

Q. Describe the PLEURA?

A. The pleura is a thin pretty strong membrane, whose external surface is cellular, adhering to the parts surrounding it; its internal surface is smooth and polished, moistened by a serous fluid emitted from its exhalant arteries. The pleura forms the mediastīnum, which divides the thorax into two distinct cavities. The pleura adheres to the internal surface of the ribs, intercostal and sterno-costal muscles, sternum, dorsal vertebrae, and upper surface of the diapbragm, and is called, *Pleura Costalis;* it also covers the pericardium and lungs, and is there called *Pleura Pulmonalis.*

Q. Do the contiguous surfaces of the pleura costalis and pleura pulmonalis not adhere?

A. Not in their natural and sound state; the exhaled fluid prevents adhesion: in cases of inflammation, however, they frequently adhere at the inflamed part. The potential space between them forms the cavity of the thorax.

Q. Describe the MEDIASTINUM?

A. It is double, being formed by a reflection of the pleura, whose two layers are united by cellular substance; the anterior mediastinum is connected with the sternum before, and with the pericardium and large vessels of the heart behind.

Q. What is contained in the *Anterior Mediastīnum?*

A. The two layers of the Mediastinum separate at the upper part of the thorax near the sternum, and include the *Thymus Gland.*

Q. What does the *Posterior Mediastīnum* contain?

A. It extends from the root of the lungs, and back part of the heart to the dorsal vertebrae: between its layers a triangular space is formed, containing the under end of the Trachēa, the Œsophagus, the Aorta Descendens, the Vena Azygos, the Thoracic Duct, and the two trunks of the eighth pair of Nerves.

Q. What is the *use of the Mediastinum?*

A. It divides the thorax into two cavities which do not communicate with each other; it supports their contents, and prevents the weight of the one side from pressing the other when we recline horizontally on one side; or any fluid effused in the one lung from passing into the other.

Q. What *organic derangements* is the *Pleura* subject to?

A. It is very subject to inflammation, during which its exhalant vessels pour out a great quantity of a serous fluid into the cavity of the thorax, and it is often mixed with pus: its texture is thickened and pulpy, and its surface is often covered with a layer of coagulable lymph, which forms adhesions to the contiguous parts. Some portions of the pleura have been found ossified. When pus is collected in the cavity of the thorax, it is called *Empyēma*. When a serous or watery fluid is poured out by the vessels of the Pleura into the cavities of the thorax, it produces *Hydrothorax*.

OF THE LUNGS.

Q. How many lungs are there?

A. *Two;* a *right*, which is divided into three lobes, and a *left*, which is divided into two, the heart occupying the middle space.

Q. Do the *Lungs* in their natural condition fill the cavities of the thorax?

A. Yes; they are in contact with the surrounding parts, and completely fill the thorax.

Q. What are the *connexions of the Lungs?*

A. They are connected with the trachēa by the bronchia, with the spine by the two layers of the Mediastinum, and with the heart by the pulmonary vessels.

Q. Is each lobe of the Lungs again subdivided?

A. Yes; each is again divided into a great many lobules of different forms and sizes; and these diminish, and ultimately degenerate into Cells or Vesicles.

Q. How many *Coats* have the Lungs?

A. *Two;* their *external coat* is a reflection of the pleura; their *internal* or *proper* coat adheres firmly to the former, insinuates itself between the Lobules, and is intimately connected with their cellular substance.

Q. Of *what Vessels* are the Lungs composed?

A. Of bronchial vessels, blood-vessels, absorbents, and nerves.

Q. Describe the *structure* of the *Bronchial Tubes?*

A. Their structure in the larger tubes is nearly the same as that of the trachēa, the cartilaginous rings are divided into pieces, which however can keep the tubes open; they become thinner, and after they have descended a considerable way into the substance of the lungs, the cartilaginous fabric disappears; the muscular coat goes down from the trachēa into the substance of the lungs upon the bronchial tubes, farther than the cartilaginous rings are observable: and after the bronchial tubes become small, having dropt their cartilaginous and muscular texture, the elastic ligamentous coat, and the innermost irritable membrane of the trochēa, are continued to their terminations in the numerous Cells of the lungs.

Q. Do the *Bronchial tubes* form many ramifications?

A. Yes, a great many; for there branch out from the larger tubes innumerable smaller ones, which being still much more minutely divided, are disposed in such a manner as to occupy the whole of the neighbouring space; their ramifications resemble the branches of a tree, and their terminations in the Cells a cluster of grapes: and this disposition is continued throughout the whole of the lungs, which are thus made, when the

bronchial tubes and cells are filled with air, to occupy the wbole internal space of the thorax, not taken up by other visccra.

Q. Is tbe *Membrane* which lines the bronchia a *mucous one?*

A. Yes; it is strictly speaking a mucous membrane; and this in a very thin attenuated state forms the innumcrable Cells at the terminations of the bronchial tubes.

Q. Wbat *Blood-Vessels* are dispersed thoughout the lungs?

A. The Pulmonary and the Bronchial Blood-Vessels.

Q. Describe tbe *Pulmonary Artery?*

A. This artery, arising from the Right Ventricle of the heart witbin the pericardium, ascends behind the sternum as high as the concave part of the arch of the aorta, wbere it divides into two branches; the right being the longest and largest, passes behind the curvature of the aorta, and the superior vena cava; these branches divide into ramifications, which accompany the bronchial tubes through the substance of the lungs.

Q. Describe also the *Pulmonary Veins?*

A. The extremities of these veins receive the blood from the extremities of the Pulmonary Arteries; they then unite and form larger and larger trunks, which accompany the course of the bronchial tubes and branches of the pulmonary artery; at last the pulmonary veins in each lung form two trunks, which, with the two of the other lung, making in all four venous trunks, terminate in the left auricle of the heart.

Q. Describe the *Bronchial Arteries?*

A. They arise from the anterior part of the Descending Aorta; two are commonly sent to each lung, they divide into minute brancbes, which follow the distribution of the bronchia through the lungs.

Q. Describe the course of the *Bronchial Veins?*

A. These Veins receive the blood from their arteries, unite into larger and larger trunks, accompany the branches of the broncbia, and terminate in the Vena Azȳgos, and left Superior Intercostal Vein.

Q. Describe the situation, and use of the BRONCHIAL GLANDS?

A. The bronchial glands situated in cellular substance around the trachea, where it divides into two branches, are large, of a purple colour, and belong to the lymphatic system, as numerous absorbents pass through them; they become smaller as they descend in the substance of the lungs.

Q. What course do the *deep-seated Lymphatics* observe in the Lungs?

A. They follow the course of the bronchial tubes in the same manner as the pulmonary veins do; and lastly, pass through the bronchial glands.

Q. What course do the *Nerves* take which are dispersed through the deep-seated parts of the lungs?

A. They arise from the anterior and posterior pulmonary plexuses near the division of the trachēa into the bronchia, accompany the branches of the bronchia and blood-vessels in the substance of the lungs, and are ultimately dispersed upon the internal membrane of the Air Cells.

Q. What connects the lobes, lobules, cells, bronchial tubes, blood-vessels, absorbents, and nerves of the lungs together?

A. *Cellular Substance*, completely destitute of fat, is interposed, it unites the different vessels and parts firmly together, and supports them in their relative situations.

Q. Have the *Cells* of the bronchial tubes any communication with those of the cellular substance of the lungs?

A. No; the bronchial cells communicate with each other through the medium of their tubes; but they have no communication with the common cellular texture of the lungs.

Q. Do the *Cells* in the cellular substance of the lungs communicate with each other?

A. Yes; most freely, as they do in other parts of the cellular texture throughout the system; hence when they are filled with an effused fluid, they constitute the disease called *Hydrops Pulmōnum*.

Q. What *Organic Derangements* are the lungs subject to?

A. The lungs are very subject to inflammation, abscess, tubercles, fluid accumulated in their cellular substance, to be changed by inflammation into a substance like liver, to be converted into bone in some parts, to small calcareous concretions formed in masses, which are sometimes split up, and to hydatids.

OF THE PERICARDIUM.

Q. To what parts is the Pericardium attached?

A. Its external coat fixes it firmly to the middle tendon of the diaphragm, and also to its muscular part opposite to the fifth rib; and to the mediastinum anterius, while the large vessels themselves fix it to the spine.

Q. What is the structure of the *Pericardium?*

A. It is composed of two layers, the external of which is a continuation of the Pleura; the internal is strong and tendinous-like, smooth within, and composed of fibres running in different directions.

Q. Is the *Pericardium* larger than the heart?

A. Yes; it is much more capacious than merely to contain the heart, and of course so large as to admit of the motions of the heart most easily.

Q. Does the *Pericardium* also cover the origin of the large blood-vessels near the heart?

A. Yes; its upper and anterior part is reflected upon, and includes the Aorta, Pulmonary Artery, and Veins.

Q. Does the Pericardium adhere to the heart?

A. No; from the exhalants of its internal surface a fluid is poured out, called *Liquor Pericardii*, which lubricates the surfaces, facilitates the motions of the heart, and prevents it from adhering to the Pericardium.

Q. What is the use of the Pericardium?

A. It keeps the heart in its situation, allows it to have free motion, defends it from injuries, and restrains its inordinate motions.

Q. What are the *Chemical Constituents* of the Liquor Pericardii ?

A. It contains much water, some Albumen, Mucus, and Muriate of Soda.

Q. What are the ORGANIC DISEASES of the *Pericardium ?*

A. Inflammation, and a pulpy thickening of its coats, while a layer of coagulated lymph is formed upon its inner surface: in some cases it has adhered to the heart: a fluid is sometimes effused within it: in some rare cases, it has been converted in some parts into cartilage, or bone; and scrofulous tumours have been found in it.

OF THE HEART.

Q. What is the situation of the Heart?

A. It is situated between the right and left lungs, resting upon the superior tendinous part of the diaphragm, with its apex between the lobes of the left lung, and behind the cartilages of the fifth and sixth true ribs.

Q. What is the *division* of the heart ?

A. It is divided into a *base* placed towards the spine ; a *body*, consisting of a right or anterior, and a left or posterior side ; and an *apex* turned forwards and obliquely to the left side.

Q. How many *Cavities* are in the Heart ?

A. Two Auricles at its base, and two Ventricles in its body.

Q. What separates the right cavities of the heart from the left ?

A. A middle septum, which is generally complete in the adult ; but it is perforated by the *Foramen Ovāle* between the right and left Auricles in the fœtus.

Q. What is the *structure of the Auricles ?*

A. The structure of the auricles is strictly muscular ; and besides, they have muscular pillars on their inner surface, called *musculi pectināti*, which have smaller co-

lumns or threads running in different directions, exhibiting a reticulated appearance.

Q. What is the *structure of the Ventricles* of the heart?

A. The parietes of the Ventricles are composed of a congeries of muscular fibres variously disposed; on their inner surface are several eminences, called *columnae carneae*, running in different directions, forming a net-work; from many of their extremities the *chordae tendineae* arise, as so many tendons from muscles, and are inserted into the margin of the tricuspid valves.

Q. What *use* do the *Musculi Pectinăti*, and the *Columnae Carneae* serve?

A. The former assist in the contraction of the Auricles, and the latter in that of the Ventricles; while the *chordae tendineae*, occupying less space and attached to the Valves, prevent them from going back into the Auricle.

Q. In what do the right auricle and ventricle differ from the left?

A. In the thickness and strength of their parietes; for the left ventricle having to propel the blood into the arteries of the system, is composed of parietes of greater thickness and consequent strength for that purpose; whereas the right ventricle having to propel the blood only through the lungs, is furnished with much thinner and weaker parietes.

Q. Are the right auricle and ventricle of a larger capacity than the left?

A. In the dead body the cavities in the right side of the heart seem the largest, in consequence of being distended with blood; but the actual capacity of these cavities in each side of the heart must be equal in the living body; otherwise an accumulation of blood would take place in the lungs.

Q. What is the situation, and structure of the *Tricuspid Valves?*

A. Between the right Auricle and Ventricle there is a tendinous ring, from the whole margin of which a

circular membrane arises, and forms three triangular or *tricuspid valves*, which when shut, and applied to each other, completely prevent the blood from flowing out of the ventricle into the auricle. The chordae tendineae attached to their margin keep them directly transverse when shut.

Q. What is the situation, and structure of the *Mitral Valve?*

A. Between the left auricle and ventricle, there is a circular margin from which the valve rises membranous, and is divided into two portions, which when shut, are adapted to each other so as to close the passage. The Valvula Mitralis has all the apparatus of the Tricuspid valves to keep it directly transverse when shut.

Q. Are both the portions of the *Mitral Valve* equal in size?

A. No; one of the portions, considerably larger than the other, shuts the mouth or origin of the Aorta while the valve is open, and the blood is flowing into the left ventricle; and when the regurgitation of the blood shuts the two portions of the valve in order to prevent its reflux into the left auricle by the contraction of the ventricle, the blood is propelled into the open Aorta.

Q. Are *Valves* placed at the *Mouths of the Pulmonary Artery*, and *Aorta?*

A. Yes; *Semilunar Valves* are placed at the mouth, or beginning of each.

Q. What is the structure, and appearance of the *Semilunar Valves?*

A. They consist of three membranous portions, each of which adheres to a third part of the internal circumference of the artery; the other edge is loose and thicker, having a hard corpuscle in the middle, called *corpusculum* AURANTII vel MORGAGNI. When these three portions are shut, they come close together, and prevent the reflux of blood into the ventricles, during which they are convex towards the ventricles, and concave next the arteries.

Q. Do the *Sinus Venōsus* on the right side of the

heart, and the Sinus Venōsus on the left, differ in structure from the proper Auricles?

A. Yes; the proper auricles of the heart are composed of strong muscular fibres: but the sinuses are formed by the junction of veins, and by consequence have the same structure as veins.

Q. Is the *structure of the veins muscular?*

A. Some anatomists have thought so; but it is generally believed that the veins have no muscular coat, and that they are composed of strong membranous coats possessed of much elasticity.

Q. Describe the veins which form the *Sinus Venosus* on both sides of the heart?

A. The *right sinus venosus* is formed by the junction of the Superior and Inferior Venae Cavae, which resembles a membranous bag; the *left sinus venosus* is formed by the union of the four Pulmonary Veins, making a sac equal to the size of the right sinus. The structure of both the venous sinuses of the heart, therefore, is purely membranous, as that of the veins is, which compose them.

Q. Describe the *course of the blood through the right side of the heart?*

A. The two Venae Cavae pour their blood into the right sinus and auricle, which make but one cavity; by the contraction of the auricle it is propelled into the right ventricle, which it stimulates to contraction, by which it is propelled into the Pulmonary Artery; for the Tricuspid valves being shut, prevent its reflux.

Q. Describe the *course of the blood through the Lungs?*

A. The blood propelled into the Pulmonary Artery stimulates it to contraction, by which the semilunar valves placed at its origin are shut, and the blood is forced into the smaller branches of the artery. The extremities of the branches of the Pulmonary Artery are minutely dispersed around the air cells of the bronchial tubes, and there transmit their blood into the extremities of the Pulmonary veins, which unite into larger

and larger trunks, that carry their blood towards the left auricle of the heart, in which they ultimately terminate by four trunks.

Q. Describe the *course of the blood through the left side of the heart?*

A. When the blood is poured by the four pulmonary veins into the left auricle, it is stimulated to contraction, by which the blood is driven into the left ventricle, which in turn being stimulated, contracts, shuts the Mitral valve, and propels the blood into the Aorta, and other arteries of the system, from which the veins receive it, and carry it again back to the heart.

Q. What prevents the blood from flowing into the Venae Cavae and pulmonary veins when the auricles of the heart contract themselves?

A. The weight of the column of blood in the veins, commonly called the *vis a tergo;* because no valves are placed at the terminations of the Venae Cavae and pulmonary veins.

Q. In what manner does the *Heart receive its* own *nourishment?*

A. From the blood which the two *Coronary Arteries* transmit into its substance.

Q. Describe the *origin* of the coronary arteries?

A. The *two Coronary Arteries* arise from the beginning of the aorta, opposite to two of the semilunar valves, which cover their mouths when the blood flows into the aorta; and when these valves are shut during the contraction of the aorta, the blood at the same time flows readily into the Coronary Arteries.

Q. What is the *course* of the Coronary Arteries?

A. The one runs in the depression between the right auricle and ventricle, and chiefly sends its blood to the right side of the heart; the other runs between the left auricle and ventricle, and partly also between the ventricles on the foreside of the heart. Their branches communicate freely.

Q. Describe the *course* of the *Coronary Veins?*

A. The Coronary Veins are all collected into one

called the *Great Coronary Vein*, which turning 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 a semilunar valve peculiar to itself.

Q. What are the ORGANIC DISEASES *of the heart?*

A. The heart is sometimes dilated in one side, or in both; and then its parietes are also much thickened; its valves are sometimes thickened and cartilaginous, or ossified; its coronary arteries are sometimes partly ossified; it is subject to inflammation, and has been found ruptured.

Q. Do *Organic Diseases* of the *large arteries* near the heart affect its functions?

A. Yes, very much, when the semilunar valves either at the commencement of the aorta, or pulmonary artery, are thickened or ossified; or when the aorta itself is in a state of Aneurism, the functions of the heart are irregular, disturbed, and imperfect.

OF THE VOICE.

Q. By what organs are vocal sounds uttered?

A. By the Cartilages of the Larynx, of the Trachea, and of the Bronchial tubes, and by the lungs propelling the air with force sufficient to excite sound.

Q. Describe the manner in which *Voice* is produced?

A. A pretty full inspiration is taken in, and while the glottis and epiglottis are prepared by the action of their respective muscles for producing a certain sound, the air is voluntarily propelled from the lungs, by which the different cartilages are put into tremors that agitate the air passing through the aperture of the glottis, and thus produce sound.

Q. How are those *Sounds* or *Tones* of the voice changed?

A. They are changed by an alteration in the aperture of the Larynx, by stretching or relaxing the Tra-

chēa; and by propelling the air from the Lungs with more or less force.

Q. By what means are *sharp* or *acute tones* of the voice produced?

A. By a narrow or small aperture of the glottis; by the trachea being made tense in consequence of the head and chin being raised; and by the air being forcibly propelled from the lungs, a shrill, acute tone of voice is uttered.

Q. By what means, on the contrary, are *grave tones* produced?

A. By a larger aperture of the glottis; by a relaxed state of the trachēa, and by forcing the air slowly out of the lungs.

Q. Whether do the organs of the *human voice* possess the properties of a *stringed*; or *wind instrument?*

A. They possess the properties of both; for the tension and tremors of the trachēa and bronchia, and even of the cartilages of the ribs themselves, correspond to the properties of a stringed instrument: while the adaptation of the aperture of the glottis, by means of the muscles of the Larynx, and by the application of the Epiglottis, corresponds to the properties of a wind instrument.

Q. Does the *human voice* possess also the *property of articulation?*

A. Yes; while the human voice possesses all the properties of stringed and wind instruments, it also by the assistance of the tongue articulates the tones into intelligible words, and thereby possesses also the properties of speech.

OF THE RESPIRED AIR.

Q. Do any changes take place on the Air inspired into the Lungs?

A. Yes; the air expired is loaded with vapour, and is charged with Carbonic Acid Gas, which is demonstrated by passing it through Lime Water, which is rendered turbid by the formation of Carbonate of Lime.

Q. From what source comes the *Carbonic Acid Gas?*

A. From part of the Oxygen of the inspired Air uniting chemically with the Carbon emitted from the blood.

Q. How is it proved that a portion of the Oxygen of the inspired air is thus disposed of?

A. It has been found by repeated and accurate experiments, that a portion of the Oxygen in the air inspired disappears, when it is expired; and that the quantity of oxygen necessary to constitute the Carbonic Acid expired is exactly equal to that which had disappeared.

Q. Whence comes the *Vapour* in the air expired?

A. The exhalant vessels of the lungs throw out a fluid, which by acquiring Caloric is converted into vapour, and emitted with the expired air.

Q. From what source comes the CALORIC *generated in the Lungs?*

A. From the difference of capacity of the Oxygen, and of the Carbonic Acid for retaining Caloric; for the Oxygen, when it forms a part of the atmospheric air, has a greater capacity for combining with and retaining Caloric, than it has when in combination with Carbon in the Carbonic Acid; hence a part of the latent Caloric is set at liberty, and becomes sensible, when the Oxygen changes its state, and enters into the formation of the Carbonic Acid. This evolution of Caloric is the source of heat communicated to the animal body.

Q. Does this evolution of free Caloric then increase the temperature of the lungs above that of other parts of the body?

A. No; but it would increase the temperature of the lungs very much indeed, were no provision made in the animal economy for its reception.

Q. By what provision of Nature is the *free Caloric absorbed* or disposed of in the lungs?

A. The venous blood is charged with *Carbon*, which, when the blood circulates through the lungs, is brought into near contact with the Oxygen in the bronchial cells, it separates from the blood, enters into combination with

part of the Oxygen of the atmospheric air, and forms *Carbonic Acid:* While the Blood, having thus lost its superfluous Carbon, has its capacity for receiving and entering into combination with Caloric much increased. The *Caloric*, therefore, as soon as it is evolved, by the Oxygen changing its state, is immediately absorbed by the Blood, enters into combination with it, and becomes latent.

Q. Is the *colour of the Blood* affected by the *Carbon?*

A. Yes; the blood much charged with carbon is of a purple colour; but when it has parted with the Carbon, it becomes much redder, and what is commonly called *arterial blood.*

Q. How does *Carbon* affect the *capacity* of the blood for retaining *Caloric?*

A. The matter necessary for the formation and deposition of particles, requisite for the renovation of wasted parts of the system, is prepared by the extreme arteries, whether in glands, or otherwise; and during that preparation Carbon is disengaged, and enters into the blood, which is received into the veins. In proportion as the Carbon thus accumulates, the capacity of the blood for retaining Caloric is diminished; the latent Caloric therefore is disengaged from its combinations, becomes sensible, and produces animal heat: and as the extremities of arteries are general every where in the system, so is the evolution of free Caloric, and the generation of animal heat.

OF THE THYMUS GLAND.

Q. Describe the situation, and structure of the THYMUS GLAND?

A. This gland is situated in the upper part of the thorax, between the layers of the anterior Mediastinum; it has two long cornua, extending upwards to the fore part of the neck, and two broad lobes below, lying over the Pericardium. It seems peculiar to the fœtal state; a whitish fluid may be squeezed out of it; no excretory duct has been detected issuing from it. It is large in the

fœtus; but, in the adult, it is so completely absorbed that scarcely a vestige of it remains, except cellular substance.

Q. What is the *use* of the *Thymus Gland?*

A. It seems to be of great importance in the fœtal state, as it is then large, and always present; but its use in the system has not hitherto been ascertained.

OF THE ŒSOPHAGUS.

Q. What are the situation, and course of the Œsophăgus?

A. The Œsophagus begins from the inferior part of the Pharynx, descends on the fore part of the cervical vertebrae behind the trachēa; in the thorax it passes down between the layers of the posterior Mediastinum behind the base of the heart, and turning slightly to the right descends upon the fore and right side of the Aorta Descendens; towards the lower part of the thorax it inclines forwards, and rather to the left, perforates the muscular portion of the diaphragm about the ninth dorsal vertebra, and terminates in the left and upper orifice of the stomach, called *Cardia.*

Q. How many *Coats* has the *Œsophagus?*

A. *Four;* a cellular, muscular, nervous, and mucous or villous; the external cellular coat connects the muscular to the surrounding parts; the muscular consists of two layers of fibres, the external layer has strong longitudinal fibres which shorten the tube, the internal has circular ones which contract its diameter; the nervous coat connects the muscular to the mucous or innermost coat, which is continued from the mouth, and has many longitudinal plicae when the œsophagus is collapsed, but they disappear when it is distended; this innermost coat is well lubricated with mucus.

Q. Whence does the *Œsophagus* receive its *blood?*

A. The cervical part of it receives branches from the Inferior Laryngeal arteries; the thoracic part from the Œsophageals, and branches of the Bronchials, which arise from the descending Aorta.

Q. What is the *use* of the *Œsophagus*?

A. It transmits the aliment from the mouth and pharynx to the stomach.

Q. What *Organic Derangements* is the *Œsophagus* subject to?

A. A fungous tumour hanging from the Pharynx, spasmodic stricture, stricture from a thickening and puckering of the inner membrane; it sometimes becomes partly cartilaginous.

OF THE ABDOMEN.

Q. What are the boundaries of the Abdomen?

A. It is bounded by the diaphragm above, by the pelvis below, by the abdominal muscles before and on the sides, and by the lumbar vertebrae behind.

Q. Into how many *regions* is the *Abdomen* generally divided?

A. Into nine; a transverse line from the last rib of the one side to that of the other, marks out the three superior regions, viz. the Epigastric in the middle, and the right and left Hypochondric on either side of it; another transverse line between the superior anterior spinous processes of the Ilia, divides the three inferior, viz. the Hypogastric region in the middle, and the right and left Iliac; from the three middle transverse regions, viz. the Umbilical in the middle, and the right and left lumbar regions on either side of it.

Q. What *Viscĕra* are contained *in the Abdōmen?*

A. The Chylopoietic Viscera; namely, the Stomach, Intestines, Omenta, and Mesentery; and the Assistant Chylopoietic Viscera, viz. the Liver, Spleen, and Pancreas. The Kidneys, fundus of the Bladder, and of the Uterus in gestation, are also in the abdomen.

OF THE PERITONEUM.

Q. What is the *situation* of the PERITONEUM?

A. The peritoneum is situated in the abdomen, is in

the form of a shut sac, the anterior and lateral parts of which line the parietes of the abdomen; the posterior cover and involve the intestines; and the superior part of it lines the under surface of the diaphragm.

Q. What is the *structure* of the *Peritonēum?*

A. It is a thin, firm, elastic membrane, its external surface is rough and cellular, adhering to the contiguous parts; its internal is very smooth and lubricated by a fluid exhaled from its own vessels.

Q. What is meant by the *cavity* of the Abdomen?

A. The cavity of the abdomen is between the anterior and lateral portions of the Peritoneum which line the parietes of the abdomen, and that portion of it which covers the intestines.

Q. What retains the Viscĕra of the abdomen in their respective situations?

A. The *Peritonēum*, which includes the intestines in a duplicature, and its substance forming two layers constitutes the Mesentery, Meso-Colon, and Omenta.

Q. What is the MESENTERY?

A. It is a doubling of the Peritoneum, including between its two layers numerous blood-vessels, lacteals, glands, nerves, fat, and cellular substance, which binds them together.

Q. What is the *situation* of the *Mesentery?*

A. It commences at the duodenum, where the intestine becomes moveable, includes the whole length of the Jejunum and Ilium in its duplicature, ends at the termination of the Ilium, and is situated between these small intestines and the lumbar vertebrae, where it becomes so contracted as to be attached to the first, second, and third lumbar vertebrae, running obliquely downwards towards the right side.

Q. What is the MESO-COLON?

A. It is that portion of the peritoneum, which after including the Colon in its duplicature, passes double between it and the body, and fixes it in its situation.

Q. How many OMENTA are there?

A. *Three;* the Omentum majus, or Omentum Gas-

tro-colĭcum ; the Omentum minus, or Omentum Hepato-gastrĭcum ; and the Omentum Colĭcum.

Q. What is the situation and formation of the *Omentum Gastro-colĭcum ?*

A. The Peritoneum gives a covering to the stomach ; the portion of it covering its anterior and superior side, and the other portion covering its posterior and inferior, meet at the large curvature of the stomach, are united by cellular substance ; this Omentum majus being double descends below the umbilicus, and is then reflected backwards and ascends, forming the posterior layer of the Omentum, and is attached to the transverse arch of the Colon. The Omentum majus thus composed of four layers of the peritoneum, neither adheres to the abdominal muscles, nor to the small intestines.

Q. Does the *Omentum majus* contain any thing between its layers ?

A. It contains much adipose matter, which exudes from it, and lubricates the external surface of the intestines.

Q. What seems to be the *use* of this *Omentum Gastro-colĭcum ?*

A. It is interposed between the abdominal muscles and the intestines, as a soft cushion to defend them from injuries, and to facilitate their peristaltic motions by its lubricating quality.

Q. What is the *situation* of the *Omentum minus ?*

A. This Omentum Hepato-gastrĭcum is composed of two layers of the peritoneum, and extends from the under and back part of the Liver to the whole small curvature of the stomach and beginning of the duodenum ; it does not contain much fat between its layers.

Q. What is the *use* of the *Omentum minus ?*

A. It binds the stomach to the great vessels and liver, towards the vertebrae of the spine ; for it extends from the liver to the small curvature of the stomach.

Q. What is the *situation* of the *Omentum Colĭcum ?*

A. It descends double from the right portion of the

arch of the Colon in a wedge-like form, and is connected with the Caput caecum coli.

Q. What is the *use* of the *Omentum Colicum*?

A. It retains the colon in situ from the right portion of its arch downwards in the lumbar region to the caput caecum.

OF THE CHYLOPOIETIC VISCERA.

Q. Into what parts is the *Alimentary Canal* divided?

A. Into the Pharynx, Œsophagus, Stomach, Duodēnum, Jejunum, Ilium, Caput Caecum coli, Colon, and Rectum.

OF THE STOMACH.

Q. What is the situation of the Stomach?

A. The Stomach is situated obliquely across the superior and posterior part of the abdomen in the left Hypochondric and Epigastric regions.

Q. What is the *form* of the stomach?

A. It is long and round, being much larger at the left extremity and tapering towards its right; it is curved from end to end. Between the Cardia, its left orifice, and the Pylorus, its right, the smaller curvature is placed; and the larger curvature extends along its inferior and anterior margin from the left to its right extremity.

Q. What parts is the stomach contiguous to?

A. Its large or left extremity is in contact with the Spleen, and is considerably higher than its pyloric extremity; which lies under the left lobe of the Liver: its superior part is in contact with the diaphragm, its inferior, with the intestines.

Q. By what is the stomach retained in its situation?

A. It is connected by the Cardia to the Œsophagus, by the Pylorus to the Duodenum, by the Peritoneum and blood-vessels to the Spleen, by the Peritoneum to

the root of the Liver and transverse arch of the Colon, and by blood-vessels to the Aorta.

Q. Is the stomach *moveable* at the *Cardia?*

A. The œsophagus at the Cardia binds it firmly down, and retains it in situ, but its body and larger curvature can rise up as it becomes distended with food, and it forms almost a right angle with the œsophagus.

Q. Is the *Pyloric extremity* of the Stomach fixed in situ?

A. The Pyloric extremity of the Stomach, situated under the left lobe of the Liver on the right side of the vertebrae, is lower, turned more forwards than the Cardia, is quite moveable, so that it can be drawn towards the Cardia by the contraction of the Stomach longitudinally.

Q. How many COATS *has the Stomach?*

A. *Four;* the peritoneal, muscular, nervous or cellular, and the inner or villous coats, bound together by cellular substance.

Q. Describe *these Coats?*

A. The *peritonēum* is reflected over the stomach, and gives it its external coat. The *muscular* situated immediately under the peritoneal coat, to which it adheres by cellular substance, is composed of two planes of fibres; the external plane is longitudinal, being continued from the œsophagus, extends from the large to the small extremity; and on each side of the small curvature being collected, they form a strong thick band: the internal plane bas thick, strong, circular, and transverse fibres. The *nervous coat* is composed of cellular substance intermixed with aponeurotic-like filaments crossing each other obliquely: The *inner* or *villous coat*, being the same as that of the œsophagus, only having a great many more prominent Villi crowded with minute vessels.

Q. Are the *nervous* and *villous coats* more extensive and larger than the others?

A. They are thrown into many *rugae* of a waving transverse direction when the stomach is empty; this appearance is the effect of the natural partial contraction of the fibres of the muscular coat; but when the stomach

is filled, they are stretched, and their rugae disappear: hence they are not more extensive than the other coats.

Q. What *use* can *these rugae serve* in the internal surface of the stomach?

A. They support the vessels and nerves dispersed in them; enlarge the internal surface of the stomach, and thus favour the flow of the Gastric Juice; and perhaps they tend to retain the aliment in the stomach till it be properly chymified.

Q. By what *apparatus* is the GASTRIC JUICE *secreted?*

A. It is secreted by the extremities of the arteries on the internal surface of the stomach.

Q. What is the *nature of the Gastric Juice?*

A. It is a limpid fluid, somewhat similar to saliva, of very great solvent power, of antiseptic properties, and well calculated to dissolve our food.

Q. Is there a *sphincter at the Cardia?*

A. No proper sphincter; but the muscular fibres are so disposed in various directions around it, and the end of the œsophagus projects a little into its internal surface, that nothing can return from the stomach towards the mouth, even when the head is turned downwards, unless ejected by vomiting.

Q. Describe the *Sphincter of the Pylōrus?*

A. The two innermost coats of the stomach form a large circular ruga or fold, that includes a fascicŭlus of muscular fibres, which form a ring projecting into the internal part of the passage. This muscular ring contracts, and completely shuts the passage from the stomach into the duodenum, and thus constitutes the Sphincter Pylori.

Q. What ARTERIES are sent to the Stomach?

A. The *superior gastric*, which is a branch of the Coeliac; the *right inferior gastric*, sent off from the Hepatic; and the *left inferior gastric*, sent off from the Splenic, are the principal arteries; but besides, the *arteriae breves* from the splenic are dispersed upon the left extremity of the stomach; and the *Pyloric branches* from the hepatic are distributed near to the Pylorus.

Q. Where do the veins of the stomach terminate?

A. They have their names from the arteries, they follow their course, and terminate in the Vena Portae.

Q. Has the *Stomach* many *Absorbents?*

A. Yes; the absorbents of the stomach are both numerous and large; they however convey Lymph and not Chyle, because chyle is scarcely, if at all, formed in the stomach.

OF THE DUODENUM.

Q. Describe the course, and situation of the Duodenum?

A. The Duodenum being the commencement of the small intestines, begins at the Pylorus, turns up and backwards by the neck of the gall-bladder; then bends downwards before the great vessels going into the liver, and before the renal artery and vein; and near the under part of the kidney, it makes a turn to the left side, going before the Aorta and Vena Cava at the first or second lumbar vertebra, and perforating the root of the Mesentery, and Meso-colon, it turns forwards and terminates at the left side of the spine in the Jejunum.

Q. How *many Coats* has the *Duodēnum?*

A. It has three complete coats, the muscular, nervous, and villous, and a partial coat from the peritoneum, which covers the anterior portion of it only; the posterior part of the Duodenum being fixed to the parts behind by cellular substance.

Q. Is there any thing peculiar in the coats of the Duodēnum?

A. Its muscular coat is very thick and strong; its villous coat has many mucous glands under it, especially near the pylorus; the Villi are very conspicuous, and becoming longer, are converted into Rugae; and lastly, into Valvulae Conniventes, towards the termination of the Duodenum.

Q. Do any of the *Lacteal Vessels* arise from the Duodenum?

A. Yes; when the Villi and Valvulae Conniventes become considerable near the end of the duodenum, the Lacteals are apparent.

Q. What is the *form*, and *use* of the *Valvŭlae Conniventes?*

A. They are fixed to the internal surface of the intestine by one side, and hang loose with the other; they are of different lengths, and the end of one is insinuated between the ends of two, occupying the interstices of each other. They afford a very extensive surface, on which the mouths of the Lacteal vessels open, and absorb the Chyle. They also in some degree retard the passage of the Alimentary mass, and give more time for the formation of Chyle.

Q. Is the *Duodenum perforated* by the entrance of any *ducts?*

A. Yes; the end of the Ductus Communis Choledochus, and the end also of the Pancreatic Duct, penetrate the coats of the Duodenum, very obliquely in its posterior part, just at the root of the Mesentery and Meso-Colon, and terminate in its cavity.

Q. Do the Biliary, and Pancreatic Ducts terminate separately in the posterior part of the Duodenum?

A. They most commonly terminate together, and sometimes separately, but always near to each other.

Q. Do the contents of the Duodenum not return into the open terminations of these Ducts?

A. No; their termination is so oblique in penetrating the coats, particularly the planes of muscular fibres, that the contents of the Ducts can be poured into the Duodenum when it is a little distended, but nothing can return into the Ducts?

Q. Why do these Ducts terminate in the posterior part of the Duodenum rather than in the anterior?

A. The posterior part of the Duodenum is always fixed, and affords a ready exit to the contents of the Ducts at all times: whereas the anterior part of it is moveable, particularly when the presence of aliment stimulates it to strong action; the terminations of the ducts

therefore would have been constantly changing their situation, and the egress of their contents would have been uncertain, and often interrupted.

OF THE JEJUNUM.

Q. What is the situation of the Jejunum?

A. The Jejunum begins at the duodenum, where the gut becomes moveable, it forms numerous convolutions in the upper part of the Umbīlīcal Region, and terminates in the Ilium.

Q. What is the *structure* of the *Jejunum?*

A. It has four coats; a complete one from the Peritonēum; a thin muscular, a nervous, and a villous coat; the Villi, Valvulae Conniventes, and Lacteals, are very numerous and conspicuous on its internal surface. It is smaller than the duodenum.

OF THE ILIUM.

Q. What is the situation of the *Ilium?*

A. It commences where the Jejunum terminates; the limit, however, is not well determined; the Jejunum is generally empty; the Ilium is smaller in diameter, and of a paler colour, it occupies the under part of the umbilical region, extending to the Hypogastric and Iliac regions, and in women sometimes to the cavity of the Pelvis.

Q. Do the *Coats of the Ilium* differ in any respect from those of the Jejunum?

A. The coats of the Ilium are generally thinner; its internal surface exhibits fewer and smaller Lacteals; the Valvulae Conniventes, though large at its commencement, gradually decrease in size and number towards its termination, and at last disappear. Mucous Glands are numerous and large near its termination.

Q. Where does the *Ilium terminate?*

A. Its extremity passes across to the right Iliac Re-

gion, and terminates in the left side of the Colon, about three inches from its beginning.

Q. Is any *Valve* placed at the termination of the Ilium?

A. Yes, the *Valvula Ilei*, or *Valvula Coli*; the Villous and nervous coats of the Ilium form a duplicature which incloses some circular muscular fibres, it projects into the Colon in the form of two lips, which are placed transversely in the posterior and left side of the Colon. The lips of the Valve are bound in their situation by the *Retinacula* or *Fraena* MORGAGNI, and admit of the passage of the alimentary mass into the Colon, but prevent any thing from returning into the Ilium.

OF THE COLON.

Q. Into what parts is the Colon divided?

A. Into the Caput Caecum Coli, Colon, and Rectum.

Q. Where is the Caput Caecum situated?

A. The *Caecum*, about three inches long, and nearly the same in diameter, is situated in the Right Iliac Region; its extremity is shut. The Appendix Vermiformis hangs from it.

Q. What is the *course of the Colon?*

A. It encircles the small intestines, beginning at the Caput Caecum, it ascends in the right Lumbar Region over the Kidney, to which it is connected, from the Kidney it forms an arch across the abdōmen, first passing, in the right Hypochondric, under the liver and Gall-Bladder, then in the Epigastric, and lastly, in the left Hypochondric region, under the stomach, being connected to the Duodenum; this is called the *Great Arch* of the Colon. In the left Hypochondric region, the Colon turns backwards under the Spleen, and descends in the left Lumbar region on the fore side of the Kidney, to which it is attached; in the left Iliac Region, it forms the Sigmoid Flexure, which is continued down into the Rectum.

Q. What fixes the *Colon* in its situation?

A. The Peritoneum surrounds the Colon, and between

it and the body its two layers are connected by cellular substance, and thus form the Meso-Colon, which retains the Colon in its place.

Q. How many *Coats* has the *Colon?*

A. Four; they are stronger and thicker than those of the small intestines. The longitudinal fibres of the muscular coat are collected into three fasciculi or bands, which begin at the root of the Appendix Vermiformis, and are continued along the Colon to the Rectum. The internal surface is divided into cells by transverse folds running from one longitudinal band to another.

Q. By what means is the feculent mass thrown out of these cells and moved along?

A. The muscular longitudinal bands are shorter than the rest of the Colon; the transverse muscular fibres included between the layers of the two internal coats forming the folds or partitions, and the circular muscular fibres dispersed upon the whole substance of the Colon, contract themselves, and move the contents of the gut towards the Rectum.

Q. What is the *use* of those *Cells* of the Colon?

A. The transverse septa answer the same purpose as the Valvulae Conniventes: they enlarge the inner surface of the intestine, and retard the too rapid movement of the feculent mass, that every particle of a nutritive quality may be absorbed.

Q. Are many Mucous Glands placed in the Colon?

A. In the Caecum there is a considerable number of pretty large ones; the appendix vermiformis too contains a number, they pour their mucus into the Caecum; many others are dispersed over the internal surface of the Colon, and the Rectum is well supplied with them.

Q. On what part of the Colon are the *Appendicŭlae Pinguedinōsae* situated?

A. On the outer surface of the muscular, and under the Peritoneal coat of the Colon these Appendiculae, thin at their roots, and becoming larger and thicker in their bodies, are situated at different distances from one another.

Q. What is the *use* of the Appendiculae Pinguedinosae?

A. They seem destined to lubricate the external and perhaps the internal surfaces of the intestine in a manner similar to the Omentum.

OF THE RECTUM.

Q. What is the precise *situation* of the RECTUM?

A. It begins at the last lumbar vertebra, descends curved upon the fore part of the Os Sacrum, and Os Coccygis, and ends in the Anus.

Q. Describe the *Rectum* particularly?

A. The Rectum becomes wider as it descends towards the Anus, and thus forms a Reservoir for the faeces. Near to the Anus its internal surface is disposed in longitudinal folds, but higher up they are transverse. The muscular fibres of the Rectum are strong, thick, and spread uniformly over it; and at its extremity, they are collected into a firm circle, which forms the *Sphincter Ani.*

OF ORGANIC DERANGEMENTS OF THE STOMACH AND INTESTINES.

Q. What Organic Derangements is the internal surface of the Stomach and Intestines subject to in common?

A. Their internal surface is frequently seized with Inflammation, Ulceration, Scirrhus, Cancer, Tumors, Papillae and Pustules, Aphthae, Spasm, Stricture, and Calculi.

Q. What *Organic Derangements* affect the *Stomach particularly?*

A. Dilatation into a Pouch in consequence of money and extraneous substances lodged in it. The Stomach is found sometimes contracted to the size of a small intestine; sometimes it is preternaturally dilated. It has been found much distended with air: A hole has been

found in it formed by the great solvent power of the Gastric Juice after death.

Q. What *Organic Derangements* affect the *Intestines in particular?*

A. Besides those in common with the Stomach, the intestines are sometimes found adhering together at some of their convolutions: Intus-Susceptio; Herniae; Stricture of some inches in consequence of a thickening of the coats; Piles, Fistŭlae in Ano, affect the lower end of the Rectum; The Rectum sometimes ends in a Cul-de-sac, or in the Bladder, from malconformation; and Ossification in certain portions. Alvine Concretions, and Worms, have been found in the Intestines.

Q. What are the *Organic Derangements of the* MESENTERY and its GLANDS?

A. The *Mesentery* is subject to Inflammation, an enlarged state of its Glands, which are often scrofulous; or sometimes its glands are found to contain an earthy, or bony matter; or they become cancerous.

Q. What *Organic Derangements* are the OMENTA subject to?

A. To inflammation, adhesions to the contiguous parts, to gangrene in cases of strangulated Hernia, to steatomatous and scirrhous tumors, to Hydatids, and to Water collected within their sacs.

OF THE ASSISTANT CHYLOPOIETIC VISCERA.

Q. What viscera are denominated Assistant Chylopoietic?

A. The Liver, Spleen, and Pancreas.

OF THE LIVER.

Q. What is the *situation* of the *Liver?*

A. It is situated immediately under the diaphragm in the right Hypochondrium, and Epigastrium chiefly, and partly also in the left Hypochondrium.

Q. What is its *colour* and *figure?*

A. It is of a dusky reddish colour; its upper surface in close contact with the diaphragm is convex; its under surface is concave, and receives the convexity of the stomach, duodenum and colon; it is thick on its right and posterior parts, becomes thin towards its left, and acute before.

Q. Into how many *Lobes* is the *Liver divided?*

A. Into *two*, the right or great lobe, and the left or small lobe: and besides, into *three* lobules.

Q. What is the precise *situation* of the *Right Lobe?*

A. It is situated obliquely in the right hypochondrium, following the curve of the diaphragm, and rests upon the pylorus, colon, and top of the right kidney.

Q. What is the *situation* of the *Left Lobe?*

A. It is situated nearly in a horizontal position, in the Epigastrium chiefly, and reaching a small way into the left hypochondrium.

Q. Where are the *Lobules* situated?

A. On the under surface of the right lobe.

Q. Describe their relative situations?

A. The *Lobŭlus* SPIGELII being the largest, is situated near the spine, between the *fossa* of the *ductus venōsus* on the left side, and the *fossa* of the *vena cava* on the right, and behind the *sulcus transversus;* the *Lobŭlus Candātus* is an angle of the former, inclining towards the middle of the right lobe; the *Lobŭlus Anonўmus*, or *Quadratus*, is a small portion of the right lobe between the fossa ductus venosi and the gall-bladder.

Q. How many *fossae* or *sulci* are observable on the inferior surface of the Liver?

A. *Four;* the *fossa umbilicālis* situated between the right and left lobes; the *sinus portarum*, or *sulcus transversus*, situated across the right lobe between the lobŭlus Spigelii behind, and the lobulus anonўmus before; the *fossa venae cavae* between the right lobe and the lobulus Spigelii; and the *fossa ductus venōsi* is situated betwcen the left lobe and the lobulus Spigelii.

Q. How many *Ligaments* retain the *Liver* in its situation?

A. *Five;* the *Coronary* Ligament, which connects the root of the Liver to the tendinous part of the diaphragm; the *Broad* or *Suspensory* Ligament, which is triangular, and runs from the umbilicus and ensiform cartilage to the fossa umbilicalis between the right and left lobes; the *Round* Ligament, which was the umbilical vein in the foetus, runs in a doubling of the former along its inferior margin to the Liver between its left lobe and the lobulus Spigelii; the *Right Lateral* Ligament, which is short, and fixes the back and right portions of the great lobe to the diaphragm; and the *Left Lateral* Ligament, which connects the left lobe to the diaphragm.

Q. Has the *Liver* no other *Ligaments?*

A. Yes; the celebrated HALLER described the *Hepatico-colicum*, which passes from the sinus portarum and gall-bladder, over the duodenum to the colon, and the *Hepatico-renale*, which runs from the root of the Liver to the right kidney.

Q. How many COATS has the Liver?

A. *Two;* a *peritoneal*, which surrounds the liver, except at the coronary ligament; and a condensed thin *cellular coat*, which both covers the surface, and enters into the substance of the Liver.

Q. What *vessels* enter, and go out from, the *Liver?*

A. The hepatic artery, and vena portae, enter it; the hepatic veins, absorbents, and biliary ducts go out of it.

Q. What is the *structure* of the Liver?

A. It is glandular, being of the conglomerate kind. The Vena Portae, and Hepatic Artery, enter the Porta of the Liver, branch out into repeated and minute ramifications in its substance; their extremities are coiled up in cellular substance so as to form innumerable pulpy corpuscles, called *Acini;* which constitute the glandular apparatus for secreting the Bile. The Hepatic Veins, and Biliary Ducts also, commence in these glandular Acini, and uniting into larger and large

trunks, accompany the branches of the Vena Portae through the substance of the liver.

Q. What *Vessels compose* the *Vena Portae?*

A. It is made up of the Veins of the Stomach, of the Intestines, of the Spleen, of the Pancreas, and of the Omenta. The trunks of these veins all meet at the Porta of the Liver, and form one large vein, which is thence called *Vena Portae.*

Q. What is *peculiar in the Vena Portae?*

A. Its partaking of the nature of a Vein, and of an Artery. While its branches coming from the different abdominal Viscera are uniting and forming larger trunks, and all these ultimately conjoined constitute the *Vena Portae,* it partakes of the nature of a Vein. But when it enters the Liver, divides into branches, which are again and again minutely subdivided in the substance of the liver, and ultimately terminate in the Acĭni, it clearly partakes of the nature of an Artery.

Q. Does the *Vena Portae,* when performing the office of an Artery in the substance of the Liver, *pulsate?*

A. *No;* its coats are thick and strong, but membranaceous, as those of the other veins are; of course, having no muscular coat, it cannot pulsate.

Q. Is the *blood* in the *Vena Portae* of the Liver *arterial?*

A. No; it is venous.

Q. Is the *Bile secreted* from *Venous blood?*

A. Yes; but some extremities of the Hepatic Artery anastomose with those of the Vena Portae, and thus its arterial blood may assist in affording bile.

Q. Can *Bile* be *secreted* from *arterial blood* alone?

A. Yes; in one or two cases discovered by dissection, the *Vena Portae* did not enter the liver, but terminated in the Vena Cava; in such cases the bile was found to have been secreted from the arterial blood of the hepatic artery, which was much enlarged.

Q. Describe what happens in the *Acĭni* of the Liver?

A. The extremities of the Vena Portae, coiled up in-

to these glandular Acini, prepare and secrete the Bile, which is instantly absorbed by the *Tubŭli Biliferi*, and carried into the biliary ducts: the blood, after the bile is secreted, passes into the extremities of the Hepatic Veins, which accompany the arteries and branches of the Vena Portae.

Q. What *course* do the *Biliary Ducts follow*?

A. They form larger and larger trunks by their repeated junctions, and follow the branches of the Vena Portae towards the root of the Liver, where they become one trunk, called *Ductus Hepaticus*.

Q. Where do the *Hepatic Veins terminate*?

A. The Hepatic Veins receive the blood partly from the extremities of the Hepatic Artery, and chiefly from those of the Vena Portae, they unite by degrees, accompanying the branches of the Vena Portae towards the root of the Liver, where they form two or three large trunks, which terminate in the ascending Vena Cava just before it perforates the Diaphragm.

Q. What connects these *sets of vessels together*?

A. Fine cellular substance deprived of fat enters into the composition of the innumerable Acini, surrounds the different vessels, and supports them in their relative situations.

Q. Where have the *Lymphatic vessels* of the liver their course?

A. They are very numerous, and cover almost all its external surface; they form larger and larger trunks, which terminate partly in the beginning of the Thoracic Duct, and partly in a Plexus situated behind the sternum.

Q. What is the *situation of the* GALL-BLADDER?

A. It is situated obliquely transverse on the inferior or concave part of the right lobe of the liver, with its cervix at the Sinus Portarum, and its fundus at the anterior margin of the Liver, and sometimes beyond it when full: its fundus is rather lower than its cervix, when the body is erect.

Q. Describe the *Vesicŭla Fellis*?

A. It is a small pyriform sac, consisting of a cervix, a body, and a fundus, composed of three coats, and a partial one from the Peritonēum.

Q. What is the *fabric of its Coats?*

A. It receives a covering from the *Peritonēum*, except where it is attached to the Liver; some pale fibres scattered in various directions have been considered its *muscular coat;* under which is cellular membrane, frequently considered its *nervous coat;* and its innermost *villous* or *mucous coat*, exhibits numerous rugae.

Q. Is the internal surface of the *Gall-Bladder* copiously supplied with *Mucus?*

A. Yes; its inner coat is perforated by innumerable ducts of small follicles situated under it, which pour out much Mucus to defend its surface from the acrimony of the Bile.

Q. What connects the *Gall-Bladder* to the *Liver?*

A. Cellular substance, Blood-Vessels, and Absorbents.

Q. Has the *Gall-Bladder* a *Duct?*

A. Yes; its neck is twisted and folded upon itself, and contracted into a duct, called *Cystic*, which runs about an inch and a half, and then joins the Hepatic Duct.

Q. Describe the *Common Duct* formed by the junction of the Hepatic and Cystic Ducts?

A. It is called *Ductus Communis Choledŏchus*, of the size of a goose-quill; it descends under the head of the Pancrĕas, to the back part of the Duodēnum, which it enters about five inches from the Pylōrus.

Q. Describe the *passage* of the *Ductus Communis Choledŏchus* through the coats of the Duodēnum?

A. It is generally joined by the Pancreatic Duct, either while passing through the coats of the Duodenum, or before it enters them; having pierced the muscular coat obliquely, it runs a considerable space in the cellular or nervous coat along the gut, and then opens upon a considerable eminence of a fold of the inner coat of the

Duodenum. This oblique entrance through the coats answers all the purposes of a *Valve*.

Q. What is the *structure* of the *Biliary Ducts?*

A. They have two coats; the external of which is fibrous and strong; the internal mucous coat is reticulated in such a manner as to catch a probe pushed along the duct as a valve would do; hence these transverse folds have sometimes been mistaken for real obstructions. These coats admit of great dilatation, as sometimes happens in *Gall-stones*.

Q. Is the BILE constantly secreted in the same quantity?

A. No; its secretion is constantly going on, but its quantity depends upon the state of the circulation, and a ready passage into the Duodēnum.

Q. How can the *state of the circulation* of the Blood affect the *secretion of Bile?*

A. When the blood flows with great strength and velocity, a much greater quantity is sent into the Liver in a given time, than a slower and weaker circulation could have sent, hence the quantity of Bile secreted is much larger; this may explain the superabundance of bile in hot climates, particularly in Fevers.

Q. How can a ready, or difficult passage of the Bile into the Duodenum affect is secretion?

A. When the coats of the Duodenum are collapsed in consequence of no digestion going on; or when the Ductus Communis Choledŏchus, or the Hepatic Duct, is obstructed, or at least nearly impervious in its diameter by Calculi; or when constipation retards the natural actions of the Intestines, and has induced indigestion, then the Bile accumulates in the ducts, produces a *Bilious plethōra* in them, and prevents the secretion of new bile: in such a case the blood passes into the hepatic veins without the natural bile being secreted from it; and that accumulated in the ducts is partly absorbed, and produces *Jaundice*.

Q. How does the Bile get into the Gall-bladder?

A. When the coats of the Duodenum are collapsed,

or the extremity of the duct in any way obstructed, the Bile cannot flow readily into the Duodenum; the cystic duct being free and open, it naturally turns into the Gall-bladder, as a receptacle, and fills it.

Q. By *what means* is the *Bile propelled* from the *Gall-bladder?*

A. By the pressure of the distended stomach against the Gall-bladder, and partly perhaps by a contractile power of the coats of the Gall-bladder itself, while the entrance into the Duodenum is free, in consequence of digestion going on, and the *Chyme* passing into the Duodenum.

Q. Is the *quality of the Bile changed* in the Gall-bladder?

A. Its thinner part is absorbed, if it is detained long in the Gall-bladder; and the remainder becomes more acrid, thick, and bitter: but when it is detained for a short time, it is very little changed.

Q. Is the *quality of the Bile* ever *vitiated?*

A. Yes; its quality is vitiated by several circumstances, such as by a slight inflammation of the Liver; or even by irritation of it, in consequence of a large influx of blood into it in hot climates, or in acute Fevers.

Q. When the quality of the Bile is vitiated, is its *quantity* also *increased?*

A. Yes, in general; it then becomes thinner, and more acrimonious, as its effects upon the stomach clearly show. We have a good example of a changed quality and quantity of the mucous secretion of the nostrils in *Catarrh.* Instead of the bland mucus in spare quantity, the secretion is very copious, thin, watery, and so acrid sometimes, as to excoriate the nostrils and upper lip. Something very analogous happens to the Bile when its quantity is much increased, and its quality vitiated and acrid; it excites great uneasiness and pain in the liver, stomach, and intestines.

Q. What is the *use of the Bile?*

A. The Bile and Pancreatic Juice are poured into the Duodenum, and there mixed with the *Chyme;* it

occasions various rapid compositions, and decompositions in the Alimentary mass, by which the *Chyle* is generated, and separated; it gives a considerable stimulus to the intestines, as its deficiency in *Jaundice*, and its increase in *Fevers* shew; it checks too much acidity in the intestines; and it carries off some impurities from the mass of blood.

Q. How can it be proved that the *Bile carries off impurities* from the Blood?

A. This is most evident in the foetus, which receives no food into the stomach; passes neither urine, nor faeces, and yet a great accumulation takes place in the intestines: whence can it, the *Miconium*, come, but chiefly from the Liver, and in small quantity perhaps from the intestines themselves? In the adult, the same discharge of impurities by the Bile continues.

Q. What CHEMICAL CONSTITUENTS does the *Bile* consist of?

A. Dr JOHN DAVY found by analysis, that the Bile, of a person executed, consisted of 36.0 Water, 12.5 Resin of Bile, and 1.5 Albumen in the hundred. THENARD however found, that 1100 parts of Human Bile consisted of 1000.0 Water, 2 to 10 Yellow insoluble matter, 41.0 Resin, 42.0 Albumen, 5.6 Soda, 4.5 Sulphate of Soda, Muriate of Soda, Phosphate of Soda, Phosphate of Lime, and Oxide of Iron.

OF ORGANIC DERANGEMENTS OF THE LIVER.

Q. Enumerate the principal Organic Derangements of the Liver?

A. Acute and Chronic Inflammation; Adhesion to the contiguous parts; a part of its coats Cartilaginous; Induration, or Scirrhus, sometimes accompanied with a diminution, but much more frequently with an enlargement of its size; Tubercles on its surface, and in its substance; Abscesses in its substance; Hydatids in a cyst of considerable size, and hard as Cartilage; the Liver is sometimes unusually soft and pulpy, with red-

dish Tumors interspersed in its substance, or very hard and tuberculated; cartilaginous, or osseous Cysts containing earthy matter; Worms, in some rare cases; Rupture from violence; and Calculi in the biliary ducts.

Q. What *Organic Derangements* affect the GALL-BLADDER?

A. Inflammation of its coats, and adhesions to contiguous parts; Coats thickened and tuberculated, or partly ossificd.

Q. What are the *Organic Derangements* of the BILIARY DUCTS?

A. Dilatation, Obstruction, Obliteration, Calculi, and Hydatids.

OF THE SPLEEN.

Q. Describe the *Spleen?*

A. It is soft, very vascular, of a dark purple colour, of an irregular oval figure, smooth and convex externally, and rather concave next the spine.

Q. What is the *situation* of the *spleen?*

A. It is situated in the left Hypochondric region, between the left, or large extremity of the stomach and false ribs, with its lower end behind the colon, and over the left kidney.

Q. What parts is the *spleen attached to?*

A. To the large extremity of the Stomach by cellular membrane, by the omentum, and by the vasa brevia; to the left extremity of the Pancreas by cellular membrane, and blood-vessels; to the Diaphragm, Colon, and left kidney, by cellular substance and reflections of the Peritoneum.

Q. What is the *structure* of the Spleen?

A. It has two coats, a peritoneal, and a proper coat; they are closely connected to each other: it consists of a congeries of blood-vessels, lymphatics, and nerves, involved in, and supported by much cellular substance. The extremities of the arteries are coiled up into *peni-*

cilli, which have been mistaken for a glandular apparatus.

Q. Is the *Spleen not a Gland?*

A. No; it has much the appearance of one, but no excretory duct has hitherto been discovered proceeding from it, and in consequence, it is generally considered not glandular.

Q. Are there any real glands in the system from which no excretory ducts have been traced?

A. Yes; the *Thyroid*, and *Thymus Glands* are of this description, no excretory ducts have been detected issuing from them; but their glandular structure has never been disputed.

Q. What *Blood-vessels enter the Spleen?*

A. The Splenic Artery, which is very large in proportion to the size of the Spleen; this artery enters it in a very winding serpentine manner, and is divided in its substance into innumerable branches, which ultimately form plexuses and penicilli, with which the extremities of the veins communicate.

Q. What *Arteries are sent off* from the *Splenic?*

A. Two or three small branches to the Pancreas; the *Gastrica Inferior Sinistra*, which runs along the large curvature of the stomach towards the pylorus, communicating freely with the Gastrica Superior, and Gastrica Inferior Dextra; and three or four considerable short branches, named *Arteriae Breves*, or *Vasa Brevia*, which are dispersed upon the large extremity of the stomach.

Q. What is the *use of the Spleen?*

A. Various opinions have at different times been entertained of the use of the Spleen. The Ancients thought it the Receptacle of Black Bile; others more lately, that a particular Menstruum is secreted in it, and transmitted to the stomach for the purpose of Digestion; others, that it assists in forming the red globules of the blood; others, that when it is compressed by the full stomach, a greater quantity of blood is sent to the Pancreas to promote its secretion; others lately, that the blood undergoes some change in it useful in the se-

cretion of the Bile; but it seems most probable that the use of the Spleen is to allow the free circulation of a quantity of blood through it, which when the Stomach is empty and its coats collapsed, is not wanted for the secretion of *Gastric Juice:* but when the stomach is distended with food, it presses upon the Spleen, interrupts the free circulation of the blood through it, and turns the current of circulation into the stomach through the Gastrica Inferior Sinistra, and the Vasa Brevia; from which increase of blood in the Stomach *Gastric Juice* is secreted in large quantity at a time when it is indispensably necessary for digestion. Thus the *Spleen is useful* for regulating the quantity of blood sent to the stomach, and also the quantity of Gastric Juice for the purposes of Digestion.

Q. What ORGANIC DERANGEMENTS is the *Spleen* subject to?

A. The coats of the Spleen have been found inflamed, adhering to the contiguous parts, and in some instances cartilaginous; its substance too has been found in a state of inflammation; it is sometimes extremely soft, and much enlarged; sometimes diminished in size; it sometimes contains much purulent matter, which has been evacuated by tapping, or which has burst into the abdŏmen and proved fatal; it is frequently indurated and enlarged; it is in some rare cases tuberculated; hydatids, and calculous concretions have been found in it; it has been ruptured when unnaturally large; several small ones have been found near to the natural spleen; it has been found wanting.

OF THE PANCREAS.

Q. Describe the Pancreas?

A. It is a flat conglomerate gland about six inches long, not unlike the tongue of a dog; it resembles the Salivary Glands in colour, consistence, and structure.

Q. What is the *situation* of the *Pancrĕas?*

A. It is situated in the Epigastric Region, across the

the spine, behind the stomach, and before the Aorta, Vena Cava, part of the splenic vessels, and the edge of the transverse part of the Duodenum.

Q. What are its *attachments?*

A. The right extremity of the *Pancrĕas* is attached to the Duodenum; its left extremity is fixed to the spleen by the omentum majus; its body is connected with the Duodenum, Aorta, Vena Cava, and Spine, and it is covered anteriorly by the meso-colon.

Q. Describe the *structure of the Pancrĕas?*

A. It is composed of a number of lobules, in which are Acini, from each lobule a small duct arises, which terminates in the common *Pancreatic Duct* running from the left extremity towards the right, becoming gradually larger till it attains the size of a crow's quill. From the right extremity of the Pancreas, an elongation or process is sent downward adhering to the Duodenum, this process is called the *head* of the Pancreas, or sometimes the *Pancreas minus;* the principal duct of this joins the other common pancreatic duct before its termination in the Duodenum.

Q. What is the *use of the Pancreas?*

A. It secretes a *liquor,* or *juice* resembling saliva in appearance, and in chemical properties.

Q. What is the *use of the Pancreatic Juice,* or *Liquor?*

A. It dilutes the Chyme, and incorporates it with the Bile, so as to produce the chemical changes necessary for the formation of *Chyle.*

Q. What are the ORGANIC DERANGEMENTS of the *Pancreas?*

A. It is subject to Inflammation and all its consequences, Suppuration and Abscess, Gangrene, Scirrhus, Enlargement of size; and Calculi in the ducts.

OF THE URINARY ORGANS.

OF THE KIDNEYS.

Q. What is the *situation of* the *Kidneys?*

A. They are situated in the Lumbar Regions, one on either side of the spine, extending about five inches from the eleventh rib to near the crest of the Os Ilĕi. They lie upon the Diaphragm, the Psoae Magni, Quadrati Lumborum, and Transversales Abdomĭnis Muscles. The right is placed under, and at the back part of, the great lobe of the Liver, and behind the Colon; it is a little lower than the left. The left is placed at the under and back part of the Spleen, and behind the left portions of the Stomach, of the Pancreas, and of the Colon.

Q. What is the *general figure* of the *Kĭdney?*

A. It is rounded before, flattened behind, convex on its outer margin, has a deep sinus towards the spine, and surrounded with unequal edges: it is somewhat broader behind than before, broader and more curved above than below.

Q. What are the *Connexions* of the Kidneys?

A. The right Kidney is connected to the Liver and Duodenum, the left to the Spleen, and both to the Psoae and Quadrati Lumborum muscles, to the Colon, and Renal Glands, by cellular Substance, and by the Peritoneum.

Q. How many *Coats* has the Kidney?

A. *Two;* the tunica adiposa, which covers both the Kidney and its large vessels; under the adipose coat is its proper coat incorporated with cellular membrane.

Q. What is the *exterior appearance* of the Kidney?

A. It is generally smooth and uniform; sometimes however it is irregular and lobulated.

Q. What is the *interior appearance* of the Kidney?

A. It exhibits an exterior *cortical,* and an interior *medullary* part. The cortical, considered the secerning part, surrounds the Kidney, forming one third of its breadth, and sends processes towards the pelvis, which divide the medullary part. The medullary, considered the Urinifĕrous part, is redder coloured than the cortical, and is separated into a number of distinct columns, each of which terminates in a *Papilla.*

Q. What *Arteries* are sent to the *Kidney?*

A. The *Emulgent* or *Renal Artery* arises from the Aorta, passes across, and enters the Kidney at the upper part of the sinus; it then divides into numerous branches, which become very minute, anastomose frequently, and form arches in the cortical substance; their extremities at last wind in toward the medullary substance, and are coiled up into *Acini*, which seem corpuscles disposed in clusters.

Q. Is the *Urine secreted* in these *Corpuscles?*

A. Yes; in these corpuscles situated in the cortical substance the urine is secreted, and received by the extremities of the Uriniferous tubes, which commence there, and gradually uniting together, form larger tubes, that converge in a radiated manner towards the pelvis of the Kidney, and ultimately terminate in the Papillae.

Q. How many *Papillae* are generally in a Kidney?

A. They vary in number, but in general are twelve or fifteen.

Q. Into what vessels do the *Papillae* pour the Urine?

A. Into *Infundibŭla* or *Calices*, which are tapering membranous tubes; each arising from around the base of a Papilla.

Q. Are there as many *Infundibŭla*, as *Papillae* in each Kidney?

A. Yes, they are generally the same in number; sometimes however two or three Papillae open into the same Infundibŭlum.

Q. Where do the *Infundibŭla terminate?*

A. Their apices converge, join, and form two or three trunks, which ultimately unite into a dilatation of considerable size, called the *Pelvis* of the Kidney.

Q. Is *each Papilla* to be considered a *distinct gland?*

A. Yes; in the foetal state the Kidney consists of a number of separate glandular Lobules, each of which generally forms a Papilla; the number of Papillae therefore depends on the original number of Lobules. In the course of time they are firmly united externally into one smooth kidney.

Q. Is the *Pelvis of the Kidney* without its body?

A. The Pelvis is conical, and partly within, and partly without the Kidney; it contracts gradually into a tube of the size of a common goose quill called *Urēter.*

Q. What is the *course of the* URETERS?

A. They descend obliquely inwards behind the Peritonēum, pass over the Psoae muscles and Iliac Vessels in a waving manner into the Pelvis, and terminate in the lateral and back part of the Bladder near its cervix.

Q. What is the *structure of the Urēters?*

A. They are composed of *three coats* and a partial covering from the Peritonēum on their anterior part. Their external coat is membranous; their middle one is muscular, consisting chiefly of circular fibres; and their internal coat is villous or mucous, as it is very vascular, and perforated by many small ducts, which pour out mucus on its internal surface to defend it from the acrimony of the Urine.

Q. What ORGANIC DERANGEMENTS are the *Kidneys* subject to?

A. To inflammation, abscesses, scirrhus, scrofulous tumors, calculi, hydatids, great spongy softness, enlargement, or diminution of size, ossification, to a cartilaginous state, and to dropsy.

Q. What ORGANIC DERANGEMENTS are the *Urēters* subject to?

A. To inflammation, and a thickening of their coats from the irritation of Calculi; to dilatation in consequence of an obstruction near the bladder; to pus; hydatids; to spasm; and to be ruptured.

OF THE RENAL CAPSULES.

Q. What are the Renal Capsules?

A. They are two small, flat, glandular-looking substances, of a dark yellow colour, and somewhat of a triangular figure, about two inches long.

Q. What is the *situation* of the *Renal Capsules?*

A. They are situated, one on each side at the upper,

inner, and fore part of the Kidneys, higher than the Renal vessels over the Psoae muscles and crura of the diaphragm.

Q. What parts are they connected with?

A. The right Renal Capsule is connected with the Liver; the left with the Spleen and Pancreas; and both with the small muscle of the diaphragm, and with the Psoae muscles and Kidneys by cellular substance.

Q. What *Coats* have they?

A. They are surrounded by cellular substance, which is a part of the *tunica adipōsa* of the Kidneys; and they have besides a thin proper coat adhering firmly to them.

Q. What is the *use* of these *Renal Glands*, or *Capsules?*

A. Their use is unknown; they seem however to be useful in the foetal state, as they are proportionally larger in it, than in the adult; perhaps to divert the blood from the Kidneys, because then urine is not secreted.

Q. What DISEASED APPEARANCES have the *Renal Capsules* presented?

A. They are very seldom found diseased; but they have become enlarged, and exhibited a white matter similar to a scrofulous absorbent gland; sometimes they have become cartilaginous, or have contained calcareous granules in their substance.

OF THE URINARY BLADDER.

Q. What is the situation of the Bladder?

A. It is situated in the anterior part of the Pelvis, before the Rectum, and behind the Ossa Pubis; when distended it rises up above the brim of the Pelvis almost to the Umbilīcus.

Q. To *what parts* is the *Bladder* attached?

A. It is attached by cellular substance to the Ossa Pubis; by the peritonēum reflected from its sides, and by cellular substance to the Pelvis, and below and behind to the Rectum in the male; and to the uterus in the female, by two or three ligaments, viz. the urăchus and shrivelled umbilical arteries to the Umbilīcus; by a

strong ligamentous expansion from each side of its neck and Prostate Gland to the inside of the arch of the Pubis; and by the Urethra to the Penis.

Q. How many *Coats* has the Bladder?

A. *Four*; the *Peritoneal*, which covers it all except its cervix; the *muscular*, composed of fleshy fibres disposed in fasciculi, of which the external are longitudinal, and are connected at the under and fore part of the Bladder with the Ossa Pubis; the internal fibres run in all directions, and are interwoven with each other; at the neck of the bladder they are collected into the Sphincter Vesicae; the third coat called *nervous* is composed of cellular substance, which connects the muscular to the innermost *mucous* coat.

Q. How many *openings* are in the Bladder?

A. *Three*; one for the Urethra anteriorly coming off at almost a right angle with the Bladder; and two openings formed by the terminations of the Ureters on the posterior and lower part of the bladder at about an inch and a half's distance from each other, and from the commencement of the Urethra.

Q. In what manner do the *Ureters terminate?*

A. They run down between the peritoneal and muscular coats a long way, and then penetrate the muscular coat obliquely, and passing between it and the mucous coat, ultimately pierce it also obliquely, and terminate by open oval mouths in the bladder.

Q. Can the Urine not return from the Bladder into the Ureters?

A. No; the obliquity of the termination of the Ureters in passing through the coats of the Bladder answers all the purposes of valves.

Q. What is the *use* of the Bladder?

A. It receives the Urine from the Ureters, and retains it till a convenient opportunity occurs for passing it.

Q. By what means is the Urine expelled from the Bladder?

A. Its expulsion is partly voluntary, and partly not. When the stimulus of the urine, and the distention of

the bladder are great, it is expelled involuntarily : but in general, by the contraction of the bladder itself, assisted by the Abdominal Muscles and Diaphragm, we can pass urine at pleasure.

Q. What ORGANIC DERANGEMENTS is the *Urinary Bladder* subject to ?

A. The Bladder is subject to inflammation, and a thickening of its coats ; ulcers ; scirrhus, aud cancer ; fungous excrescences, and polypi, from its inner surface ; elongations of its inner coat ; cysts communicating with the bladder ; its cavity being divided by a membranous substance into two chambers ; calculi ; to paralysis from very great distention ; to preternatural contraction ; to communicate by malformation, or ulceration, with the Rectum ; and to its being partly protruded in a hernial sac.

OF THE ORGANS OF GENERATION IN THE MALE.

Q. What parts does the PENIS consist of ?

A. Of five principal parts, the two corpora cavernosa ; the corpus spongiosum, the glans, the prepuce, and the urethra.

Q. Describe the situation of the *Corpora Cavernosa Penis ?*

A. They form the upper and lateral parts of the penis, and are covered by a strong, elastic, ligamentous sheath. Their crura arise from the crura of the Ischium, and Pubis, at the lower part of the symphisis they are united, and continue closely applied to each other, till they terminate in a rounded extremity at the Glans. There is a depression above in which the Principal Vein of the Penis runs ; and another between them below for the Urethra.

Q. What is the *structure* of the *Corpora Cavernosa ?*

A. Their ligamentous sheath sends up a triangular process to be fixed to the Symphisis Pubis, called the *Ligamentum Suspensorium*, which supports the Penis in its proper position ; their internal structure is reticu-

lated, and divided into *Cells*, which are very similar to the cancelli in the extremities of long bones, and communicate very freely with each other; among these Cells the arteries are copiously dispersed; and pour their blood into them, distend them, and thus produce an erection of the Penis.

Q. Do the *Cells* of the *one Corpus Cavernosum* communicate with those of the other?

A. Yes; the membranous sheath forms an imperfect septum between them; and between the cords or fibres of which, fissures of communication are left, through which the blood easily passes from the one corpus cavernosum to the other.

Q. What is the *situation* of the *Corpora Spongiosum Urethrae?*

A. It is situated under and between the Corpora Cavernosa Penis; it begins nearer the bladder than the junction of the Corpora Cavernosa, is connected firmly to them by condensed cellular substance, and terminates at the point of the penis, projecting considerably farther than the Corpora Cavernosa.

Q. Describe the *Corpus Spongiosum Urethrae?*

A. Its posterior part is dilated into a longitudinal conical prominence, called the *Bulb* of the Urethra, its anterior is expanded into the *Glans*, which covers the extremity of the Corpora Cavernosa.

Q. Describe the *Glans Penis?*

A. It adheres to the Corpora Cavernosa by a continuation of the ligamentous sheath, which covers them; its posterior part forms a prominent circle, termed *Corōna Glandis*, behind which is the Cervix; the surface of the Glans is furnished with numerous blood-vessels, and nervous Papillae, covered by a delicate membrane continued from the inside of the *Prepuce*.

Q. What is the *Prepuce?*

A. It is a loose fold of the common integuments, which generally covers the Glans, and preserves its sensibility; it can be moved forwards and backwards; it is

connected to the under and anterior surface of the Glans by a triangular fold, termed *Fraenum Preputii.*

Q. Are there any *Mucous follicles* situated under the *Prepuce?*

A. Yes; around the Cervix and Corona Glandis are many *Glandŭlae Odorifĕrae,* which throw out a sebaceous secretion, for keeping the parts moist and facilitating the movements of the Prepucé.

Q. What is the *Structure* of the *Corpus Spongiosum Urethrae?*

A. Its structure is cellular, being the same as that of the Corpora Cavernosa, only its cells are smaller; the Bulb of the Urethra, and the Glans Penis, are also cellular in their internal structure.

Q. Describe the *canal of the Urethra?*

A. It proceeds from the under and fore part of the Bladder, bends round the Symphisis Pubis, runs along the Corpus Spongiosum, and terminates in the point of the Penis.

Q. Has the *Urethra* any *Dilatations,* or *Contractions* in its course?

A. Yes; it has *three Dilatations,* the first at the Prostate Gland, the second in the Bulb, and the third at the beginning of the Glans: and it has *three* slight *Contractions,* one at its Origin, near the neck of the Bladder, another between the Prostate Gland and Bulb, and the third at the point of the Glans.

Q. Describe the *internal part* of the *Urethra?*

A. Between the Prostate Gland and the Bulb, the Urethra is entirely membranous, and covered only by cellular substance; its internal membrane is very vascular and sensible, possessed of very considerable contractibility, and moistened by mucus, which is poured out from numerous Lacunae, situated between it and the Corpus Spongiosum.

Q. Has the *internal surface* of the Urethra any *Glands?*

A. Yes; these *Lacūnae* are mucous follicles, two or three larger than the rest are situated near the Glans;

but at the sides of the membranous part of the Urethra, *two* about the size of a garden pea have been called COWPER'S *Glands*.

Q. What *Arteries* are sent to the *Penis?*

A. Branches from the Pudic, and from the Femoral Arteries are sent into the Penis; they inosculate freely with each other, and pour their blood chiefly into the Cells, and partly into the Veins.

Q. Whence do the *Veins* of the Penis commence, and where do they direct their course?

A. The Veins commence chiefly by open mouths from the Cells, and partly from the extremities of the arteries. The greater number unite and form the *Vena Magna Penis*, which runs in the superior groove between the Corpora Cavernosa; it is furnished with Valves.

Q. What produces an *Erection* of the Penis?

A. An influx of blood into its cells, which become distended.

Q. What seems to be the cause of that influx?

A. A venereal affection of the mind; a local stimulus from the semen masculinum; or from a collection of Urine in the Bladder; or from irritation of the Rectum, or of the Penis; or sometimes from heat aided by some of the above.

Q. Where have the *Lymphatics* of the Penis their course?

A. Those arising from the Prepuce, run on the dorsum of the penis and pass into the inguinal glands; those from the Glans and deep parts accompany the arteries into the under part of the Pelvis.

Q. What are the ORGANIC DERANGEMENTS of the *Urethra?*

A. Inflammation of its internal membrane; Stricture in the membranous part, or two or three inches from the Glans; Dilatation near the Bladder, in consequence of Obstruction near the extremity of the Urethra; Abscesses; Fistŭlae; Calculi; Ulcers; Caruncle, or a small fleshy excrescence; preternatural Orifice of the Urethra

placed where the fraenum usually is; and a Layer of earthy matter along its whole length.

OF THE PROSTATE GLAND.

Q. What is the exact situation of this Gland?

A. It is situated on the beginning of the Urethra, with its base at the neck of the bladder, and its apex immediately behind the under part of the symphisis pubis: it closely embraces the neck of the bladder and urethra below, and projects with its two lobes on either side of it.

Q. Describe the *Prostate Gland?*

A. It is of the size of a Walnut, and of the figure of a heart, its internal structure is spongy, and rather firm, it sends out *ten* or *twelve ducts*, which open obliquely at the beginning of the Urethra, and pour out a thin whitish fluid.

Q. What is the *use* of this *secretion* of the *Prostate Gland?*

A. It is supposed to dilute the semen, and facilitate its passage along the Urethra; perhaps in ordinary it lubricates the posterior part of the Urethra.

Q. What are the ORGANIC DERANGEMENTS of the *Prostate Gland?*

A. The Prostate Gland is sometimes inflamed; enlarged and hardened, or scirrhous; suppurates, and forms an Abscess containing common pus, or scrofulous white curdy matter; calculi are found in its ducts; it is sometimes preternaturally small.

OF THE TESTES.

Q. What is the situation of the Testes?

A. They are generally situated in the cavity of the Scrotum; sometimes one or both are retained in the abdomen.

Q. What are the *coverings* of the Testes?

A. They are covered by the Scrotum externally, and by the Tunica Vaginalis, and the Tunica Albuginea internally.

Q. What is the *structure of the Scrotum?*

A. It is a continuation of the common integuments, contains no fat, is copiously supplied with sebaceous follicles, on its external surface there is a vertical longitudinal Raphé; its internal surface is lined with cellular substance of a red and fibrous appearance, which has been supposed a muscle, called Dartos. A middle partition divides the Scrotum into two separate cavities.

Q. Describe the other two Tunics of the Testes?

A. The *Tunica Albuginea* adheres most firmly to the surface of the Testes, covers the Epididȳmis, and supports it in its situation; it is strong, thick, dense, and inelastic; it is very smooth on its surface: the *Tunica Vaginalis* incloses the testicle, is much larger than merely to surround it, in order to allow it room to change its place, it adheres to the tunica albuginea behind, where the vessels enter the testes; its external surface is connected with the cremaster muscle: both coats are derived from the Peritoneum.

Q. How do the *Testes* happen to receive these *two coats* from the Peritonēum?

A. In the foetus, the *Testes* lie in the abdōmen on the Psoae muscles, a little below the Kidneys; they receive a covering from the Peritoneum, as the other viscera of the abdomen do, which is their *Tunica Albuginea;* they receive also their arteries from the Aorta, and their nerves from the aortic plexus, the testes slide downwards carrying their blood-vessels and nerves enveloped in the Peritoneum along with them: at the upper abdominal Aperture they come in contact with the Peritoneum, which lines that aperture, push it down before them through the inguinal canal, through the external abdominal Ring into the Scrotum, and there it forms the Tunica Vaginālis Testis.

Q. About what period does that *change of the position* of the *Testes* take place?

A. Generally from the fifth to the seventh or eighth month of the foetus in utero; their descending progress

is slow, during which, the vessels and peritoneum become so much elongated as to allow their descent easily.

Q. What is the *Distribution of the Spermatic Arteries* in the *Testicle ?*

A. The internal part of the Testicle is composed of Septŭlae or partitions, formed by cellular substance, which extend in a radiated manner from its back part towards its circumference ; on these the minute ramifications of the arteries are dispersed in a very intricate convoluted manner.

Q. Describe the origin of the *Seminal Vessels ?*

A. The *Tubŭli Seminiferi*, after communicating with the extremities of the arteries, are collected into bundles, which are coiled up into others of a smaller size, and of a conical form, with their apices towards the posterior edge of the Testicle, and are placed between the Septulae. These tubes are extremely small, have no division into branches, and when drawn straight are several feet in length.

Q. What vessels are continued from these ?

A. From these Convoluted Seminal Tubes an equal number of straight vessels is sent backwards, called *Vasa Recta*, which communicate and form an irregular plexus, termed *Retc Vasculosum Testis.*

Q. What vessels proceed from the Rete Vasculosum Testis ?

A. From it *twelve* to *eighteen* straight tubes are sent out, called *Vasa Efferentia*, which are soon rolled up into Cones, called *Coni Vasculosi.*

Q. What vessels communicate with these Cones ?

A. These *Coni Vasculosi*, connected by cellular substance, compose rather more than a third part of the *Epididўmis ;* they gradually unite into one Tube, called *Epididymis*, which is much convoluted ; and then becomes larger and straighter, termed *Vas Deferens.*

Q. Recapitulate the different parts of the *Seminal Tubes ?*

A. From the coiled up extremities of the Tubuli Se-

miniferi the Vasa Recta arise, and by their communications form the Rete Vasculosum Testis, from which the Vasa Efferentia arise, and terminate in the Coni Vasculosi, which unite and form the Epididymis, and this again ends in the Vas Deferens.

Q. What is the *Caput Gallinaginis?*

A. It is an eminence on the lower part of the Urethra, where it is surrounded by the Prostate Gland: it is larger towards the bladder, and stretches forwards into a narrow point. On either side of its summit the two canals common to the Vasa Deferentia, and Vesiculae Seminales, open; around which the ducts of the Prostate, and of mucous follicles terminate.

Q. What vessels compose the *Spermatic Cord?*

A. The Spermatic Arteries, Veins, Lymphatics, Nerves, and Vas Deferens, connected by cellular membrane, and surrounded by the peritoneal process, which forms the vaginal coat of the testicle.

Q. What is the *Structure* of the VAS DEFERENS?

A. Its coats are of considerable strength and thickness; its outer one seems condensed cellular substance, and its inner one thin and dense mucous membrane: perhaps some muscular fibres are interspersed between them. When compressed between the finger and thumb, it communicates the same sensation as whip-cord does.

Q. Describe the *course* of the *Vas Deferens?*

A. It arises from the posterior and inferior part of the Epididymis, ascends on the back part of the spermatic cord through the abdominal apertures, at the upper of which it separates from the cord, passes down on the Psoas muscle to the lateral part of the bladder; and descending obliquely inwards behind the umbilical artery, it crosses the urēter at the lower surface of the bladder, and near the prostate gland joins the cylindrical canal of the Vesicula Seminalis at an acute angle; which canal common to both, being about an inch long, perforates the prostate gland, and opens on the under surface of the Urethra at the side of the *Caput Gallinaginis.*

Q. What ORGANIC DERANGEMENTS are the *Testes* and their *Coats* subject to?

A. To inflammation; scirrhus; cancer; hydrocēle; hydatids; abscess; scrofula; pulpy enlargement; to be converted into cartilage, or bone; and to a wasting and diminution of size.

Q. What ORGANIC DERANGEMENTS affect the *Spermatic cord?*

A. Scirrhus, varicose veins, and dropsy.

OF THE VESICULAE SEMINALES.

Q. What is the situation of the VESICULAE SEMINALES?

A. They are placed obliquely on the inferior and posterior part of the bladder, their apices at the neck of the bladder nearly touch each other, but their bases recede from each other as they extend backwards. They have a flattened pyriform appearance, and are surrounded by much cellular substance.

Q. What is the *structure* of the Vesiculae Seminālęs?

A. Each of them is composed of a single Tube, much convoluted, and bulging out into irregular processes, which resemble cells; it has a strong coat of condensed cellular substance, and an internal mucous coat: and is covered and compressed by part of the Levator Ani Muscle.

Q. What is the *use* of the *Vesiculae Seminales?*

A. Various opinions have been entertained concerning their use; some have supposed that they secrete a fluid for diluting the semen, and facilitating its passage along the urethra; others, that this fluid was in some way useful in generation; but the most probable and most simple opinion is, that they are Reservoirs in which the semen is lodged, after it has been secreted in the Testes, and sent thither until it be ejected in coitu, or absorbed.

Q. Does any *mechanism of the Vessels* favour the last opinion?

A. Yes; the Vesiculae Seminales can be filled with

a coloured injection, when it is thrown into the Vasa Deferentia, without any of it passing into the urethra. The semen, therefore, in proportion as it is secreted, fills the seminal tubes of the Testicles, by its own stimulus is propelled along the Vasa Deferentia, and when it comes to the canals of the Vesiculae Seminales, it returns into them. This reflux of the semen, and temporary retention of it in the Vesiculae Seminales, is very similar to those of the Bile in the Cystic Duct and Gall-Bladder.

Q. Enumerate the ORGANIC DERANGEMENTS of the *Vesiculae Seminales?*

A. They have been found inflamed; scrofulous; scirrhous; terminating in a cul-de-sac; very small, and sometimes one wanting.

GENITAL ORGANS OF THE FEMALE.

Q. In what does the *Urinary bladder* of the *female* differ from that of the male?

A. It is generally larger and broader in proportion to the size of the pelvis.

Q. In what does the *female Urethra* differ?

A. In shortness, wideness, and straightness, being about two inches in length, and slightly bent.

Q. Has the *female Urethra* any *Prostate Gland?*

A. No; it has no gland, but is furnished with several Lacunae, which pour mucus into it in order to defend it from the acrimony of the urine.

Q. Enumerate the *External parts of the female?*

A. The Labia Pudendi, Clitoris, Nymphae, and Vestibulum, or Fossa Navicularis.

Q. Describe the *Labia Pudendi?*

A. They extend from the Pubis to within an inch of the Anus, their upper part being covered with hairs on the pubis; is called *Mons Veneris;* they are thickest above, and becoming thinner below, terminate in a transverse fold, called the *fraenum* or *fourchette,* between which and the Anus is the Perinēum.

Q. What is the *structure* of the Labia pudendi?

A. They are composed of the integuments elevated by much cellular substance and fat, and lined by a very thin vascular membrane, constantly moistened by the secretion of sebaceous follicles.

Q. Describe the *Clitoris?*

A. It is situated between the upper parts of the Labia, about an inch in length, and bound to the fore-part of the Symphisis Pubis; it is very vascular and sensible, has two corpora Cavernosa, separated by a septum, and two crura twice the length of its body, which arise from the crura of the Ischium and Pubis; it has its Ligamentum Suspensorium and Glans, has no perforation like the penis; is covered by a continuation of the sensible delicate membrane of the Labia, and at its inferior part forms a fold, called *Preputium Clitoridis.*

Q. Describe the *Nymphae?*

A. They arise from the under and outer part of the clitoris, narrow from the prepuce of the glans, and are formed by a production of the inner membrane of the Labia; they run downwards along the inside of the Labia, increasing in breadth nearly for an inch and a half, and then suddenly diminish to their lower extremity at the Vestibulum.

Q. What is their *structure*, and *use?*

A. The Nymphae contain cellular substance, blood-vessels, nervous papillae, and sebaceous follicles between their layers, by which they are very sensible, and always well moistened. They lie close together, and cover the orifice of the Urethra and Vagina, and assist in directing the urine from the Urethra.

Q. What is the *Vestibulum*, or *Fossa Navicularis?*

A. It is the smooth depression between the Nymphae and Perinēum; it leads to the Urethra above, and to the Vagina below.

Q. What is the precise situation of the *Orifice of the Urethra?*

A. Its orifice is in a direct line, about an inch down from the glans of the clitoris, between the Nymphae,

situated in a slight spongy eminence projecting below, which is perforated by Lacunae of considerable size for lubricating its extremity.

Q. Describe the *Orifice of the Vagina?*

A. The external orifice of the Vagīna is situated immediately under the Urethra, about half an inch below the symphisis pubis; it is surrounded and contracted by its corpus cavernosum, and its *sphincter* muscle; and generally in Virgins two-thirds of it are closed by a thin dense membrane, called the *Hymen*, generally of a semilunar shape, placed next the perinēum.

Q. Is the Orifice of the Vagina not partly contracted also by the *Carunculae Myrtiformes?*

A. Yes; in the posterior and lateral parts of the orifice are three or four little bodies, of the size of myrtle berries, supposed to be the remains of the ruptured Hymen; they seem, however, rather to be corrugations of the inner membrane of the vagina, for admitting of its dilatation, which is naturally rather contracted near the sphincter.

Q. What are the ORGANIC DISEASES of the *Labia Externa?*

A. The Labia are sometimes oedematous, and very large; are inflamed, adhere to each other, and leave no opening into the vagina, but a small one before for the discharge of urine; are sometimes affected with Erysipelas, which spreads rapidly; are ulcerated: Venereal excrescences, and Polypi grow from them: scrofulous and scirrhous tumours have their seat in them.

Q. What *Organic derangements* happen to the *Nymphae?*

A. They are sometimes so much elongated as to protrude between the Labia, and occasion inconvenience in walking.

Q. What *Organic Derangements* is the *Clitoris* subject to?

A. It is occasionally so much enlarged, and elongated, as to be mistaken for a male penis: its enlargement

is sometimes accompanied by induration, thickening, and cancerous ulceration.

Q. What are the *Organic Derangements* of the *Hymen*, and *Caruncŭlae Myrtiformes?*

A. The *Hymen* in some rare cases is so thick that it cannot be ruptured by the ordinary means; it is sometimes imperforated, and retains the menstrual fluid behind it; the *Carunculae Myrtiformes* are sometimes of an unnatural length, and occasion much uneasiness.

OF THE INTERNAL PARTS IN THE FEMALE.

Q. Enumerate the internal Organs of Generation in the Female?

A. They are the Utĕrus and its appendages, viz. the Ovaria, Fallopian Tubes, Broad and Round Ligaments, and the Vagina.

Q. What are the *figure*, and *dimensions* of the UTERUS?

A. Its figure much resembles a pear, somewhat flattened with its base or fundus uppermost, and its cervix below: the Uterus varies in size, becoming larger in women who have had children; in Virgins, however, it is about two inches and a half long; one and a half, or at most, two inches broad at the fundus; one at the cervix; and about one inch in thickness.

Q. What is the *situation* of the *Utĕrus?*

A. It is situated in the unimpregnated state in the Hypogastric Region; the anterior and inferior part of its body, and its cervix adhere firmly to the Bladder; and the posterior part of its cervix, to the Rectum, by cellular substance, and by the Peritoneum reflected over the bodies of both.

Q. To what parts is the *Utĕrus attached?*

A. To the bladder and rectum as we have just mentioned; to the sides of the Pelvis by the Ligamenta Lata; and to the external parts by the Vagina.

Q. Describe the *structure of the Utĕrus?*

A. Its external coat is smooth and polished, being a

portion of the Peritoneum; under which is its muscular coat of compact structure, firmly connected by cellular sobstance; it is very vascular in its body and fondus; it is lined by a very soft vascular membrane, rather of a villous appearance; its cervix is contracted by numerous *rugae*, between which are many follicles for secreting mucus to lubricate the parts.

Q. Describe the *mouth of the Uterus?*

A. The lower part of the cervix projects into the Vagina, something similar to the Glans penis, and is perforated by a transverse slit, called *Os Tincae*, a little larger in a Virgin than the orifice of the male urethra, but much larger in a woman who has born children. The *Os Tincae* is formed by two thick lips, the anterior of which is the larger, hangs farther down, and give it an oblique direction backwards.

Q. What ORGANIC DISEASES is the *Uterus* subject to?

A. To inflammation; malignant ulcers; scirrhous enlargement; tubercles; polypi; strictore; its os tincae contracted and closed up; converted in some places into ossification, and an earthy substance; the dead Fœtos being changed into an earthy, or bony mass within it; hydatids; prolapsos; and inversion.

Q. Describe the BROAD LIGAMENTS of the Uterus?

A. The Peritoneom, after giving a coat to the Uterus, is reflected forwards upon the bladder, and backwards over the rectum, it then passes laterally from the edges of the Uterus, and upper extremity of the Vagina to be fixed to the sides of the Pelvis, thus forming the *Broad Ligaments* by its doubling.

Q. What *purposes* do the *Broad Ligaments* serve?

A. They, together with tbe Uterus, divide the Pelvis into an anterior and a posterior cavity: they attach the edges of the Uterus to the sides of the Pelvis; support the Round Ligaments, its blood-vessels, lymphatics, and nerves between their layers; contain and support the Ovarium on either side in tbeir posterior layer,

and the Uterine or Fallopian Tube in their anterior ala, or layer.

Q. What is the situation of the UTERINE or FALLOPIAN TUBES?

A. These Tubes are connected with the corners of the fundus of the Uterus, open into it by a very small perforation, and pass laterally in the duplicature of the Broad Ligaments towards the sides of the Pelvis.

Q. Describe the *Fallopian Tubes?*

A. These Uterine Tubes begin small near its fundus, are about three inches in length, a little curved, become larger and convoluted; but near their extremity they are suddenly contracted and terminate by open mouths, which can contain a goose-quill; their extremity is free, loose, and fimbriated. They are lined by a soft pulpy membrane converted into many small longitudinal plicae.

Q. What is the *use* of the *Fallopian Tubes?*

A. It is supposed, that during coition, they grasp the Ovaria with their fimbriated extremities, and form a communication between the semen masculinum and the ovum, which becomes fœcundated, passes along the Tube, and is deposited in the cavity of the Uterus.

Q. What ORGANIC DERANGEMENTS affect the *Fallopian Tubes?*

A. Inflammation; obstruction from adhesion of their sides; dropsy when both ends are shut; an ovum inclosed by its proper membranes has been found lodged in the Tube; the Tube has been found to end in a culde-sac; and tumours grow from their outside.

Q. What is the situation of the OVARIA?

A. The Ovaries are situated in the posterior layer of the broad ligaments, one on either side of the fundus, about an inch from the Uterus.

Q. Describe the *figure*, and *size* of the *Ovaria?*

A. The Ovary is somewbat of the figure of the Testicle, but rather less in size, is placed transversely, is largest in the prime of life, becomes smaller and shrivelled in old age.

Q. What is the *structure* of the *Ovaria?*

A. They have an external coat from the peritoneum, and a dense cellular coat, within which is a complicated intermixture of vessels and nerves, very much resembling a glandular structure, aud a number of small vesicles, called Ova, containing a limpid fluid.

Q. In what do the *Ovaria* of a woman, who has never born children, differ from those of one who has?

A. In a woman who has never been impregnated, the surface of the Ovaria is smooth and uniform; but in the Ovaries of a woman who has had children, a cavity is found, called Corpus Luteum, from which the impregnated ovum had escaped; and these Corpora Lutea have been found to correspond with the number of impregnations of the same woman.

Q. What ORGANIC DERANGEMENTS do the *Ovaria* present?

A. Inflammation either of the peritoneal coat, or substance; scirrhus; a pulpy and enlarged substance with cells containing a fluid; scrofulous matter; dropsy very commonly; and a fatty substance intermixed with hair and teeth, while the hymen was perfect, and not ruptured.

Q. From what part of the Uterus do the ROUND LIGAMENTS arise?

A. They arise, one on each side, from the corners of the fundus of the Uterus, before and rather below the Fallopian Tubes, they descend obliquely, becoming rather smaller in the Ligamenta Lata.

Q. What are the *course,* and *termination* of the *Round Ligaments?*

A. They pass along the Broad Ligaments to the sides of the pelvis, pass through the abdominal apertures or Rings, as the Spermatic Cords do in the male, and are afterwards divided into a great number of branches, which terminate upon the Mons Veneris, sides of the Pudendum, and groins.

Q. What parts compose the *Round Ligaments?*

A. The Round Ligaments are of a pale red colour, composed of strong longitudinal ligamentous fibres, blood-vessels, nerves, and cellular substance interposed.

Q. What is the *use* of the Round Ligaments?

A. They seem to assist the Ligamenta Lata, to give the proper inclination to the Uterus forwards in pregnancy, and to direct its ascent before the intestines.

Q. Do the *Round Ligaments* increase in size and length as the Uterus rises in pregnancy?

A. Yes; they are augmented in the same manner as the other parts of the Uterine system are.

Q. What is the *situation* of the VAGINA?

A. The Vagina is situated at the under and posterior part of the bladder and urethra, before the rectum, to all which it is firmly connected by cellular substance: it reaches from the Pudendum to the cervix of the Uterus, extending higher up at the posterior than the anterior part. It is slightly curved.

Q. What is the *structure* of the *Vagina?*

A. It is a thick, strong, membranous canal, having numerous rugae on its anterior and posterior internal surface, which diminish its diameter; and also many nervous papillae, which give it great sensibility. Between the rugae a great number of mucous follicles is situated for moistening the canal. The external end of the vagina is covered on each side by a substance composed of blood-vessels and cells, similar to those of the Penis, called *plexus reteformis*, or *corpus cavernosum Vaginae:* which corpora are compressed by the sphincter vaginae, and tend very much to contract the orifice, and to increase the sensibility of the parts during coition.

Q. What ORGANIC DERANGEMENTS have been found in the *Vagina?*

A. Inflammation; adhesion of its sides; ulcers; scirrhous tumours; deficiency in length or width; too wide, being preternaturally stretched by tumours or polypi; and inversion from procidentia Uteri.

Q. What ARTERIES are sent to the UTERUS?

A. The *two Spermatics*, which are sent off from the Aorta; and the *two Uterine* Arteries, from the Internal Iliacs. The former are dispersed upon the Ovaria, Fallopian Tubes, and Uterus near its fundus; the latter much larger than the former, run to the under part of the Uterus, send branches to the Vagina, and bladder, and are reflected upwards along the edges of the Uterus towards its fundus. They are all very tortuous in their course, and anastomose freely with each other.

Q. From what source comes the PERIODICAL EVACUATION of the *Menses?*

A. In the female constitution from puberty to the decline of life, a natural influx of blood takes place to the Uterine Arteries, and produces a congestion in the Uterine system; which forces the mouths of the exhalants of the internal surface of the Uterus to dilate, and throw out some red particles, along with their usual exhalation, which discharge in a short time diminishes, and ultimately removes the plethora of the vessels. The natural tendency, however, of the uterine arteries to assume an increased action from various stimulating causes, again produces congestion and plethora of blood in the uterine system, a discharge again takes place of much serum and some red particles of the blood mixed with it as before, which removes the plethora for a time. In this way the *Menstrual Flux*, similar to a secretion, is instituted, and a habit induced, by which it is continued as long as the constitution produces a plethoric congestion in the uterine vessels.

OF THE GRAVID UTERUS.

Q. In what respects is the *Uterus changed by pregnancy?*

A. It receives a new stimulus, by which it becomes enlarged in proportion to the growth of the Ovum, Embryo, and Foetus; its mouth, immediately after

conception, is sealed up by a ropy mucus, and its internal surface forms the membrane, called Decidua, or Spongy Chorion. The menstrual flux is stopt.

Q. Are the parietes of the uterus thinner in consequence of its enlargement?

A. No; the increased action of the arteries deposites new matter sufficient for the increase of all its parts without any diminution of the size or thickness of their texture.

Q. Do the *arteries* and *veins* become less tortuous by the enlargement of the Uterus?

A. No; they increase in size, and retain their tortuous course in proportion to the increase of the Uterus.

Q. Is the Enlargement of all the parts of the Uterus owing to the deposition of new substances?

A. Yes; particles of new matter are deposited sufficient for the growth of all its parts.

Q. By what means is that enlargement of the Uterus diminished after birth of the foetus?

A. By *Absorption*, and by the *Lochial Discharge*, which gradually removes the great determination and influx of blood to the Uterus, and reduces it to its usual size.

OF THE GROWTH OF THE FOETUS.

Q. What takes place immediately after conception?

A. The *Rudiments* of the Foetus, in the state of a fluid, are conveyed from the Ovarium along the Fallopian Tube into the cavity of the Uterus, where a Vesicle containing a limpid fluid becomes visible in a few days. This *Vesicle* soon sends off flocculent ramifications to be converted into the Placenta in contact with the Uterus. It becomes thicker and larger, and consists of a membranous capsule, called *Chorion*, within which is the *Amnios*, which surrounds the *Embryo*, water, and umbilical cord: on the outer side of the Chorion is the *Decidua Reflexa*, and around the internal surface of the Uterus itself is the *Decidua Vera*. The De-

cidua seems a temporary covering in the first months, and to be the effect of the stimulus given to the internal surface of the Uterus by the Ovum: it is very similar to a membrane formed by Coagulable Lymph thrown out by an inflamed surface in other parts.

Q. At what period can the *Embryo* be first seen?

A. About the end of the third week after conception, the Embryo, like an oblong Vesicle, is visible floating in the limpid fluid of the Ovum; which is very large in proportion to the size of the Embryo. At the end of the fourth week the Ovum is of the size of a pigeon's egg; the Embryo, of that of a common fly. At the end of the third month, the Ovum is of the size of a goose's egg, the Foetus is nearly three inches in length, and has its head and extremities distinctly formed. In the sixth month, the Foetus is eight or nine inches long, and weighs eight or nine ounces; the Placenta and membranes weigh seven or eight. At the end of the ninth month, when the Foetus is matured for birth, its length is about twenty inches, and its weight seven or eight pounds; while the Secundines are about a pound and a half, or two pounds.

Q. How is the *Foetus* connected to the Uterus?

A. By means of the *Placenta*, which generally adheres to the Uterus near to its fundus; but it may, and frequently does, adhere to any part of its internal surface.

OF THE PLACENTA.

Q. Describe the Placenta?

A. It is composed of Arteries, which proceed from the Uterus in a tortuous manner, and terminate in Cells of the Placenta. Veins receive the blood from the Cells, and carry it back to the Uterus: these are termed the *Maternal Vessels:* they are on the side of the Placenta next the Uterus. The two Umbilical Arteries of the Foetus enter the Placenta by the cord on the Foetal side, divide into minute branches, which are dis-

tributed through the whole Placenta, and spread their terminations around the Cells, into which the maternal blood is poured, without having any direct communication with them. The extremities of the Umbilical Vein receive the Foetal blood from the Arteries, and carry it back to the Foetus.

Q. Is the *distribution* of the arteries of the Foetus around the Cells of the Placenta, similar to that of the Pulmonary artery round the air cells.

A. Yes, very similar; the extremities of the Umbilical arteries being very minute, are dispersed around the Maternal Cells of the Placenta, just as those of the Pulmonary Artery are around the Air Cells of the Lungs: and the extremities of the Veins communicate with those of the Arteries in both cases.

Q. Is any *change produced upon the blood* of the Foetus in the Placenta?

A. Yes; the *Placenta* to the Foetus in Utero seems to perform the same important function, as the Lungs do to the Adult, namely, *to purify the blood*, and thus to render it fit for the purposes of nutrition and growth of parts in the Foetus.

Q. What, besides the Maternal and Foetal Vessels, forms the substance of the Placenta?

A. Fine cellular substance completely destitute of fat is interspersed among them, supports them in their relative situations, and gives to the Placenta its necessary firmness and tenacity.

Q. What are the ORGANIC DERANGEMENTS of the *Placenta?*

A. It is occasionally ossified in certain points, and adheres firmly to the Uterus after the birth of the Child. It has been found in some rare cases to have been converted into a mass of Hydatids.

OF THE PECULIARITIES OF THE FOETUS.

Q. In what do the *bones* of the Foetus differ from those of the adult?

A. They are generally soft, yielding, and often imperfect. Those of the head are joined by membrane, which admits easily of an alteration of form in facilitating parturition.

Q. Do the *Fluids* abound in the Foetus?

A. Yes; they are much more copious in proportion than in after life.

Q. Is there any difference in its *Nervous System?*

A. Yes, the Brain, Spinal Marrow, and Nerves of the Foetus, are proportionally larger and softer.

Q. Is there any difference in the *Glands?*

A. The *Thymus* Gland is very large in the Foetus, and seems to perform some important part in its system: the *Liver* is very large, and indeed all the glandular organs.

Q. Is there any difference in the *Lungs?*

A. The Lungs of the Foetus in Utero are small, collapsed, and sink in water, and are of a dark red colour.

Q. What difference is there in the *blood-vessels of the Lungs?*

A. The Pulmonary Artery divides in the Foetus, as in the adult, into a right and left branch sent through the respective lungs of the thorax: at its division in the Foetus, however, the *Ductus*, or *Canalis Arteriosus*, larger than both the other branches, arises, passes obliquely upwards, and terminates in the Aorta, where it begins to descend: it forms nearly one half of the Aorta.

Q. In what does the *Heart of the Foetus* differ from that of the adult?

A. In having the *Foramen Ovale* in the back part of the septum between the Auricles, it has a thick muscular margin; upon the side of the foramen next the left Auricle, a membranous valve is placed, which allows the blood to flow through the foramen into the left Auricle, but prevents its return.

Q. What purposes do the *Canalis Arteriosus*, and the *Foramen Ovale* serve?

A. As the Lungs are in a collapsed state in the foetus, a small quantity of blood only can circulate through them, the Canalis Arteriosus therefore transmits the remaining quantity, sent into the pulmonary artery, directly into the descending Aorta: while a large part of the blood, sent to the right Auricle of the heart by the Venae Cavae, flows directly through the Foramen Ovale into the left Auricle.

Q. How is the *Circulation equal* in both sides of the Heart by these means?

A. For the sake of demonstration, let us suppose that a *third part* of the blood flows directly through the Foramen Ovale at every dilatation of the Auricles, and that *two-thirds* are propelled by the contraction of the right Auricle into the right Ventricle, and thence by its contraction into the Pulmonary Artery, which transmits *one-third* through the Lungs, and the Canalis Arteriosus carries the remaining *third part* into the Aorta. The pulmonary Veins carry the *one-third* circulating through the Lungs into the left Auricle, which by its contraction propels this third, together with the *other third* part which passed though the Foramen Ovale, into the left Ventricle. Each Ventricle therefore receives exactly *two-thirds;* and by this construction of parts, the same quantity of blood circulates through both sides of the heart in a given time.

Q. What difference do we find in the *Liver of the Foetus* from that of the adult?

A. The Liver of the Foetus is so large, that it occupies the right and left Hypochondric, and the Epigastric Regions. It receives the Blood from the umbilical vein. This vein returns the Foetal blood from the Placenta, is twisted round the Umbilical Cord, together with the arteries, enters the abdomen by the umbilicus, passes in the posterior and inferior duplicature of the Broad or Suspensory Ligament to the Porta of the Liver, and there sends off a pretty large branch, called *Ductus Venosus*, which runs in a waving direction to the Left Vena Hepatica, where it enters the Cava, and

terminates; while the trunk of the Umbilical Vein itself, after having sent off considerable branches to the right and left lobes, at last terminates in the Left Branch of the Vena Portae, which is distributed, chiefly through the left lobe of the Liver.

Q. What is the *use of such a distribution* of the Foetal Blood in the Liver?

A. By such distribution, nearly a half of the blood of the Foetus, which has been purified in the Placenta, is sent by the Ductus Venosus directly to the Vena Hepatica, which soon joins the Vena Cava, or to the Cava itself, to be transmitted to the Heart and whole system; while the other part of the Foetal blood circulates through the Liver, and perhaps throws off some other impurities to be discharged with the Bile into the Intestines, before it is sent to the heart again to circulate through the system.

Q. In what do the *Intestines* of the Foetus differ from those of the adult?

A. They are filled with black green, tar-like, viscid faeces, called *Miconium*.

Q. In what do the *Kidneys* of the Foetus differ from those of the adult?

A. They are irregular and lobulated on their surface; each lobule consists of a Cortical and a Medullary part, has its Papilla, and is covered by its proper membrane or coat: while their surface becomes smooth in the adult. They secrete no urine.

Q. Do the *Renal Capsules*, or *Glands* differ?

A. They are larger in the Foetus, and nearly equal to the size of the kidneys.

Q. Does the *Urinary Bladder* of the Foetus differ from that of the adult.

A. It is of a longer form, rises nearly to the Umbilicus, and has the *Urachus*, of a conical shape and solid consistence as a ligament, arising from its fundus between the umbilical arteries, and between the Peritoneum and linea alba, and extending to the Umbilicus, where it disappears in the umbilical cord.

Q. What difference takes place in the *Iliac Arteries?*

A. The common Iliac Artery of the Foetus separates into a small external, and a large internal branch on each side: the principal part, being the trunk of the Internal Iliac, is reflected upwards by the side of the Bladder on each side; on the outside of the peritoneum both Arteries perforate the Umbilīcus, and are entwined in the Umbilical Cord.

Q. Is there any difference in the *Pelvis* of the Foetus?

A. It is very small, and its Viscĕra seem contained in the cavity of the abdomen.

Q. Is there any difference in the *Female Organs of Generation?*

A. The prepuce of the Clitoris is much larger; and in consequence a female has sometimes been mistaken for a male.

Q. What difference is there in the *Male Organs of Generation?*

A. The Testes, in the early months, are lodged in the Abdōmen on the Psoae muscles a little below the Kidneys; between the Testicle and Scrotum on each side a fibrous vascular conical substance is extended, called Gubernaculum Testis, which is supposed to make way for the descent of the Testis, and to direct its course into the Scrotum, which happens about the seventh or eighth month of pregnancy. The Testes carry down with them their Coats, Vessels, and Nerves.

Q. Repeat as shortly as possible the *Foetal Circulation of the blood in the Thorax*, beginning at the Vena Cava?

A. From the termination of the Cavae, a part of the blood is sent through the Foramen Ovāle into the left Auricle, and the two parts retained in the right Auricle are propelled by its contraction into the right Ventricle; which again by its contraction throws these two parts into the Pulmonary Artery, one of which it transmits through the Lungs, the other is carried by the Canalis Arteriōsus directly to the descending Aorta. That part of the blood sent through the Lungs is collected

and brought to the left Auricle of the Heart by the Pulmonary Veins; this part and that sent directly through the Foramen Ovāle, making two, stimulate the left Auricle to contraction, by which they are propelled into the left Ventricle, which by its contraction throws them into the Aorta and systemic arteries.

Q. Repeat also the *Foetal Circulation of the blood in the Abdomen*, beginning at the Iliac Arteries?

A. The larger branches of the Internal Iliac Arteries, reflected upwards, pass out of the Abdomen by the Umbilicus, are entwined in the Umbilical Cord, enter the Placenta, are minutely divided into branches in its substance, and ultimately terminate around the innumerable Cells in which the mother's blood is contained. With the extremities of these Arteries Veins communicate, receive their blood, join again and again into larger and larger trunks, till at last they form one, the *Umbilical Vein*, which comes out of the Placenta where the arteries enter, is entwined along with them in the Umbilical Cord, enters the Abdōmen of the foetus at the Umbilīcus, passes up to the Porta of the Liver, where it sends off the Ductus Venosus, which terminates in the Hepatic Vein just before it ends in the ascending Vena Cava; or sometimes in the Vena Cava itself: the Umbilical Vein afterwards sends off several branches to both lobes, and terminates in the left branch of the Vena Portae, which is dispersed chiefly through the left lobe of the Liver, and the Hepatic Veins carry its blood to the Inferior Cava and Heart.

Q. Do the Blood-vessels of the Foetus communicate with those of the Mother in the Placenta?

A. No; they have no direct communication; they do not anastomose; in some very rare instances a small branch or two may pass between the Maternal and Foetal Vessels, but it is by no means a common occurrence. Some ancient anatomists thought the vessels of mother and child, are intimately connected in

the substance of the Placenta, and pass into each other; but they were mistaken.

Q. From what *source* does the *Foetus in utero* derive its *nourishment?*

A. Various opinions have been entertained on this subject, such as the nourishment of the Foetus being received from the mother's blood by a direct communication of the vessels of the mother and child: or by absorption from the blood of the cells by the veins of the Placenta: or from serum secreted into the cells and absorbed by Lymphatics of the Placenta and Umbilical cord: or from the Liquor Amnii being swallowed: but, it seems probable, that a nutritious quality is received from the blood of the mother, by the minute extremities of the Umbilical Vein spread around the cells of the Placenta, in which the mother's blood is contained, and conveyed to the blood of the Foetus; from which the Arteries form, and deposite proper nourishment in every part of the Foetal system.

OF THE BLOOD-VESSELS OF THE SYSTEM.

Q. How are the Blood-Vessels of the human body divided?

A. Into ARTERIES and VEINS.

Q. What are the *general characters* of ARTERIES?

A. They are elastic tubes dispersed through the whole body, are distinguished from Veins by their *pulsation*, by the *whiteness* of their colour, and by the *thickness* of their coats.

Q. How many *Coats* have the *Arteries?*

A. *Three;* the external is *membranous* or *cellular;* the middle *muscular*, composed of transverse fibres forming the segments of a circle interposed between each other; and the *inner coat* is remarkably thin, smooth, and dense. These coats are connected by fine cellular substance.

Q. How do the *Arteries* receive their *own nourishment?*

A. Vessels, termed *Vasa Vasorum*, sent from the nearest small branches of arteries, are dispersed upon the surface of the larger arteries, and afford them nourishment.

Q. Do the *Arteries* receive their *Nerves* and *Lymphatics* in the same manner?

A. Yes; the nerves in the neighbourhood send small twigs to the Arteries; and the Lymphatics are frequently so numerous as to cover them.

Q. Have the *Arteries* any *Valves* in their internal cavity?

A. The *only Valves* in the Arterial System are those at the commencement of the Aorta, and Pulmonary Artery.

Q. When an artery divides into branches, does its diameter diminish in proportion to their size?

A. Yes; the trunk of the artery is diminished, but the Areae or calibers, of the branches conjunctly are nearly a half larger than that of the trunk.

Q. Why is the *Area* of the capacity of the branches larger than that of the trunk?

A. That the momentum or velocity of the blood may be continued the same in the branches, as in the trunk itself, more room is requisite to compensate for the increase of friction of their sides, which always retards motion.

Q. In what different ways do the *Arteries terminate?*

A. In *four* ways; they terminate in Veins; in Glands or Follicles; in Exhalants or Capillary extremities, which open upon the internal surfaces, and upon the skin; and in Cells, as those of the Penis, Clitoris, Placenta, and Corpora Cavernosa Vaginae.

Q. What are the general characters of VEINS?

A. They are flexible elastic tubes, capable of greater distention than arteries, and composed of thinner, and

almost transparent coats, through which the purple colour of the blood is conspicuous.

Q. How many *Coats* have the *Veins?*

A. *Three;* an external cellular, a middle membranaceous, and an internal firm, compact, thin coat. These coats, however, are so intimately united to each other, that some Anatomists have considered them only two, an external cellular, and an internal membranous.

Q. Are the *Veins* of the same size and number as their corresponding Arteries?

A. The size of the Veins is more than double that of tbeir corresponding arteries, excepting the pulmonary, bronchial, and renal veins, which are rather smaller.

Q. How are the *Valves in Veins formed?*

A. The Valves are formed of semilunar folds of the inner coat of the veins, placed in pairs at irregular distances: tbey are concave next the heart, and when applied to each other, prevent the blood from flowing along the trunk towards the extremity of the veins.

Q. Are *Valves* to be found in all the Veins?

A. No; the veins of tbe Cranium, of the Thorax, and of the Abdomen want Valves; excepting the Spermatic, and Internal Mammary Veins, and the Vena Azygos, which have Valves. All the Veins of the extremities, and of deep muscular parts have numerous Valves.

OF THE PULMONARY ARTERY AND VEINS.

Q. Repeat the *course* of the *Pulmonary Artery?*

A. It arises from the right Ventricle of the Heart, ascends inclining to the left to the arch of the Aorta, divides into right and left branches, which accompany the bronchial tubes, and divide again and again into numerous branches, that ultimately become very minute, and have their terminations spread round the Bronchial Cells.

Q. Repeat the *Course* also of the *Pulmonary Veins?*

A. Their extremities being very small receive the blood from the minute extremities of the Pulmonary Artery, unite repeatedly and form larger trunks, which accompany their corresponding arteries; all the Veins of each Lung ultimately unite, and form two trunks, which uniting with the two trunks of the other Lung, terminate in the left Auricle of the Heart.

Q. *What happens to the Blood* circulating through the *Lungs?*

A. The whole blood of the body is gradually sent through the Lungs, where it comes nearly in contact with the atmospherical air, the thin membrane of the cells only intervening: notwithstanding this membrane it comes within the sphere of attraction of Chemical Affinity; the Oxygen of the air attracts the Carbon from the blood, which immediately becomes more florid, has also its capacity increased for receiving the Caloric, disengaged from the oxygen changing its state of combination in the air-cells. The blood now becomes arterial, and is fitted for being again transmitted by the arteries through the system.

OF THE AORTA AND ITS BRANCHES.

Q. Describe the Origin, and course of the Aorta?

A. It arises from the left Ventricle of the Heart, turns rather to the right, ascends backwards and towards the left, as far as the top of the thorax, where it is reflected obliquely backwards over the left branch of the Trachēa, and then descends, running close upon the vertebrae; thus forming the Arch of the Aorta.

Q. What Arteries does the *Aorta* first send off?

A. The two CORONARY ARTERIES, which arise immediately above the Semilunar Valves at the origin of the Aorta.

Q. What is their *course?*

A. The *right Coronary Artery* is the larger, runs in a groove between the right Auricle and Ventricle, and is distributed upon the right side of the heart: the

left being divided, runs partly between the left Auricle and Ventricle, and partly between the Ventricles on the fore part, is distributed upon the left side of the Heart, and anastomoses very freely with the right Coronary.

Q. How many *Coronary* VEINS are there?

A. By far the greater part of the Coronary Veins, after uniting together repeatedly, form *one trunk*, termed the *Great Coronary Vein*, which terminates in the under part of the right Auricle, where its orifice is covered by a *semilunar Valve*.

Q. What *Arteries* arise from the *Curvature*, or *Arch of the Aorta?*

A. From the upper or convex part of the Arch three large Arteries arise, viz. the *Arteria Innominata* on the right side, which soon divides into the right Carotid, and right subclavian; and on the left side, the *left Carotid*, and *left Subclavian*.

Q. Describe the course, and division of the CAROTID ARTERIES?

A. On each side of the Trachēa they ascend between the cervical vertebrae and the sterno-mastoidei muscles, diverging a little from each other, till they reach the upper part of the Larynx, opposite to the Os Hyoides, where they divide into *External* and *Internal Carotids*.

Q. How many principal branches does the EXTERNAL CAROTID send off?

A. The External Carotid is smaller than the Internal, and seems a continuation of the common trunk; it sends off *seven Arteries*, viz. the Superior Laryngeal, or Superior Thyroid; the Liugual; the Facial; the Inferior Pharyngeal; the Occipital; the Posterior Auris; and the Internal Maxillary; the trunk itself, ascending under the Zygōma on the Temples, is named the Temporal Artery.

Q. These arteries may be divided into three orders; do so?

A. The first order may comprehend those running

forward to the Thyroid Gland, to the tongue, and to the Face; namely, the Superior Thyroid, Lingual, and Facial, which are much exposed, and are the subject of many particular Operations. The second order comprehends the three smaller arteries running backwards and inwards to the Pharynx, the Occiput, and the Ear, namely, the Inferior Pharyngeal, the Occipital, and the Posterior Auris; which run so deep, that wounds in them are rare. The third order comprehends those running to the Inside of the Jaws, and to the Temples, namely, the Internal Maxillary, and the Temporal, which are of great importance, and should be well known.

Q. Describe the SUPERIOR THYROID ARTERY?

A. It is named also *Superior Laryngeal, Superior Guttural;* it is large, and comes off just after the division of the Carotids; it runs downwards and forwards in a very tortuous form, and sends branches to the Os Hyoides and contiguous parts, to the Thyroid Cartilage; it sends off the Laryngeal branch; and the trunk itself is dispersed in the Thyroid Gland.

Q. Describe the LINGUAL ARTERY?

A. The Arteria Lingualis comes off immediately above the Thyroid, runs forwards and upwards along the side of the tongue, sends a branch to the Pharynx; the *ramus hyoidēus* to the muscles between the tongue and the larynx; the *dorsalis linguae* to the fauces, amygdăla, epiglottis, and pharynx; the *ramus sublingualis* to the sublingual gland and adjacent muscles; and the *ramus ranīnus* to the apex of the tongue.

Q. Describe the FACIAL, or ANGULAR ARTERY; called also External Maxillary, or Labial?

A. The Facial or Labial Artery runs forwards deep under the Stylo-hyoidēus, and tendon of the Digastric muscles, perforates the submaxillary gland, is very tortuous, mounts suddenly in a circular turn over the lower jaw at the under and fore part of the Massēter, then ascends tortuous by the side of the nose, towards the inner angle of the eye. In its course it sends off

the *Palatina Inferior* vel *Ascendens* to the velum palati, and parts near it; several small twigs to the tonsil, tongue, inferior maxillary gland, muscles, and skin; the *Submentalis* to the muscles and adjacent parts; the *Inferior Labial* to the under lip; the *Inferior* and *Superior Coronary* to the margin of the lips; the trunk is then divided and spent upon the cheek and nose.

Q. Describe the INFERIOR, OR ASCENDING PHARYNGEAL ARTERY?

A. This is a small artery, which arises near the Lingual, runs upwards deep in the neck, and sends twigs to the pharynx, fauces, and base of the skull, where some of them enter the foramina, and are dispersed upon the Dura Mater: twigs are also sent to the sterno-mastoidēus, and neighbouring glands.

Q. Describe the OCCIPITAL ARTERY?

A. It arises next the Pharyngeal from the back part of the Carotid, runs close upon the bones, then over the Internal Jugular Vein, then between the transverse process of the Atlas and Mastoid Process; it passes under the bellies of the Digastric, Tracbēlo-mastoideus, Splenius, and Complexus muscles, and becomes superficial near the middle ridge of the occiput, where it rises with many beautiful branches. It is very tortuous, and in its course gives off branches to the muscles already named, and to the glands; a branch, which runs backwards along the jugular vein, enters the cranium by the foramen lacĕrum posterius, and is dispersed upon the under and back part of the Dura Mater under the lobes of the Cerebellum: it, when among the muscles, sends down a long branch, which inosculates with a branch of the Axillary Artery, and also with the Vertebral Artery through the interstices of the vertebrae.

Q. Describe the POSTERIOR AURIS?

A. This artery sometimes comes off from the Occipital, or Pharyngeal, or is sometimes wanting. It commonly comes off from the Carotid, very high in the substance of the Parotid Gland, passes across under the

styloid process, then over the belly of the digastric, and lastly, runs up behind the ear. It sends small branches to the Parotid Gland, Digastric, and Sterno-mastoid muscles, to the Meatus Auditorius externus, to the Membrana Tympani, and the *Stylo-mastoid* branch goes through the Foramen Stylo-mastoideum to the Internal Ear and Tympanum: while the trunk itself is dispersed upon the back part of the ear, and side of the head.

Q. Describe the origin, and course of the INTERNAL MAXILLARY ARTERY?

A. The External Carotid passes up through the Parotid Gland; and the Internal Maxillary comes off from it, embedded in this gland, behind the broad plate, whence the condyloid and coronoid processes of the inferior Maxilla arise. It passes between the jaw, and the external Pterygoid muscle, then ascends in a very tortuous manner to the back of the Maxillary Antrum, and there terminates in numerous branches.

Q. Enumerate the PRINCIPAL BRANCHES of the *Internal Maxillary Artery?*

A. It first sends a number of twigs to the external ear, to the glands near it, one enters the Tympanum by the fissura Glasseri, to the muscles of the Malleus, and sometimes one through the Foramen Ovale to the Dura Mater.

The Internal Maxillary Artery then sends off *seven* branches, viz. the *Meningeal* or *Middle Artery* of the *Dura Mater*, which passes between the external and internal Carotids, then through the Foramen Spinale of the sphenoid bone, and ramifies beautifully over the surface of the Dura Mater, and inside of the Parietal bone, sending twigs to the substance of the bone, and to the internal ear.

Secondly, The *Inferior Maxillary Artery*, which enters the Foramen Maxillare Posterius, runs along the Inferior Maxillary canal, sends off twigs to the teeth, and substance of the jaw, and ultimately emerges by the Foramen Menti to be distributed upon the chin; it

gives off small branches to the Pterygoid, Masseter, and Temporal muscles as it passes into the canal.

Thirdly, The *Alveolar Artery*, which runs round behind the Antrum in very tortuous branches, some of which go to the soft parts, others to the substance of the bones, to the Antrum, and to the back teeth, the proper trunk enters into the substance of the jaw, runs in the Canal, and gives branches to the other teeth.

Fourthly, The *Infra-Orbitar Artery*, which runs in the canal under the orbit, gives off small branches to the soft parts, the substance of the bone, the antrum maxillare, and fore-teeth, and then emerges by the Foramen Infra-Orbitarium to be dispersed upon the cheek.

Fifthly, The *Palatino-Maxillary Artery*, which passes through the Foramen Palatinum posterius, runs between the bony and fleshy parts of the palate, sending twigs to them, and to the sockets of the teeth, it then frequently turns up through the Foramen Incisīvum into the cavity of the nose.

Sixthly, The *Superior Pharyngeal*, which is small, and comes off at the back of the Orbit, it is dispersed upon the pharynx and adjacent parts, a twig runs towards the Pterygoid or Vidian hole, where it inosculates with a branch from the Internal Carotid.

And lastly, The *Lateral Nasal Artery*, which passes through the Foramen Spheno-palatinum into the upper and back part of the nostril, where it divides into branches, of which *one* goes to the posterior Ethmoid cells, *another* to the cells of the Sphenoid bone, a *third* to the back part of the septum narium, a *fourth* passing through the spongy bones to the bottom of the nose, gives twigs to the mucous membrane, to the Antrum Maxillare, and inosculates with the termination of the Palatino-Maxillary coming through the Foramen Incisīvum.

Q. Describe the course of the TEMPORAL ARTERY?

A. After the trunk of the external Carotid gives off the arteries already described, it emerges from the substance of the Parotid Gland, between the Meatus Auditorius and root of the Zygōma, and is afterwards named

the *Temporal Artery*, which forms some sharp turns before the ear; and a little above the Zygōma, where its pulsation can be felt, it divides into an *anterior* and a *posterior branch*, which run superficially between the aponeurosis of the temporal muscle and the integuments, and are distributed upon the brow, and side of the head.

Q. Describe the *branches* sent off from the *Temporal Artery?*

A. The Temporal Artery first gives off several branches to the Parotid Gland; then the *Transversalis Faciei* of considerable size, which runs across the cheek in the direction of the Parotid Duct, gives twigs to the parotid gland, to the articulation of the jaw, the massēter and buccinator muscles, and inosculates with the facial and internal maxillary arteries: then the *Articular* Artery, which sends branches to the articulation of the jaw, to the external meatus, and membrana tympani, and penetrates into the internal ear: then the *Deep Temporal*, which ascends obliquely forwards under the aponeurosis of the temporal muscle to the outer part of the orbit: then the *Anterior Auricular* branches, which are dispersed upon the fore part of the ear, and inosculate with the Posterior Auris, and then small twigs to the masseter.

Q. What is the distribution of the *Anterior Temporal Branch?*

A. It is ramified in a very serpentine manner upon the side of the forehead, as far down as the orbit where it inosculates with the Facial, and upwards to the Sagittal Suture, where it communicates with its fellow of the opposite side. It is dispersed in the integuments and occipito-frontalis and temporal muscles.

Q. What is the distribution of the *Posterior Temporal Branch?*

A. It seems the continuation of the trunk, ascends obliquely backwards, is distributed to the muscles and integuments, inosculates with the Anterior, with the Occipital of the same side, and with its fellow of the opposite side of the head; from all which, numerous

small branches are sent to the Pericranium, substance of the bones, and even through the Sutures in young subjects to the Dura Mater.

OF THE INTERNAL CAROTID.

Q. Describe the course of the Internal Carotid into the cranium?

A. The Internal Carotid is very tortuous in its ascent, is inclosed in the same sheath with the Par Vagum and Great Intercostal Nerves; at the base of the cranium, it makes a bend forwards in entering the Carotic Canal, then upwards, again forwards, then upwards and forwards to emerge from the canal; after it leaves the canal, it turns upwards and then forwards by the side of the Sella Turcica, perforates the Dura Mater at the root of the anterior Clinoid Process, and then beuds backwards and upwards, where it divides into branches.

Q. What *branches* does the *Internal Carotid Artery* send off?

A. The Arteria Ophthalmĭca; Arteria Communĭcans cum Vertebrali; The Anterior Cerebri; and the Media Cerebri.

Q. Describe the course, and terminations of the OPHTHALMIC ARTERY?

A. It enters the Foramen Optĭcum; passes under the Optic Nerve towards the outer part of the orbit; it then takes a spiral turn towards the nose, and gives off the *Arteria Lachrymalis* to the lachrymal gland and adjacent parts; the *Centralis Retĭnae*, which penetrates the optic nerve, runs in its centre, and spreads out into numerous small branches upon the inside of the Retina and capsule of the Vitreous Humour; the *Ciliares* sent to the coats, the iris, and ciliary processes; the *Muscularis Superior*, and *Inferior* dispersed upon the muscles, membranes, and fat of the eye; the *Ethmoidālis Anterior*, and *Posterior*, which pass through the Foramina Orbitaria Interna, anterius and posterius, to the nose,

the frontal, ethmoidal, and sphenoidal sinuses; and the *trunk itself* of the Ophthalmic emerges from the socket of the eye, passes through the Foramen Supra-orbitarium of the frontal bone, is then named the *Frontalis*, and is dispersed upon the forehead.

Q. Describe the ARTERIA COMMUNICANS CUM VERTEBRALI?

A. It goes directly backwards from the trunk of the Internal Carotid, and meets the posterior cerebral branch of the Vertebral Artery, and thus forms an important communication between the *Middle Artery* of the brain, which is the trunk of the Internal Carotid, and the *Posterior Artery*, which is the largest branch of the vertebral.

Q. Describe the *Anterior Cerebri?*

A. This, called semetimes *Arteria Callosa*, goes off from the Middle Artery or trunk, at nearly a right angle forwards, turns in towards its fellow, and they become almost contiguous near the fore part of the union of the Optic Nerves, where they anastomose by means of a short, but large *Transverse Branch:* the Anterior Cerebri is dispersed through the Anterior lobe of the Brain, and is reflected backwards upon the Corpus Callosum.

Q. Describe the ARTERIA MEDIA CEREBRI?

A. This Artery, called also *Arteria Fossae Sylvii*, runs outwards to the lateral part of the brain, along the Fossa Sylvii, is the trunk of the Carotid continued, and is distributed chiefly to the Middle Lobe, but it also gives branches to the Anterior and Posterior Lobes; it inosculates with its fellow, with the Anterior Cerebri, and with branches of the Basilar Artery.

OF THE VERTEBRAL ARTERIES.

Q. What other Arteries are sent to the brain?

A. The *Vertebral Artery* on each side, being very little smaller than the Internal Carotid.

Q. Describe the origin, and course of the *Vertebral Arteries?*

A. They arise from the Subclavian Arteries, and in a short space, each on its own side, enters the Canal formed by the perforations in the transverse processes of the cervical vertebrae, ascends in nearly a straight direction to the second vertebra, where it turns laterad; in passing from the Dentata to the Atlas it bends still more laterad and forward; after passing the perforations of the Atlas, it turns suddenly backwards, runs horizontally in a groove of the Atlas, turns upwards into the Foramen Magnum, perforates the Dura Mater, enters the Cranium, inclines towards its fellow at the beginning of the Medulla Oblongāta, where the two Vertebral Arteries unite, and form the *Basilar Artery.*

Q. Why do the *Vertebral Arteries* form such turnings before they enter the Cranium?

A. By these windings they are accommodated to the motions of the head without any risk of their being ruptured from over-extension; but chiefly that the impetus or force of the circulating blood may be much diminished by those various and sudden turnings, before it enters the tender and delicate substance of the brain.

Q. Do the *Vertebral Arteries* send off any branches during their ascent in the neck?

A. Yes; they send some twigs outwards, between the vertebrae to the deep-seated muscles: and others inwards by the holes, which transmit the Cervical Nerves, to the Spinal Marrow, and its membranes.

Q. Do the *Vertebral Arteries* send off any branches, where they enter the Cranium, before they form the Basilar?

A. Yes; each Vertebral Artery sends off the *Posterior Meningeal* to the posterior part of the Dura Mater, twigs to the Medulla Oblongata, and frequently the *Posterior Artery* of the Spinal Marrow: near its junction with its fellow, it sends down the *Anterior Artery* of the spinal Marrow.

Q. Describe the ARTERIA BASILARIS?

A. The *Basilar Artery* runs up between the basilar aspect of the Tuber Annulare, which it impresses, and the Cuneiform Process of the occipital bone; at the upper and fore part of the Tuber, it divides into four branches, two to each side, namely, the Anterior or Superior Cerebelli, and the Posterior, or Profunda Cerebri.

Q. Does the *Basilar Artery* send off any branches before its division into right and left branches?

A. Yes; from its sides several small twigs are sent off to the Tuber and adjacent parts; and one larger than the rest, called *Auditoria Interna*, enters the canal of the Portio Dura on each side, is spread on the Vestible, Semi-circular Canals, and Cochlea.

Q. Describe the *Anterior*, or *Superior Cerebelli?*

A. It turns round the crura cerebri, gives branches to the Nates, Testes, and upper part of the Cerebellum, and is dispersed in its substance.

Q. Describe the *Posterior*, or *Profunda Cerebri?*

A. This Artery is rather larger than the former, is distributed chiefly through the Posterior Lobe of the brain on each side; sends a considerable branch into the posterior corner of the Lateral Ventricle, which inosculates with branches of the Carotid, and forms the posterior Arteries of the Choroid Plexus; near its root it receives the *Communicating Artery* from the Carotid, and this union forms the *Circle of* WILLIS.

Q. Mention particularly how the *Circle of* WILLIS is formed?

A. The two Anterior Arteries of the Brain, near the fore part of the junction of the Optic Nerves, have a free communication by means of a short large transverse branch, proceeding from the one to the other. This forms the anterior part of the Arterial communication. The communicating arteries running on each side between the Internal Carotids, and the two Posterior Arteries of the Brain, form the sides of the Circle; and the Posterior Arteries themselves issuing from the Basi-

lar Artery, form the posterior part of the Arterial communication, or Circle, as it is called.

Q. What *purpose* does such a communication serve?

A. It seems calculated to guard against accidents which might obstruct the flow of blood in the Carotids, or in the Vertebrals in different cases. For should the one Carotid be obstructed by Aneurism, or by a Tumour pressing upon it, the other, communicating with the two Vertebral Arteries by the circle of Willis, could supply the deficiency of blood in the brain, and *vice versa*.

OF THE SUBCLAVIAN ARTERY.

Q. Describe the course of the *Subclavian Artery?*

A. The *Subclavian* arises from the Arch of the Aorta on the left side, and from the Arteria Innominata on the right, ascends to the upper part of the thorax, then passes transversely outwards behind the origin of the Sterno-mastoidēus, then between the Anterior and Middle Scalēni, and between the Subclavian muscle, and first rib; which it crosses, and passes under the Pectoral muscles into the Axilla, where it is called the Axillary Artery.

Q. What branches does the *Subclavian Artery* on each side send off *upwards?*

A. *Five;* the Vertebrālis, Thyroidēa Inferior, or Gutterālis, Cervicālis Anterior, Cervicalis Posterior, and Dorsālis Superior Scapŭlae.

Q. What branches does the *Subclavian* send off *downwards?*

A. *Two;* the Mammaria Interna, and the Intercostalis Superior.

Q. Describe the course of the *Thyroidea Inferior*, as the *Vertebral* has been already described?

A. The *Inferior Thyroid Artery* ascends in a winding manner obliquely inwards behind the Carotid, and is chiefly dispersed through the Thyroid Gland, inosculating freely with the Superior Thyroid, or Laryngeal Artery.

Q. What branches does the *Inferior Thyroid* give off in its ascent?

A. It sends branches to the Trachēa, which descend into the thorax, and inosculate with the Bronchial Arteries; it sends branches also to the Œsophagus, Pharynx, and Larynx.

Q. To what parts are the *Cervicalis Anterior*, and *Posterior*, distributed?

A. To the muscles, glands, nervcs, and integuments of the neck: the *Anterior* sends twigs through the inter-vertebral foramina, where tbe cervical nerves pass out, to communicate with the Spinal Arteries: the *Posterior* sends a principal branch downwards to tlie parts about the top of the sboulder, and upper and lateral parts of the thorax; while botb anastomose with the Vertebral and Occipital Arteries.

Q. Describe the course, and distribution of the *Dorsalis Superior Scapŭlae?*

A. The Superior Dorsal of the Scapula runs transversely behind the origin of the Sterno-mastoidēus, passes tlirough the notch in the superior costa of the Scapula, and disperses its branches in the muscles on the dorsum of tbe Scapula; it also sends branches to the shoulder-joint.

Q. Describe the course, and distribution of tbe *Mammaria Interna?*

A. Tbe Internal Mammary Artery descends between the pleura and cartilages of the true ribs, and between the internal Intercostal and Sterno-costal muscles, perforates the Diaphragm under the cartilage of the seventh rib, and is dispersed upon the posterior surface of the Rectus, and Obliqui Abdominis, muscles.

Q. What *branches* does the *Internal Mammary* send off in its descent?

A. It gives branches to the integuments near the Clavicle, to the Thymus Gland, to the Mediastīnum, to the Pericardium, to the Diaphragm; and, extcrnally, to the Mamma, Pectoral muscles, and integuments.

Q. What are the *principal communications* of the Internal Mammary Artery?

A. It inosculates freely with the External Thoracics, the Intercostals, the Phrenics, and the Epigastric.

Q. Describe the course of the *Intercostālis Superior?*

A. The Superior Intercostal descends near the vertebrae, and divides into two, or sometimes three branches, which run forwards in the superior intercostal spaces corresponding to their number.

Q. Why do the superior intercostal spaces not receive their Arteries from the same source as the inferior?

A. Because the Aorta, after forming the arch, does not come near to the spine until it descends to the third or fourth dorsal vertebra, after which it gives off the Inferior Intercostals in its course: whereas the Subclavian Artery lies very near to the head of the first rib, where, in consequence, it sends off the *Superior Intercostal* to supply the two or three upper intercostal spaces.

OF THE AXILLARY ARTERY.

Q. What is the situation of the *Axillary Artery?*

A. It lies in the Axilla between the Subscapularis and Serratus Major muscles, is surrounded by lymphatic glands, veins, nerves, and fat.

Q. What *branches* does the *Axillary Artery* send off?

A. Four or six thoracics, the Scapularis Interna, Dorsalis Scapulae Inferior, the Circumflexa Anterior, and Posterior.

Q. Describe the *Thoracic Arteries?*

A. These arteries vary in number and origin; but they are generally from four to six. They sometimes arise by two or three trunks, and branch out from one another: they are dispersed through the muscles lying upon the thorax; one longer than the rest, sometimes called *External Mammary*, is distributed through the Mamma. They inosculate with the Intercostals, and Internal Mammary, and with each other.

Q. Describe the *Scapulāris Interna?*

A. It is also named *Subscapularis;* it often sends off

the Dorsalis Scapulæ Inferior; it is large, and runs near the inferior costa of the Scapula, gives off several large branches to the Subscapular muscle, the Teres Major, Latissimus Dorsi, and to the joint, and parts near it.

Q. Describe the *Dorsalis Scapulae Inferior?*

A. It turns round near the cervix of the Scapula to the *fossa infra-spinata*, and spreads out into branches among the muscles upon the posterior surface of the Scapula.

Q. Describe the *Circumflexa Anterior* vel *Articularis?*

A. It arises from the Axillary, runs transversely round the fore part of the shoulder-joint between the os humeri, and the heads of the Corăco-brachialis and Biceps muscles, and is dispersed upon the Capsular Ligament, Periosteum, and muscles covering the joint.

Q. Describe also the *Circumflexa* vel *Articularis Posterior?*

A. It is larger than the former, passes between the Subscapularis and Teres Major to get to the joint; it then turns round backwards, between the os humeri and long head of the Triceps and Deltoid, gives branches to the joint, and adjacent muscles; and anastomoses freely with the Anterior Circumflex.

OF THE HUMERAL ARTERY.

Q. Describe the *Humeral*, or *Brachial Artery?*

A. When the Axillary Artery passes down below the edge of the tendon of the Pectoralis Major muscle, it is called the *Humeral* or *Brachial Artery*, which is continued down the inner side of the humerus, until its division into the Radial and Ulnar Arteries.

Q. Where does *its division* take place?

A. The exact place is uncertain, being sometimes higher and sometimes lower; but in general it divides near to the bend of the elbow-joint.

Q. What is the *course* of the *Brachial Artery?*

A. It runs along the inner side of the Biceps before, and the Triceps behind, covered by the tendinous Apo-

neurosis, and giving off branches to the muscles in its course.

Q. What *principal branches* does it send off?

A. The *Brachial Artery* sends off *three:* the Profunda Humeri Superior, vel Spiralis; Profunda Inferior, vel Minor; and the Ramus Anastomoticus.

Q. Describe the *Profunda Humeri Superior?*

A. It arises opposite to the insertion of the Teres Major and Latissimus Dorsi muscles, runs downwards and outwards in a spiral manner, between the Triceps and the bone, towards the outer condyle, where it anastomoses with the Radial Artery; near its origin it sends branches upwards, which inosculate with others from the Humeral and Scapular Arteries.

Q. Describe the *Profunda Inferior*, or *Minor?*

A. It arises near the middle of the humerus from the Brachial, or frequently from a branch of the Profunda Superior; it is dispersed among the muscles on the inner side of the arm.

Q. Describe the *Ramus Anastomotĭcus Magnus?*

A. It arises from the Brachial two or three inches above the bend of the elbow, sends branches to the Triceps, Brachialis Internus muscles, and parts contiguous; it also forms various anastomoses with other branches of the Profunda upwards, and with the Recurrents of the Radial and Ulnar downwards.

Q. Do no other branches arise from the Brachial Artery in its course along the humerus?

A. Yes; a great many smaller branches arise from it, which are short and dispersed in the contiguous muscles, periosteum, and bone; one of these is the *Medullary Artery*, which nourishes the bone.

Q. At what part of the os humeri does this artery enter?

A. At the inner and fore part of the middle of the bone the *Medullary Artery* enters, and runs slanting down towards the condyles.

Q. What branches, did we say, are formed by the *division* of the *Brachial Artery?*

A. The Radial, and Ulnar, and sometimes the Interosseal Arteries.

OF THE RADIAL ARTERY.

Q. Describe the origin, and course of the *Radial Artery?*

A. The origin of the Radial Artery is most generally at that place where the Brachial divides into two branches, near to the elbow-joint, sometimes higher up; it passes over the Pronator Teres, proceeds along the radius between the Supinator Longus and Flexor Radialis, and near the wrist it lies immediately under the integuments upon the Flexor Longus Pollicis; at the carpal end of the Radius it turns anconad, or towards the back of the hand, under the tendons of the Abductor and Extensors of the thumb, and gets between the metacarpal bones of the thumb and fore finger, where it passes to the palm or vola, runs across ulnad close to the metacarpal bones, forming a curve, convex towards the fingers, called the *Deep Volar Arch.*

Q. What branches does the *Radial Artery* send off below the wrist?

A. When the Radial Artery turns under the extensors of the thumb towards the back of the hand, and gets between the metacarpal bones of the fore-finger and thumb, it sends off the *Arteria Magna Pollicis,* which runs along the side of the thumb next the fore finger, or it sometimes divides and supplies both sides of the thumb; it also sends off the *Arteria Radialis Indicis,* which runs along the fore-finger next the thumb; and it sends of a *Thenal branch* running generally above the Transverse Ligament of the Carpus, inosculates with the Ulnar Artery beneath the Aponeurosis Palmaris, and completes the deep *Volar Arch.* A number of irregular branches anastomose with others of the Ulnar and Interosseal Arteries.

OF THE ULNAR ARTERY.

Q. Describe the origin, and course of the *Ulnar Artery?*

A. It is generally the continuation of the trunk of the Humeral Artery, and is larger than tbe Radial; it runs deep below the flexors of the hand, keeping its course a good way between the Flexor Sublimis, and Profundus Digitorum; near the Carpus it becomes more superficial, runs under the Fascia, and over the Annular Ligament, close by the radial side of the os pisiforme, and thencé under the Aponeurosis Palmaris towards the radial side of the Carpus, forming tbe *Superficial Volar Arch.*

Q. Describe the branches, and connexions of the ULNAR ARTERY *at the* WRIST *and in the* PALM?

A. The Ulnar Artery at the wrist sends off a *Dorsal branch*, which passing behind the tendon of the flexor carpi ulnaris to the back of the hand, inosculates there with branches of the Interosseal and Radial, and forms a plexus, from which many small branches arise to the carpus, metacarpus, and fingers. From its Superficial Volar Arch, branches are sent to the integuments and superficial parts; the *Ulnaris Profunda*, of considerable size near the root of the metacarpal bone of the little finger, passes deep, and inosculates with the Radial Artery, and forms part of the Deep Volar Arch; *three Volar Branches*, which run opposite to the interstices of the metacarpal bones, and at the roots of the fingers, divide into Digital Branches.

OF THE INTEROSSEAL ARTERY.

Q. Describe the origin, and course of the *Interosseal Artery?*

A. The Interosseal Artery arises generally from the Ulnar, sometimes from the Humeral at its division into the Radial and Ulnar: sometimes there are two Inter-

osseal Arteries by different origins; but generally the Interosseal shortly after its origin sends off a *Posterior Interosseal* branch, which perforates the Interosseous Ligament, and runs along the anconal aspect of the forearm. The *Interosseal* itself runs close upon the interosseous ligament, in the middle between the Radius and Ulna, always on the fore or thenal aspect; near the wrist the principal branch perforates the interosseous ligament, goes to the posterior side of the carpus and back of the hand, and divides into inosculating branches.

Q. Describe the course, and connexions of the INTEROSSEAL ARTERY more minutely, *at the* CARPUS *and* HAND?

A. Near the carpus, the great Interosseal Artery passes chiefly to the back of the carpus and hand; and partly passes under the annular ligament of the carpus, inosculates with the superficial volar arch, and volar branches, and is dispersed upon the neighbouring parts of the wrist and palm. The posterior branch inosculates with the extreme branches of the Posterior Interosseal, which runs along the anconal aspect of the interosseous ligament, and is dispersed upon the muscles, tendons, and ligaments in its course; it assists in forming the arterial plexus or arch on the back of the carpus, and metacarpus, which sends three arteries downwards to the fingers along the spaces between the metacarpal bones.

Q. Do these Volar Arches communicate with each other?

Yes; the Superficial and Deep Volar Arches anastomose by the Ulnaris Profunda, and by other smaller irregular branches, the Ancōno-carpal Arch or Plexus on the back of the hand, inosculates with the perforating branches of the deep volar arch. In short, there is a general communication among the arteries, both superficial and deep seated, of the palm, and also among the arteries on the back of the hand, and between them and those of the palm.

Q. What parts do the VOLAR BRANCHES supply?

A. The Volar Branches spread upon the Interossei

and Lumbricales muscles, and give twigs to them, and ultimately divide into the Digitals.

Q. Do other branches of Arteries run along and supply the anconal aspect, or back of the interossei muscles?

A. Yes; branches sent from the ancono-carpal arch run along them, and perforants pass between them and the volar branches.

Q. Describe the origin, course, and termination of the DIGITAL ARTERIES?

A. The three volar arteries, arising from the Superficial Volar Arch, receive at the roots of the fingers an equal number of branches from the deep Volar Arch: and then each of these volar arteries divides into two Digital branches, the one running along the radial, and the other along the ulnar side of the flexor tendons of all the fingers, except the ulnar side of the little finger, and the radial side of the fore-finger; the former is supplied from the Volar Arch, and the latter from the Radial Artery. Near the extremity of the distant phalanx, the Digitals gradually converge and inosculate with each other, forming the Digito-Volar Arch, which sends off a great number of small branches to the tip of the finger, where the sense of touch is most acute.

OF THE RECURRENT ARTERIES.

Q. Describe the RECURRENT ARTERIES situated at the bend of the elbow?

A. At the elbow-joint Recurrent branches are sent upwards from the Radial, Ulnar, and Interosseal Arteries, which inosculate freely with others sent down from the Profunda and Anastomotic of the Brachial Artery. These recurrents are to be seen supplying the parts on all the four aspects of the arm.

Q. What advantage do we expect from these *Recurrents* in the *Operation for Aneurism* at the elbow-joint?

A. When the trunk of the principal artery affected by the Aneurism is tied, these Recurrent Arteries must carry on the circulation to the fore-arm and hand. They

become much dilated, and in a short time are quite fitted for transmitting the usual quantity of blood without inconvenience.

Q. Do the *Radial*, *Ulnar*, and *Interosseal Arteries* send off branches in their course along the fore-arm?

A. Yes; after the Recurrents, they send off a great many nameless and irregular branches to the different muscles, membranes, and bones, as they pass.

Q. From what arteries do the *Nutritious Arteries* of the Radius and Ulna arise?

A. From the *Interosseal Artery* which runs on the thenal aspect of the Interosseous Ligament.

OF THE THORACIC AORTA.

Q. What Arteries are sent off from the DESCENDING AORTA in the Thorax?

A. The THORACIC descending AORTA sends off three sets of Arteries, namely the Bronchials, the Œsophagēals, and the Inferior Intercostals.

Q. Describe the BRONCHIAL ARTERIES?

A. The Bronchial Arteries are three or four in number, and are generally sent off from the fore part of the Aorta; sometimes some of them arise from the Intercostals, or by common trunks with the Œsophagēals. They are but small, and some of them are distributed to the right, and others to the left lung: they follow the ramifications of the bronchial tubes, and in their passage give twigs to the bronchial glands.

Q. Do the *Bronchial Arteries* inosculate with branches of the *Pulmonary Artery?*

A. Not in general; they sometimes anastomose by some of their minute branches, but this seems an accidental occurrence, as by far the greater number does not inosculate with the Pulmonary Artery.

Q. What is the *use* of the *Bronchial Arteries?*

A. They carry blood from which nourishment seems to be derived to the whole substance of the lungs.

Q. Do the *Bronchial Arteries* send branches to any other parts besides the lungs?

A. Yes; they send small branches also to the œsophagus, to the posterior mediastinum, and to the pericardium, before they enter the lungs.

Q. Describe the ŒSOPHAGEAL ARTERIES?

A. The Œsophageals, four or five in number, are small, and arise from various parts of the Aorta, or from the Bronchials, or Intercostals, and are dispersed chiefly upon the Œsophagus, and partly upon the posterior mediastinum, lungs, pericardium, and diaphragm.

Q. Describe the origin, and course of the INFERIOR INTERCOSTAL ARTERIES?

A. They are sent off from the back and lateral parts of the Aorta on each side, and consist of nine or ten pairs. They run along the groove in the inferior margin of the ribs, towards the sternum between the external and internal layers of the Intercostal muscles; and give branches backwards to the spine, spinal marrow and its membranes; in their course forwards to the intercostal and pectoral muscles, and to the pleura costalis. They anastomose freely with one another, and with the internal Mammary, and external Thoracics above; and with the Phrenic or Diaphragmatic, the Epigastric and Abdominal Arteries, as they descend towards the last rib.

OF THE ABDOMINAL AORTA.

Q. What portion of the *Aorta* is strictly called *Abdominal?*

A. The Aorta passes down through the diaphragm between its long crura into the abdomen; and that portion of it from the last dorsal vertebra at the Diaphragm, to its division into the common Iliacs at the fourth lumbar, is properly called the *Abdominal Aorta.*

Q. Enumerate the ARTERIES sent off FROM THE ABDOMINAL AORTA from the Diaphragm downwards?

A. The Phrenic, Coeliac, Superior Mesenteric, Inferior Mesenteric, Renal or Emulgent, the Spermatic,

Capsular, Adipose, Ureteric, the Lumbar, and the Sacra Media, Arteries, in the exact order of description.

Q. Describe the PHRENIC or DIAPHRAGMATIC ARTERIES?

A. They are two in number, and arise from the Aorta as soon as it passes through the Diaphragm, or sometimes from the Coeliac, are ramified on the concave or abdominal side of the Diaphragm, and their extreme branches anastomose with the Inferior Intercostals, the Lumbar, the Epigastrics, and the Internal Mammary Arteries.

Q. Do the *Phrenic* Arteries send branches to other parts?

A. Yes; they generally send small branches to the Capsulae Renales, Cardia, and adjacent parts.

Q. Describe the origin, and distribution of the COELIAC ARTERY?

A. The Coeliac Artery arises from the fore part of the Aorta, between the two crura of the Diaphragm, nearly opposite to the eleventh dorsal vertebra, at the upper margin of the Pancreas, below the Liver, behind the Stomach, and on the right of the Spleen; its trunk is scarcely half an inch long, when it divides into three branches, viz. the Superior Gastric, Hepatic, and Splenic.

Q. Describe the *Superior Gastric Artery?*

A. This Superior Coronary of the stomach, as it is sometimes called, is the smallest of the three Coeliac branches, it runs along the smaller curvature of the stomach, from near the Cardia towards the Pylorus; it sends branches also towards the left to the Cardia, which inosculate with the Œsophageals, Phrenics, and Vasa Brevia; in its course to the right it sends numerous branches to the sternal and dorsal aspects of the stomach, which anastomose freely with branches of the right and left Gastro-Epiploics, and of the Omentum, with the Pylorics, and Pancreatics.

Q. What seems to be the *use* of this *Superior Gastric* or *Coronary Artery?*

A. It has its course in the concave gastric arch from the Cardia to the Pylorus, and spreads its ramifications on both sides of the stomach; in consequence of such a course and distribution, it carries a quantity of blood, nearly equal, to the stomach, whether it be full or empty. This equality renders it the most proper Artery for carrying nourishment to the coats of the stomach itself; hence it is considered the *Nutrient Artery* of the stomach.

Q. Describe the course, and distribution of the *Hepatic Artery?*

A. The Hepatic is the largest of the Coeliac branches, runs dorsad of, or behind, the right extremity of the Pancreas, and behind the Pylorus to the Porta of the liver, where it divides into the right Inferior Gastric, and the proper Hepatic.

Q. Describe the *Right Inferior Gastric Artery*, or *Right Gastro-Epiploic*, as it is sometimes called?

A. It runs along the convex arch of the stomach towards the left, and sends branches to both sides of the Stomach, which inosculate with the Superior Gastric, and with the Left Inferior Gastric; it sends branches also to the Pylorus, Duodenum, Pancreas, and Omentum.

Q. Describe the proper *Hepatic Artery?*

A. The Hepatic Artery, having sent off the Gastro-Epiploica Dextra at the Porta of the Liver, soon divides into two branches, the larger of which is distributed through the right lobe, and the smaller through the left lobe of the liver.

Q. Is the BILE secreted by the extremities of the *Hepatic Artery?*

A. Not in general; the blood, which this Artery transmits, seems destined for the nourishment of the Liver; while the extremities of the Vena Portae are coiled up into the Acini, which secrete the Bile. In some chance places of the Liver, some of the extremities of the Hepatic Artery and of those of the Vena Portae

anastomose, but this seems accidental. In a very few rare cases indeed, the Vena Portae has been found to terminate in the Vena Cava Ascendens, and the extremities of the Hepatic Artery, which was much enlarged, must in such cases have secreted the Bile.

Q. From what source does the *Gall-Bladder* receive its blood?

A. From the right hepatic branch the *Arteria Cystica* is sent off, which divides, and is dispersed upon the Gall-Bladder.

Q. Describe the *Splenic Artery?*

R. It runs first behind, and then along the upper margin of, the Pancreas, to the concave side of the Spleen, where it divides into several branches; it sends off the Gastro-Epiploica Sinistra or left Inferior Gastric, and the Vasa Brevia, four or five in number: the Splenic branches enter the substance of the Spleen, and are minutely dispersed through it.

Q. Does the *Splenic Artery* send off any branches in its way to the Spleen?

A. Yes; it sends off several Pancreatic branches, and others to the Omentum, and Meso-colon.

Q. Describe the *Left Inferior Gastric*, or *Gastro-Epiploica Sinistra?*

A. It runs along the convex or large curvature of the Stomach dextrad, or towards the right, until it inosculates with the trunk of the Right Inferior Gastric; in its course it anastomoses with branches of the Vasa Brevia, of the Superior Gastric, and the other Inferior Gastric on both sides of the Stomach.

Q. Describe the *Vasa Brevia*, or *Arteriae Breves?*

A. These Arteries, generally from four to six in number, are distributed upon the left great extremity of the Stomach, where the branches sent from the Superior and Inferior Gastrics are but small and few in number; hence these Vasa Brevia copiously supply the deficiency on that part of the stomach, and freely anastomose with the other left Gastrics.

Q. Which of these *Gastric Arteries* seem to contribute most to the secretion of GASTRIC JUICE?

A. The Right and Left Inferior Gastrics, and the Vasa Brevia.

Q. How do you account for that?

A. When the Stomach is empty, and its coats considerably contracted and collapsed, the flow of the blood in these Arteries is very much impeded, and its positive quantity in a given time is most probably diminished by more than a half, or nearly altogether, while in the mean time it circulates readily through the Spleen and Liver without interruption. But, on the contrary, when the Stomach is distended with food, the blood flows freely in these Inferior Gastrics and Vasa Brevia, hence a much greater quantity is present, from which the Gastric Juice is copiously secreted, and at a time too when it is wanted for the purposes of digestion.

Q. Describe the origin, and course of the SUPERIOR MESENTERIC ARTERY?

A. It arises from the fore part of the Aorta immediately below the Coeliac, it lies behind the Pancreas, then passes over the Duodenum, enters between the layers of the Meso-colon, and of the Mesentery, forming a large arch, and proceeding a little towards the right in its descent to the beginning of the Colon; from the convexity of which many branches are sent off.

Q. What *branches* are sent off from the *Superior Mesenteric Artery*, and to what viscera are they distributed?

A. From its left or convex side between twenty and thirty branches are sent off, which are distributed upon the Pancreas, Duodenum, but particularly upon the Jejunum, Ilium, and Mesentery; from its concave or right side three pretty large branches arise, viz. the *Ilio-Colic*, which supplies the termination of the Ilium, Caput Caecum Coli, and part of the right side of the Colon; the *Colica Dextra*, which inosculates with the former, and is dispersed upon the right Colon and part of its transverse

arch; the *Colica Media* or *Anastomotica* is sent to the middle of the transverse arch, and there divides into a right and left branch, the former is dispersed upon the colon dextrad, and anastomoses with the Colica Dextra, the left branch runs siuistrad, and is dispersed upon the left side of the arch, and joins the Colica Sinistra sent off from the Inferior Mesenteric Artery; and several other smaller branches, which are distributed on the Omentum, and anastomose with branches of the Gastro-Epiploicae. Thus the *Superior Mesenteric Artery* supplies a portion of the Pancreas, of the Duodenum, the Mesentery, Omentum, and the whole of the small and large Intestines, except the Left Colon and Rectum.

Q. In what manner are these numerous branches of the *Superior Mesenteric Artery* disposed in their course and termination?

A. They anastomose and form numerous arches, upon which others are again constructed in a beautiful manner, and this is continued repeatedly, till they reach the intestines, when the branches become straight, are minutely subdivided, and dispersed through their coats; many of them terminate in the villi of the internal coat.

Q. Describe the INFERIOR MESENTERIC ARTERY?

A. It arises, next to the former, from the fore part of the Aorta, a little to the left, it descends obliquely behind the Peritoneum, upon the left Psoas muscle, and soon divides into branches, which join and separate, and join again, forming a number of arches, from which many branches are sent off; the principal are, the *Ramus Ascendens*, which divides into two branches, one of which anastomoses with the Colica Media, forming the Meso-Colic Arch, and the other is dispersed upon the left part of the Colon: the *Colica Sinistra*, which also divides into two branches, the one joins the Ramus Ascendens, the other is dispersed upon the Sigmoid Flexure of the Colon; and the *Haemorrhoidalis Interna*, which is the continuation of the trunk; it inosculates with the Colica

Sinistra, and then descends upon the back part of the Rectum.

Q. Describe the RENAL, or EMULGENT ARTERIES?

A. They arise, one on each side, from the lateral parts of the Aorta, immediately below the superior Mesenteric Artery, run transversely and obliquely downwards over the Psoas muscle, on each side, to the Kidneys. The right Renal passes behind the Vena Cava, and is longer than the left, in consequence of the Aorta being situated on the left of the Vena Cava.

Q. What is the distribution of the *Renal Arteries in the Kidney?*

A. When the Artery comes to the concave edge of the Kidney, it divides into several branches, which enter the substance of the Kidney, surround its pelvis, divide repeatedly into smaller and smaller branches, which anastomose as they diverge towards the circumference, till their extremities become exceedingly minute in the Cortical substance, where they are coiled up into Corpuscles or Cryptae, which secrete the urine from the blood at the roots or bases of the Papillae.

Q. Describe the CAPSULAR ARTERIES?

A. These Arteries generally arise from the Aorta laterally, sometimes from the Renal or Diaphragmatic, and are dispersed through the Capsŭlae Renāles.

Q. Describe the ADIPOSE ARTERIES?

A. These Arteries arise from the Aorta, and frequently from the Diaphragmatics, or Renals, or Spermatics, or Capsular, and are dispersed upon the Tunica Adiposa of the Kidney.

Q. Describe the URETERIC ARTERIES?

A. The Ureterics arise from the Aorta laterally, and sometimes from the Renal, Spermatic, or others in the vicinity, and are spread upon the Ureters.

Q. Describe the origin, and course of the SPERMATIC ARTERIES?

A. They arise, one on each side, from the fore part of the Aorta, a little below the Renal, proceed at a very acute angle from the Aorta, over the surface of the Psoae muscles behind the Peritoneum; the right passes obliquely over the Vena Cava, the left passes behind the Colic Arteries, and both descend obliquely over the Urēters, to the Internal Abdominal Aperture, where each, in its respective side, is involved in the Spermatic Cord. They are very long, and rather small in size, but become larger before they reach the testicle, in consequence of having received the branch from the Epigastric.

Q. Describe the course, and distribution of the *Spermatic Arteries* in the Cord and Testicle?

A. The Spermatic Artery, when it has joined the Cord at the upper Abdominal Aperture, receives a branch from the origin of the Epigastric Artery, and inosculates freely with it in its descent to the testicle, which it enters at its posterior part, and turns round in a serpentine form, waving along the upper part of the testicle, and sending coronary branches all over its convex surface, which terminate in the septŭlae, between which the fasciculi of the semeniferous tubes are situated.

Q. Are the *extremities of the Spermatic Arteries* coiled up in the manner of a gland?

A. They are so very minutely divided, and so intricately disposed, that it is not easy to say what is the precise form of their extremities in the numerous septulae in the substance of the testicle; it is very probable, however, that they are coiled up in a glandular manner to secrete the semen.

Q. Do the *Spermatic Arteries* send off many branches, and communicate with other Arteries in their descent to the testicle?

A. Yes; the testes in the foetus lie on the Psoae muscles, in the vicinity of the Kidneys, and before birth, pass gradually down into the Scrotum, hence they receive arterial branches from the Renal, and Capsular, as well as their principal artery from the Aorta; these inos-

culate, and in their descent, communicate with branches of the Lumbar and Iliac Arteries. The Spermatic Arteries give branches to the Spermatic Cord, and Cremaster muscle, to the Scrotum, to the Epididymis, to the Septum Scroti, and their ramifications inosculate freely with each other in the substance of the Testicle.

Q. Do the *course, and termination of the Spermatic Artery in the* FEMALE differ from those in the Male?

A. Yes; the origin and course down the abdomen are the same in both; in the Female, however, the Spermatic does not pass through the Abdominal Ring, as in the male, but it descends into the Pelvis, between the layers of the Broad Ligament of the Uterus, spreads its branches upon the Ovarium, Fallopian Tube, Fundus of the Uterus, and Round Ligament, and it also inosculates with its fellow of the opposite side, and with the Uterine Arteries.

Q. Describe the LUMBAR ARTERIES?

A. They arise from the back and lateral parts of the Abdominal Aorta in pairs, in the same manner as the Intercostal Arteries do; they are generally four or five on each side; those on the right side are longer, and pass across behind the Vena Cava, and the Psoae Muscles, but before the Quadratus Lumborum; they then perforate the Transversalis and Oblique Muscles, and are dispersed upon them.

Q. What branches do the *Lumbar Arteries* send off?

A. They give branches backwards to the Spine, Spinal Marrow, and large muscles, and integuments of the loins, others inwards to the Psoae, and Iliacus Internus muscles.

Q. What arteries do the Lumbar communicate with?

A. The *Lumbar Arteries* inosculate with the Intercostals, Internal Mammaries, Diaphragmatics, Epigastrics, Circumflex Iliacs, and with each other.

Q. Describe the SACRA MEDIAN ARTERY?

A. This Artery arises from the back, and under part of the Aorta, just at its bifurcation, it is but small; it

generally gives off a right, and a left branch, which are distributed similar to the Lumbar Arteries: its trunk descends along the mesial line of the Os Sacrum, and Os Coccygis, sending out lateral branches in its course.

OF THE ILIAC ARTERIES.

Q. Into what Arteries is the DESCENDING AORTA ultimately DIVIDED?

A. The Aorta at the lower part of the fourth Lumbar Vertebra divides into the right, and left *Common Iliac Arteries.*

Q. What is the course of the COMMON ILIAC ARTERIES?

A. The Common Iliac Artery of the left side runs obliquely downwards and outwards on the lateral or left side of the Iliac Vein; that of the right side crosses over before the Vena Cava, and takes its situation also on the lateral or right side of the Common Iliac Vein: at the symphysis, which joins the Sacrum and Ilium, each artery divides into the *Internal, and External Iliac*; the former follows the course of the Sacro-Iliac Symphysis into the Pelvis, the latter is considered the continuation of the trunk, and runs down on the inner or mesial aspect of the Psoae muscles towards the Crural Arch.

OF THE INTERNAL ILIAC.

Q. Enumerate the *principal Branches* into which the *Internal Iliac*, or *Hypogastric Artery* is divided?

A. The Internal Iliac soon divides into a number of Arteries, viz. the Ilio-lumbar, Lateral Sacral, Glutēal, Obturātor, Umbilīcal, Vesīcal, Uterine, Hæmorrhoidal, Pudic, and the Sciatic or Ischiatic. Of these the Gluteal and Ischiatic are by much the largest.

Q. Describe the *Ilio-Lumbar Artery?*

A. It is small, and passes outwards under the Psoas, and is dispersed upon the Psoae, Iliacus Internus, and

Os Ilium, giving to it its Nutrient Artery. This artery has also several anastomoses with others, as the Lumbar, and Circumflex of the Ilium.

Q. Describe the *Sacrae Laterales?*

A. These Sacral Arteries are generally two or three in number; they pass down by the foramina of the Os Sacrum, and give branches through each to the Cauda Equina; they supply the muscles, membranes, and nerves on the Sacrum, inosculate with the Sacra Media, and near the apex of the Sacrum join those of the opposite side, forming an arch.

Q. Describe the *Glutēal Artery?*

A. This is the largest branch of the Hypogastric, and by way of eminence has been called the Posterior Iliac. It passes out of the Pelvis, at the upper part of the Iliac Notch, and is soon divided into branches, which are ramified principally through the Glutēi Muscles, and inosculate with neighbouring arteries.

Q. Describe the *Obturātor Artery?*

A. This Arteria Obturatoria arises sometimes from the Ilio-Lumbar, or Ischiatic, or Gluteal; it passes along the under side of the Psoas and upper edge of the Obturator Internus to the oval hole at the superior part of the Obturator Ligament, where, in company with the Obturator Nerve, it goes out of the Pelvis; it then divides into two sets of branches, the one set is dispersed upon the parts about the hip-joint, the other upon the Obturator Externus, and adjacent muscles.

Q. Describe the UMBILICAL ARTERY IN THE FOETUS?

A. The Umbilical Artery in the Foetus, being a continuation of the trunk of the Iliac, rises by the side and fundus of the Urinary bladder, and directs its course to the Umbilīcus, where it and its fellow of the opposite side pass out of the abdomen, are entwined in the Umbilical Cord, enter the Placenta, are minutely ramified through its whole substance, and ultimately spread their extremities around the cells, which contain blood of the mother.

Q. Do these *Umbilical Arteries of the* FOETUS termi-

minate in the arteries or veins of the mother, or even anastomose with them?

A. Many ancient and some modern anatomists have described the arteries of the Foetus, and those of the mother, as communicating in the placenta, but it is a mistake; the Foetal and Maternal blood-vessels do not communicate, or run into one another. Sometimes, indeed, a chance inosulation or two may be found in the Placenta, but it is not a common occurrence.

Q. Describe the *Umbilical Artery in the* ADULT?

A. This artery in the Foetus sends off several branches to the urinary bladder, which in the adult become much larger, and form the *Vesical Arteries*, while the umbilical artery, which was large in the Foetus, is shrivelled into a Ligament in the adult.

Q. What Arteries are sent to the *Urinary Bladder?*

A. The Urinary Bladder receives these *Vesicāles* from the umbilical; branches from the Uterine arteries in the female; and branches from the other neighbouring Arteries in the Pelvis.

Q. Describe the *Uterine Arteries?*

A. They arise either from the Internal Iliacs, or from some of their principal branches, they are larger than the Spermatic, they enter the Uterus near its Cervix, extend their branches to the Vagina and Bladder, and run in the edges of the Uterus towards the fundus, they inosculate with each other, and with the Spermatics.

Q. Describe the *Haemorrhoidal Arteries?*

A. The Middle Haemorrhoidal Arteries arise either from the Internal Iliacs, or from some of their ramifications, and are irregular in their size, number, and extent of ramification. They are distributed to the Rectum, the Bladder, Vesiculae Seminales, Prostate Gland, and to the Vagina: they anastomose freely with others.

Q. Describe the course of the *Pudic Arteries?*

A. This artery on each side, arises either from the trunk of the Internal Iliac, or from the Ischiatic; it passes out of the Pelvis along with the Sciatic Artery,

through the lower part of the Sciatic Notch of the Os Ilium, at the under edge of the Pyriform Muscle, over the upper Sacro-Sciatic Ligament. As soon as it gets outside the Pelvis, it gives off a few small branches, turns round the ligament into the Pelvis again, between the Sacro-Sciatic Ligaments to the inner side of the tuberosity of the Ischium, where it is lodged deep, and protected by a process of the larger Sacro-Sciatic Ligament from lateral pressure, it continues its course close to the inner side of the ramus of the Ischium and Pubis, behind the Crus Penis, till it reaches the Symphysis Pubis; then it turns suddenly on the dorsum of the Penis, stretches along it parallel to its fellow under the Integuments, and terminates in the Glans and Prepuce.

Q. Does the *Pudic Artery* give off many branches in its course?

A. Yes; near its origin in the pelvis, it gives branches to the Rectum, Bladder, Vesiculae Seminales, Prostate Gland, the Obturator Internus Muscle, the Vagina, and Spermatic cord; to the Pyriformis, Gluteus Maximus, the Coccyx, the Gemelli, the Ischium and muscles attached to it; and then having returned into the pelvis, it sends branches to the Rectum, called External Haemorrhoidals, to the Levator and Sphincter Ani, to the Perineum and muscles there, to the Scrotum, the Corpus Cavernosum Urethrae, and Corpora Cavernosa Penis.

Q. What *Arteries* particularly belong to the *Penis?*

A. The trunks of the two Pudic Arteries, about the size of a crow's quill, are continued along the Penis. Each of them at the Symphysis Pubis, pierces the Corpus Cavernosum, and divides into two branches; of which the one runs along the Corpus Cavernosum near to the septum, through which it communicates with its fellow, and pours its blood by numerous branches into the cells, which, when filled and distended, produce Erection; the other runs along the dorsum of the Penis till it reaches the Corona Glandis, which it encircles and terminates.

Q. Describe the course, and termination of the *Pudic Artery in the female?*

A. It follows the same general course out of the pelvis, giving branches to the contiguous parts, returns, and at the inner side of the tuber, and crus Ischii, and Pubis, it sends branches to the Anus, Perineum, Labia Externa, and termination of the Vagina, while the trunk itself is distributed through the Clitoris in a manner similar to that through the Penis.

Q. Describe the *Sciatic* or *Ischiatic Artery?*

A. It is next to the Gluteal in size, it passes out of the Pelvis at the under part of the Sciatic Notch, accompanied by the Sciatic Nerve, between the Pyriformis and Gemelli, and being separated from the Glutcal Artery by the pyriformis, it descends a considerable way with the nerve of the same name under the Gluteus Maximus, in the hollow between the Trochanter Major, and the tuberosity of the Ischium, but rather inclining to the latter. It is dispersed among the muscles, tendons, and ligaments, near the hip-joint, viz. the Pyriformis, Gemelli, Quadratus Femoris, Coccygēus, Sacro-Sciatic and Capsular Ligaments, Levator Ani, Gluteus Maximus and Medius; and it inosculates frequently with other arteries.

OF THE EXTERNAL ILIAC ARTERY.

Q. Describe the course of the *External Iliac Artery?*

A. It appears in the adult to be the continuation of the trunk of the Common Iliac; it winds along the brim of the Pelvis behind the Peritoneum, rises over the Psoas, passes under POUPART'S Ligament, and, as soon as it emerges from the abdominal aperture, it is called the Femoral Artery.

Q. What arteries does the EXTERNAL ILIAC send off?

A. It sends off some small twigs to the Peritonēum, Muscles, and Lymphatic Glands; but two principal arteries, viz. the Epigastric, and Circumflex Iliac.

Q. Describe the *Epigastric Artery?*

A. It arises from the mesial or inner side of the Iliac, just before it goes under the Ligament of POUPART, at nearly a right angle, it first ascends obliquely upwards and inwards, between the Peritoneum and Transversalis Abdominis, then between the Peritoneum and Rectus, and lastly between the Rectus and its sheath, till it reaches the Epigastric region. Near its origin it passes behind the Spermatic Cord in the male, and the Round Ligament in the female. It divides and sends off many branches, which anastomose with their fellows of the opposite side, with the adjacent arteries, such as the Lumbar, Inferior Intercostals, Internal Mammaries, and Phrenics.

Q. Does the *Epigastric Artery* send off any branches near its origin?

A. Yes; it gives small twigs to the neighbouring parts, particularly a branch in the male, to the Spermatic Cord; and in the female, to the Round Ligament.

Q. Describe the *Circumflex Iliac Artery?*

A. It arises nearly opposite to the Epigastric, from the outer or lateral side of the External Iliac, it follows the curvature of the Crest of the Ilium on its central aspect, between the Transversalis and Obliquus Internus, till it arrives at the highest point of the Ilium, where it ascends more directly, and inosculates with branches of the Epigastric, Lumbar, Inferior Intercostal, and Internal Mammary Arteries.

Q. To what parts are the branches of the Circumflex Iliac distributed?

A. To the Inguinal Glands, to the different muscles in its course; and sometimes to the Cremaster and Spermatic Cord.

OF THE FEMORAL OR CRURAL ARTERY.

Q. Describe the course of the FEMORAL or CRURAL ARTERY?

A. It is the External Iliac continued, which, when without the abdomen, assumes the name of FEMORAL

or CRURAL. It begins nearly under the middle of the Ligament of Poupart; runs *centrad* or under the Fascia and Inguinal Glands, is surrounded by much fat, and unusually strong cellular membrane; has the Crural Nerve, and Iliacus Internus muscle situated *laterad*, the Pectinalis, and the Crural Vein *mesiad*, or towards the Pubis; it descends in the hollow between the Adductors on the inner side of the thigh, and the Rectus and Sartorius on the outer, covered first by the Integuments and Fascia, then by these and the Sartorius, and lastly, by these and the Aponeurosis, which stretches down from the Vastus Internus to the Large Adductor, which it perforates, turning obliquely towards the ham, where it is called the Popliteal Artery.

Q. *What Arteries* does the *Femoral* send off?

A. It sends off the *Profunda* nearly opposite to the Trochanter Minor, and between this situation, and the Crural Arch, it gives off *Inguinal* branches, Inguinal Pudics, and two Circumflex femorals.

Q. Describe the *Inguinal Branches?*

A. These *Inguinal Arteries*, arising from the Femoral near the Crural Arch, are generally small and irregular in their number; they sometimes arise from the Inguinal Pudics, or Circumflex; they are ramified on the Inguinal Glands, neighbouring Muscles, Ligaments, and Integuments.

Q. Describe the *Inguinal*, or *External Pudic Arteries?*

A. They are small and indefinite, are ramified on the Integuments of the Symphysis Pubis, on the Dorsum Penis, and Scrotum, and on the Labia Pudendi. They inosculate with other Arteries in these parts.

Q. Describe the *Circumflex Arteries of the Thigh?*

A. The *Circumflexae Femŏris* are two, the *Internal*, which is the larger, and is ramified deep among the Adductors of the Femur, and Flexors of the leg, arising from the Pelvis: and the *External*, which is ramified upon the Abductors of the Femur, and Extensors of the Leg.

Q. Describe the *Profunda Femŏris?*

A. It arises from the Femoral Artery, in general opposite to the Trochanter Minor; it frequently gives off the Circumflex; it runs down towards the insertion of the Adductor Brevis, and origin of the Vastus Internus in the linea aspera; crosses the linea obliquely, and terminates in the Flexors of the Leg. In its course, it sends off branches, called *Perforants*, which are distributed through the different muscles, some turn round close to the Femur, from the Popliteal to the Fibular aspect, to be dispersed upon the Vasti Externi and Glutæus Maximus. They inosculate with the Gluteal, Ischiatic, and other Arteries, and with each other.

Q. Does the *Femoral Artery* send off from its trunk any *Perforant Branches?*

A. Yes; just before the *Femoral* perforates the tendon of the Triceps, it gives off the *Ramus Anastomoticus Magnus*, which descends with many ramifications on the Ligaments, Tendons, and Fascia, towards the Patella, and inosculates with the external Circumflex, and other branches about the knee; near the same place it sends off also *Perforants* across the Poples, which succeed to those of the Profunda, to be distributed upon the Biceps and Vastus Externus.

OF THE POPLITEAL ARTERY.

Q. Describe the *Popliteal Artery?*

A. When the *Femoral* passes down between the Condyles of the Os Femoris, it is called the *Popliteal Artery*. It has the Popliteus and Capsular Ligament between it and the joint, the tendons of the muscles forming the ham-strings upon either side, and covered by the nerve, vein, much adipose substance, and the integuments; and a little farther down it is covered by the belly of the Gastrocnemius Externus, and Integuments. It terminates at the under edge of the Poplitēus, where it separates into the Tibialis Antica, and Tibialis Postica.

Q. What *branches* does the *Popliteal Artery* send off?

A. An External, and an Internal Superior Articular; and an External, and Internal Inferior Articular; an Azygos or Median Articular, and two Surāles.

Q. Describe the *Superior External, and Superior Internal Articular Arteries?*

A. They are circumflected *proximad* of, or above the Condyles; disperse their branches through, and under the two Vasti to the *Rotular* aspect, and form a part of the vascular plexus spread upon and round the Patella. The *Internal*, turning round by the Tibial aspect, inosculates with branches of the Anastomotic, and Perforants of the Femoral; the *External*, turning round by the Fibular aspect, inosculates with the External Circumflex, which is a long descending branch from the *Profunda*.

Q. Describe the *Inferior External, and Inferior Internal Articular Arteries?*

A. They are circumflected nearer to the joint and the Lateral Ligaments—unite conspicuously with the Recurrents from the leg in forming the Plexus. In their course they send branches to the Solēus, Poplitēus, Gastrocnemius, Tendons of the Flexors, Capsular and Lateral Ligaments, Ligament of the Patella and Semilunar Cartilages.

Q. Describe the *Azygos* or *Median Articular?*

A. It arises either from the Popliteal, or from one of the superior Articular; it spreads between the Condyles on the Capsular Ligament, fat, Semilunar Cartilages, and Crucial Ligaments; it inosculates with the neighbouring Arteries.

Q. Describe the *Surāles*, or *Gastrocnemic Branches?*

A. These two Arteries arise from the Popliteal, between the origin of the Superior and Inferior Articular branches, then enter the heads of the Gastrocnemius, and are dispersed in its substance; a branch often runs superficially down almost to the heel.

OF THE TIBIAL ARTERIES.

Q. Describe the *Anterior Tibial Artery.*

A. The Tibialis Antica is one of the branches, into which the Popliteal Artery divides, or, as some anatomists say, it is sent off from the Posterior Tibial at the lower edge of the Poplitēus Muscle, perforates the Interosseous Ligament, descends along its anterior surface, first between the Extensor Digitorum and Extensor Pollicis, and then between this and the Tibialis Antīcus: near the ankle it becomes more superficial, rises upon the fore part of the Tibia, passes under the Annular Ligament, over the Tarsus, and along the interstice between the metatarsal bones of the great toe, and index pedis, where it dives into the sole in the middle of the foot, and inosculates with the Plantar Arteries.

Q. *What branches* does the *Anterior Tibial Artery* send off?

A. Near its origin it gives various small branches to the Soleus, Tibialis Postīcus, Capsular Ligament, which inosculate with the Inferior and Azygos Articulars. Having perforated the Interosseous Ligament, it sends off the *Anterior Recurrent*, which ascends and inosculates with the Articulars, and vascular plexus of the knee; in its course downwards, it gives small branches to the muscles on the fore part of the leg; near the Tarsus it gives off the *External* and *Internal Malleŏlar;* the *Arteria Tarsea*, which runs across the Tarsus under the tendons of the Extensors: the *Metatarsea*, which runs obliquely towards the root of the little toe, and gives branches to the Interossei Muscles; before it sinks into the sole, it sends off the *Dorsalis Pollicis* to the great and second toes.

Q. Describe the *Posterior Tibial Artery?*

A. The Tibialis Postica, being a continuation of the trunk, runs down under the Solēus, near to the Tibial Nerve, passes between the Tendo ACHILLIS and Malleŏlus Internus into the sinuosity of the Os Calcis, where it divides into the *External and Internal Plantar Arteries.*

Q. What *Branches* does the *Posterior Tibial send off?*

A. Various small branches laterally, and upwards, some of which inosculate with the Inferior Articulars: and about an inch below the origin of the Anterior Tibial it sends off the *Fibularis* or *Peronēal;* and, in its descent, it gives off many lateral branches to the muscles and adjacent parts, as also the *Medullary Artery,* for the nourishment of the Tibia, about the middle of the leg.

Q. Describe the *Fibular,* or *Peronēal Artery?*

A. It runs down on the inner or Tibial side of the Fibŭla, under the Flexor Pollicis Longus, towards the Malleŏlus Externus, behind which it runs deep by the Os Calcis, and is lost in anastomoses with the Posterior Tibial, External Plantar, and among the Muscles and Ligaments, near the external side of the Os Calcis.

Q. What *Branches* does the *Peronēal Artery send off?*

A. It sends off lateral branches to the muscles, fascia, interosseous ligaments, and bone, particularly the *Medullary Artery,* for nourishing the Fibula; about three inches above the ankle-joint, one branch, called *Peronēa Antica,* larger than the other perforants, passes through the Interosseous Ligament, anastomoses with branches of the Anterial Tibial, and is dispersed upon the fore parts of the external ankle, and Tarsus.

Q. Describe the *Internal Plantar Artery?*

A. It passes along the inner or Tibial side of the sole, between the Aponeurosis Plantaris and the Abductor Pollicis, towards the root of the great toe, passes under the Flexor Longus Pollicis, anastomoses with the Arcus Plantaris, and then gives off a branch, which divides it into two; the one runs along the Tibial side of the great toe, and the other along that of the toe next it.

Q. Describe the *External Plantar Artery?*

A. This is a continuation of the trunk of the Anterior Tibial, being larger than the former; it runs obliquely fibulad between the Flexor Brevis Digitorum, and Flexor Accessorius, to the base of the metatarsal

bone of the little toe, where it bends forwards between the Flexors and metatarsal bones of the small toes to the Tibial side of the foot, until it gets to the interstice of the metatarsals of the great toe, and index pedis, where it inosculates with the Internal Plantar, and forms the *Arcus Plantaris.*

Q. Do the *Plantar Arteries* communicate with those on the upper or convex part of the foot?

A. Yes, very freely, by many anastomoses; but particularly by the *perforating branch* of the *Anterior Tibial,* which passes down between the metatarsal bones of the great toe and the one next it, to join the *Plantar Arch.*

Q. *What Arteries* are sent out from the *Plantar Arch?*

A. *Two sets* of Arterics are sent from it, namely, the *Interosseal,* which are small, running to the spaces between the metatarsal bones; and the *Digital Arteries,* which are larger, running to the toes.

Q. In what manner do the *Digital Arteries* direct their course?

A. They are sent off from the Plantar Arch, run in the spaces between the metatarsal bones to the roots of the toes, and there each divides into two branches, which run along the sides of two contiguous toes corresponding to the metatarsal bones, the *Digitals* on both sides of each toe anastomose freely, and form an Arch or Plexus near its extremity.

ORGANIC DISEASES OF THE ARTERIES.

Q. Enumerate the principal *Diseases of the Arteries?*

A. The Arteries are subject to Ossification, Inflammation, Dilatation, and Rupture.

Q. In what particular part of the Artery is the *osseous matter* deposited?

A. It is observed to be deposited in small points, in various parts of the Artery, or in thin spicular layers between the muscular and internal coats. These points or spicula increase in extent, and sometimes either sur-

round the Artery, or, at least, the greater part of its circumference.

Q. By what circumstances and symptoms can we discover *inflammation of an Artery?*

A. If the Inflammation be considerable, by great pain, increased by violent pulsation, by a red streak on the integuments, painful to the touch, and by an increase of heat in the course of the Artery.

Q. Enumerate the Varieties of *Dilatation*, or *Aneurism* of Arteries?

A. The Circumscribed and the Diffused True Aneurism; the Circumscribed and Diffused False; and the Aneurism by Anastomoses.

Q. What is understood by a *Circumscribed True Aneurism?*

A. It is when the circumference of the Artery is uniformly enlarged into a round circumscribed pulsating Tumour.

Q. What is meant by a *Diffused True Aneurism?*

A. It is so called when the tumour of the Artery is oblong, and not distinctly circumscribed; and when a sac communicates with the artery by a narrow neck.

Q. Is the trunk of the artery, near to the part affected with Aneurism, of its natural size?

A. It frequently is; but, at other times, it is considerably enlarged.

Q. What is meant by *Circumscribed False Aneurism?*

A. It is produced by the blood finding its way through an aperture, formed by a puncture, or bursting of the coats of the artery into the annexed cellular substance, which becomes condensed, and forms a cyst, in which the blood is confined.

Q. What is understood by *Diffused False Aneurism?*

A. It is formed by the blood escaping as in the former case into the cellular substance, insinuating itself into its cells, and extending along the course of the Artery, for a very considerable way.

Q. What is signified by *Aneurism by Anastomosis?*

A. It is formed by the Dilatation of a cluster of small Arteries uniting or communicating in a small space.

OF THE VENOUS SYSTEM.

Q. How are Veins to be distinguished from Arteries?

A. The Veins may be distinguished by their want of pulsation, by their bluish colour, by their larger size, and by the thinness of their coats.

Q. Do the Veins accompany the Arteries?

A. Yes, in general; in the extremities, however, and fleshy parts, one set of veins runs deep, and accompanies their respective arteries; while another set runs more superficially, and is termed subcutaneous.

Q. Do the Veins observe the same regularity in their situation, and division into branches, as the Arteries do?

A. No; they exhibit a much greater variety, both in the situation of their trunks, and in the division of their branches.

Q. Have Veins as frequent anastomoses with each other as Arteries have?

A. They anastomose much more frequently than the Arteries; and that too by large trunks, while the Arteries, with a few exceptions, anastomose by small branches.

Q. Whether are the Veins, or Arteries capable of the greater distension?

A. The Veins are more flexible, and capable of bearing greater distension than the Arteries, and, owing to this, their coats become so attenuated, that they are more subject to be ruptured.

Q. Why are the veins of the Muscular, and extreme parts furnished with *Valves?*

A. That the flow of the blood may not be retarded, but rather promoted by tbe muscular actions of those parts, while the Valves prevent it from flowing back towards the extremities.

Q. Why are the Veins of the Cranium, Thorax, and

Abdomen, with a few exceptions, not furnished with Valves?

A. Because the Veins in these cavities are not subject to pressure from muscular action, and, in consequence, the blood is not easily retarded, and rendered subject to regurgitation.

Q. What powers propel the blood in the Veins?

A. A momentum of very considerable strength is given to the blood in the Arteries by the contractile power of the heart, and arteries themselves; by which it is propelled into the extremities of the veins with a steady forcing pressure, and then the elasticity of the coats of the veins, and the motions of the surrounding parts, assisted by the Valves, continue its movement with the same momentum and velocity towards the heart.

VEINS OF THE INFERIOR EXTREMITY.

Q. Describe the deep-seated Veins of the Foot and Leg?

A. The *deep-seated Veins*, being generally two in number, called Venae Comĭtes, or Satellĭtes, run close at each side of their respective arteries, from which they receive their names, and they unite into trunks where their arteries divide. They frequently anastomose with each other, and sometimes also with the subcutaneous veins. The *Plantar* unite and form the *Tibial* and *Fibular Veins*, which ascend to the Poples, or upper part of the leg, where they join and constitute the *Popliteal Vein*.

Q. Does the *Popliteal Vein* receive others?

A. Yes; the Popliteal Vein lies close upon the posterior part of the Artery of that name, and receives the Venae Surāles, Vena Saphēna Minor, and the Venae Articulares, in its ascent, it becomes larger, and at the upper part of the Condyles is named the Femŏral Vein.

Q. Describe the course of the *Femoral Vein*.

A. It ascends close by the side of the Artery, passes through the tendon of the Triceps with it; near the

middle of the femur it lies deeper than the Artery, it then turns gradually to the inner, or Tibial, side of the Artery, and in this situation passes under the Crural Arch into the Abdomen, where it receives the name of the External Iliac Vein.

Q. *What Veins* does the *Femoral* receive in its ascent?

A. It receives all the Veins which correspond with the branches of the Femoral Artery: namely, those of the Perforant branches of the Profunda below the Tendon of the Triceps; opposite to the Trochanter Minor, the trunk of the *Vena Profunda*, which has previously received the veins corresponding with the branches of the Arteria Profunda; above the Trochanter Minor, it receives small veins from the External Parts of Generation, Inguinal Glands, and from the Integuments of the fore part of the Abdomen and of the Groin.

Q. Describe the course of the *External Iliac Vein?*

A. It commences at the Crural Arch, runs up on the mesial or inside of the External Iliac Artery, and near to the vertebrae it crosses behind this Artery on the right side of the Pelvis, and behind the Internal Iliac Artery on the left side, where each joins its respective Internal Iliac Vein, and, after their junction, the Common Iliac Vein begins.

Q. *What Veins* does the *External Iliac* receive in its ascent along the brim of the Pelvis?

A. It receives at the Crural Arch the *Epigastric*, and the *Circumflex of the Ilium*, and sometimes the *Obturator Vein*.

Q. Describe the course of the *Hypogastric*, or *Internal Iliac Vein?*

A. The different Veins which accompany the branches of the Internal Iliac Artery, are named after their respective Arteries, they all unite and form the *Internal Iliac*, or *Hypogastric Vein*, which is situated on the outer side, or lateral aspect, of the Internal Iliac Artery,

and soon joins the External Iliac Vein, to form the Common Iliac.

Q. Have the Veins, of which the *Internal Iliac* is composed, any *Valves* in their structure?

A. The Veins, situated in the muscular fleshy parts, are uniformly furnished with Valves; other Veins, or a portion of others, not subjected to muscular pressure, have no Valves.

Q. Describe the *Common Iliac Vein?*

A. This Vein lies on the right side of the Common Iliac Artery, joins its fellow just below the bifurcation of the Aorta. By their junction the lower part, or commencement of the Vena Cava Ascendens is formed, and has its situation on the right side of the Aorta.

Q. What Veins does the *Vena Cava* receive in its ascent?

A. It receives the *Sacral* Vein, the *Lumbar*, the *Renal*, and right *Spermatic;* and, at the Diaphragm, the *Diaphragmatic* and *Hepatic* Veins, after which it soon terminates in the Right Auricle of the Heart.

Q. In what manner do the *Left Lumbar Veins*, and the *Left Renal*, pass the Aorta?

A. The Left Lumbar Veins cross behind, and the left Renal Vein passes over before the Aorta to terminate in the Vena Cava.

Q. Where does the *left Spermatic* Vein terminate?

A. It terminates in the left Renal Vein.

Q. Are the *Spermatic Veins* furnished with *Valves?*

A. These Veins are much larger than their corresponding Arteries, and are always furnished with valves without the Abdomen, and most frequently also within it.

VEINS OF THE SUPERIOR EXTREMITY.

Q. What Veins do we find in the hand?

A. The *Veins of the hand* consist of a deep seated set, which take their names from the arteries; and of

a superficial set, quite irregular in their course and distribution.

Q. What Veins form the *Cephalic Vein ?*

A. The veins running up from the back of the hand, turning towards the radial aspect of the fore-arm, unite, and by degrees form a large trunk, frequently called the *Cephalic Vein.*

Q. What veins compose the *Basilic Vein ?*

A. The superficial veins on the ulnar aspect gradually unite in their ascent, and form a trunk, named the *Basilic Vein.*

Q. Are there any more superficial veins on the fore-arm ?

A. Yes ; between these on the thenal or volar aspect of the arm, several veins are seen anastomosing with one another, and sometimes with the Cephalic, sometimes with the Basilic : when they anastomose with the Cephalic they are called *Median-Cephalic,* when with the Basilic, *Median-Basilic.*

Q. Describe the course, and termination of the *Basilic Vein ?*

A. It lies near the Ulnar Condyle, and runs up the inner or ulnar side of the humeral artery, forming the *Humeral Vein,* which receives the superficial veins, and has various communications with the deep seated in its course to the Axilla, where it joins the deep veins, and forms the Axillary Vein.

Q. Describe also the course, and termination of the *Cephalic Vein ?*

A. The Cephalic Vein ascends on the outside of the Biceps, receiving superficial branches, and forming several communications with the Basilic ; then passing between the Pectoralis Major and Deltoid, it terminates in the Axillary Vein.

Q. Do the deep and superficial veins anastomose ?

A. Yes ; the deep seated or satellites run, one on each side of their respective arteries, anastomose frequently with each other, and sometimes with the superficial veins.

Q. Describe the *Axillary Vein?*

A. The Axillary Vein, formed by the junction of the superficial and deep-seated humeral veins, passes up towards the Clavicle, and when it goes between it and the first rib, it is then called the Subclavian Vein.

Q. What veins does the *Axillary* one receive?

A. The Axillary Vein receives the Circumflex, Scapular, and External Thoracic, Veins.

Q. Describe the *Subclavian Vein?*

A. It commences from the Axillary, where it passes between the Clavicle and first rib, runs across near the subclavian artery, and over the anterior portion of the Scalēnus Anterior muscle, joins its fellow of the opposite side, and both conjoined form the Vena Cava Superior.

Q. Does the *Subclavian Vein* of the left side differ in any respects from that of the right?

A. Yes; the *left Subclavian Vein* is much longer than the right, and passes across the fore part of the Arteries arising from the arch of the Aorta, to join the right Subclavian behind the cartilage of the first rib.

Q. What veins does the *Subclavian* receive in its course?

A. It receives several veins from the superior dorsal part of the Scapula, from the muscles and integuments of the neck, the *external* and then the *internal Jugular Veins*, and the *Vertebral Vein*.

Q. Does the *Subclavian* not frequently receive other Veins?

A. Yes; it frequently receives the Inferior Laryngeal, Anterior External Jugular, and Internal Mammary Veins; and on the left side, the Superior Intercostal Vein.

Q. Do the *Vertebral Veins* not terminate in the Brain?

A. Yes; the Vertebral Veins, properly so called, terminate in the Inferior Petrosal, or Occipital Sinuses; but small veins from the Spinal Cord and its mem-

branes, and from the bones and deep-seated parts form a trunk, which occupies the place of the Vertebral Vein in the canal of the transverse processes of the Cervical Vertebrae, and in consequence is called the *Vertebral Vein.*

EXTERNAL VEINS OF THE HEAD.

Q. Mention the principal veins of the external parts of the head and face?

A. Superficial and deep-seated veins from the upper parts and side of the head, after several anastomoses with the frontal and occipital, unite and form the *Temporal Vein*, which descends near to the artery, penetrates the substance of the Parotid Gland, from which, from the ear, and cheek, it receives branches, and passes down below the Inferior Maxilla, where it is joined by the Facial Vein.

Q. By what veins is the *Facial Vein* formed?

A. Numerous small veins of the forehead form the *Frontal* Vein, which accompanying the artery of that name, passes downwards under the zygoma, and receiving many branches from the great facial plexus is called the *Fascial Vein*, until it gets below the lower jaw, where it unites with the Temporal Vein, and their union constitutes the External Jugular Vein.

Q. What is the course, and termination of the *External Jugular Vein?*

A. The External Jugular, formed chiefly by the junction of the Temporal and Facial Veins, descends on the neck, under the Platysma Myoides, or Musculus Cutaneus, and anterior to the Sterno-Mastoideus, until it terminates in the Subclavian Vein.

Q. What veins does the *External Jugular* receive in its descent?

A. It receives branches from the Internal Maxillary Vein, the Lingual, and some from the Occipital Vein.

Q. What veins form the *Anterior External Jugular?*

A. The subcutaneous and Superficial Veins on the

fore part of the neck often form a small trunk called by that name, which descends, and terminates in the Subclavian Vein.

Q. Into what veins are those of the EYE sent?

A. The Vena Centrālis Retĭnae, the Ciliary veins, termed Venae Vorticosae, the Lachrymal, Ethmoidal, Muscular, and other veins in the orbit, by their union form the *Ocular Vein*.

Q. Describe the situation, connections, and course of the *Ocular Vein?*

A. It is situated at the nasal angle of the eye, where it forms large anastomoses with the Facial Vein, after which it runs across, covered by the Attollens, towards the temporal angle, and turning backwards passes through the Superior Orbitar Fissure into the Cranium, and terminates in the *Cavernous Sinus*.

VEINS AND SINUSES OF THE BRAIN.

Q. Where do the *Veins of the Brain* terminate?

A. The veins of the Brain are but small, run chiefly between the Convolutions, and terminate obliquely in the different Sinuses.

Q. Into which *sinuses* do all the smaller ones pour their blood?

A. All the other sinuses transmit their blood into the *Lateral Sinuses*.

Q. Enumerate the manner in which the different *Sinuses* communicate with each other?

A. The *Superior Longitudinal* divides into the *Lateral*, the *Inferior Longitudinal* terminates in the *Torcular* HEROPHILI, which again terminates in the commencement of the Lateral Sinuses. The *Circular Sinus of* RIDLEY, situated round the Pituitary Gland, pours its blood into the *Cavernous Sinuses*, which having their situation at the sides of the Sella Turcica, send theirs into the *Petrosal* Sinuses, which terminate in the Lateral Sinuses. All the *Occipital* Sinuses communicate with the *Lateral;* each of which ultimately passes out of the

Cranium on its own side by the Foramen Lacĕrum Posterius, and terminates in the Internal Jugular Vein.

Q. Describe the *Internal Jugular Veins?*

A. The two Internal Jugular Veins receive all the blood carried to the brain by the Internal Carotid and Vertebral Arteries, and descend in the neck behind the Sterno-Mastoideus; each is included in a sheath of cellular substance along with the Common Carotid Artery; becoming considerably enlarged, it terminates in the Subclavian Vein.

Q. What veins does the *Internal Jugular* receive in its descent?

A. It receives branches from the Pharynx, and adjacent muscles, the principal part of the Internal Maxillary Vein, several branches from the Occipital Vein, sometimes the Lingual, the Superior Laryngeal, and occasionally the Inferior Laryngeal, and also some irregular branches from the muscles of the neck.

VEINS OF THE THORAX.

Q. Describe the *Internal Mammary Veins?*

A. They ascend near to the Arteries behind the Cartilages of the true ribs; and each in its own side terminates in the Subclavian Vein; or sometimes the right terminates in the commencement of the Cava Superior.

Q. Are the *Internal Mammary Veins* furnished with *Valves?*

A. They very frequently have Valves, but sometimes they have none.

Q. Where do the *Inferior Intercostal Veins* terminate?

A. They accompany their arteries along the inferior margin of the ribs; the lower Intercostal Veins on the left side unite, and form the commencement of the Vena Azygos, which about the middle of the Thorax crosses the spine, generally behind the Aorta, sometimes before it, and ascends at the right side of the Aorta, over, or anterior to, the Intercostal arteries of the right

side. The Vena Azygos, frequently with its lower extremity on the left side, communicates with a Lumbar, or the Renal Vein, or the Cava itself: The inferior right Intercostal Veins unite also into a trunk, which, after sending a communicating branch downwards to the Lumbar or Renal Vein, ascends, and joins the trunk of the Vena Azygos, which receives the other Intercostal veins as it ascends, those of the left side crossing behind the Aorta, and those of the right uniting with it directly.

Q. Where does the *Vena Azygos* terminate?

A. Near the upper part of the Thorax the Vena Azygos makes a bend forwards over the commencement of the right pulmonary vessels, and terminates in the Superior Cava.

Q. Has the *Vena Azygos* any *Valves?*

A. Yes; it is generally furnished with valves; but sometimes not.

Q. Where do the two or three *Superior Intercostal Veins* terminate?

A. Those of the right side terminate in the Vena Azygos: those of the left side form a trunk, called the *Left Vena Azygos*, or *Left Superior Intercostal*, which ascends, and terminates in the Subclavian Vein.

Q. Where do the *Bronchial Veins* terminate?

A. The right Bronchial Veins terminate in the Vena Azygos; the left in the Superior Intercostal Vein.

Q. Where do the *Œsophageal Veins* terminate?

A. In the Vena Azygos, Left Superior Intercostal, and Subclavian Veins.

Q. Where do the *Thymic*, *Pericardiac*, and *Veins* from the *Mediastinum* terminate?

A. In the Subclavian Veins, or in the beginning of the Superior Cava.

Q. Describe the course of the *Vena Cava Superior?*

A. The Vena Cava Superior, formed by the junction of the two Subclavian and Azygos Veins, descends on the right side of, and rather anterior to, the ascending Aorta, and soon penetrates the pericardium, and after-

wards terminates in the right Auricle of the Heart, opposite to the Inferior Cava.

DISEASES OF THE VEINS.

Q. What *Organic Diseases* are veins particularly subject to?

A. To Varicose enlargement, and to Inflammation.

Q. What is meant by *Varicose Veins?*

A. It is a permanently dilated state of a Vein, containing much blood, and impeding the circulation.

Q. What are the symptoms of an inflamed Vein?

A. Fever, acute pain and redness in the course of the vein, and swelling of the part affected.

OF THE ABSORBENT SYSTEM.

Q. Of what vessels does the Absorbent System consist?

A. It consists of Lacteal, and Lymphatic Vessels, and of Conglobate Glands?

Q. Where are the *Lacteals* situated?

A. They commence on the internal surface of the small intestines chiefly, and partly too of the large; pass between the layers of the mesentery, forming many beautiful arches and plexus, and ultimately terminate by two or three trunks in the beginning of the Thoracic Duct.

Q. What is the peculiar office of the Lacteals?

A. They absorb the chyle from the chymified mass of alimentary matter, and carry it into the Thoracic Duct.

Q. What is the *Texture* of the *Lacteals?*

A. They have two or three coats, thin, somewhat transparent, and strong; composed of fibres possessing contractile power to a considerable degree, and therefore have been supposed muscular by some Anatomists.

Q. Where are the *Lymphatic Vessels* situated?

A. They have been discovered in almost all parts of the system, and a strong presumption is afforded that

tbey exist in all parts of it; altbough as yet they have not been satisfactorily demonstrated in the Brain, Placenta, and its Membranes.

Q. What is the *Office* of the *Lymphatics?*

A. They take up the Lympb, and decayed parts of the system, and convey tbem into the general mass of blood.

Q. Where are the *Conglobate Glands* situated?

A. In the cellular substance under the skin, or upon the trunks of blood-vessels belonging to the viscera of the different cavities.

Q. What is tbeir size, and texture?

A. These Glands differ in size from a millet seed to a walnut; are generally found in clusters. Their form is somewhat oval and flattened; their colour is reddish brown, becoming paler in advanced age. They are composed of a congeries of vessels minutely dispersed through their substance, and connected by cellular substance, wbich forms a membranous covering on their surface.

Q. Wbat is supposed to be the *use* of these *Conglobate Glands?*

A. The Lymphatic and Lacteal vessels all pass through these Glands, by which the Lymph and Chyle are supposed to undergo certain unknown changes: but it is more probable that tbese Glands entangle acrid and noxious particles, and prevent them from passing into tbe mass of blood.

Q. Are the Vessels which enter a Gland, designated by names different from those which pass out of it?

A. Yes; the vessels entering it are called *Vasa Inferentia;* and those passing out at the opposite side *Vasa Efferentia.*

Q. Is the *Texture* of Lymphatic Vessels the same as that of Lacteals?

A. Yes; because they both belong to the same Absorbent System.

Q. Are the Lymphatics and Lacteals furnished witb *Valves?*

A. Yes; Valves of a semilunar form, at small distances from each other, there being sometimes four, six,

or eight, in the space of an inch, are placed in pairs throughout their whole extent, and prevent the retrograde motion of their contents.

Q. In what manner do the *Absorbent Vessels* commence?

A. They commence by open extremities or mouths of a calibre too minute to be visible to the naked eye.

Q. By what power do they take up their fluids?

A. They take in the fluids applied to their extremities by Capillary Attraction, and partly, perhaps, by a Vital action of the vessels.

Q. Does the *Lymph* flow from their trunks to the extremities, or how?

A. No; it is absorbed by their extremities, and passes into larger and larger trunks in its course, to be poured into the mass of blood.

Q. By *what means* are the fluids propelled along the Absorbent Vessels?

A. They are sucked in by Capillary and Vital Attraction, are moved along by the elasticity or contractile power of the vessels, accelerated in their motion by the pulsation of the arteries and movement of surrounding muscles or parts, and prevented from flowing back by the valves.

Q. Where do the *Absorbents* terminate?

A. They all terminate either in the Thoracic Duct, or Veins.

Q. Have they any Valves at their terminations?

A. Yes; they have always one, generally two valves, placed there to prevent the contents of the Thoracic Duct, or Veins, from entering them.

LYMPHATICS OF THE LOWER EXTREMITY.

Q. Are the Lymphatics divided into superficial and deep seated?

A. Yes; in the same manner as the Veins.

Q. Where have the Superficial Lymphatics their course?

A. They are situated between the skin and muscles, are much more numerous than the Veins; they often form a plexus, or net-work, with each other in their course, by joining and separating so repeatedly.

Q. Describe the general course of the *Superficial Lymphatics in the foot?*

A. They are observed to form a plexus around the toes, from which numerous branches are dispersed over the upper part of the foot forming a plexus; while others are dispersed in a similar retiform manner along the sole towards the heel and ankles.

Q. Describe their general course on the *Leg?*

A. From the plexus on the upper part of the foot many branches ascend diverging towards the ankles, and on the fore part of the leg; and many also from the plexus at the heel, ascend on the hind part of the leg: these Lymphatics communicate very frequently with each other, and pass up, some on the inside, others on the outside of the knee-joint, and some enter the Popliteal Glands.

Q. Describe the course of the Superficial Lymphatics on the *Thigh?*

A. A plexus ascends from the inner side of the knee, spreading on the inner and fore parts of the thigh, to the groin; the other Lymphatics from the outside of the knee ascend, and form branches which either terminate in the inner plexus of the thigh, or in the Inguinal Glands.

Q. Describe the deep-seated Lymphatics?

A. They are situated among the muscles, and generally accompany the blood-vessels, either running one or two on each side of them, or forming a plexus over them. Those of the foot and leg pass into the Popliteal Glands.

Q. Describe the situation, and number of the *Popliteal Glands?*

A. These Glands are situated in the ham, around the Popliteal Artery, immersed in adipose substance. They are generally three or four in number.

Q. What deep-seated Lymphatics arise from the Popliteal Glands?

A. Two or more trunks of considerable size arise from them, accompany the femoral Artery, anastomose frequently with each other, and with some of the superficial in their ascent, and ultimately terminate in the Inguinal Glands.

Q. Describe the situation, and number of the *Inguinal Glands?*

A. They are generally eight, twelve, or more in number; some of which are situated external to the tendinous fascia, others below it and close upon the blood-vessels of the groin.

Q. What Lymphatic Vessels do these *Inguinal Glands* receive?

A. They receive the superficial and deep-seated Lymphatics of the thigh; the superficial ones of the Loins, Nates, Scrotum, Penis, Labia Pudendi, and under part of the abdomen.

Q. Where do the deep-seated Lymphatics of the *Genitals* pass?

A. They pass generally into the abdomen, and terminate in the Iliac, and Lumbar Glands; some of them sometimes terminate in the deep-seated cluster of the Inguinal Glands.

Q. What Vasa Efferentia proceed from the Inguinal Glands?

A. A few trunks of considerable size go out of them, pass into the abdomen under the Crural Arch and over the blood-vessels, and terminate in the Iliac, and Lumbar Glands.

Q. Describe the *Lymphatics of the Urinary Bladder?*

A. They accompany its blood-vessels, pass into Glands situated upon its sides, and terminate in the Iliac Glands.

Q. Describe the *Lymphatics of the Uterus?*

A. They accompany the Hypogastric and Spermatic Arteries, forming a plexus upon them, pass through

Glands situated on the sides of the Vagina, and terminate in the Iliac Glands.

Q. Where do the *Lymphatics of the Rectum* pass?

A. They pass through small Glands situated between it and the os sacrum, and then terminate in the Lumbar Glands.

Q. What is the situation of the *Iliac Glands?*

A. They are scattered along the course of the Iliac Arteries, and are pretty numerous.

Q. What is the situation, and number of the *Lumbar Glands?*

A. They are placed on the fore part of the Abdominal Aorta, of the Inferior Vena Cava, and of the bodies of the Lumbar Vertebrae. They are very numerous.

OF THE LACTEAL VESSELS.

Q. Describe the *Origin of the Lacteals?*

A. Each Lacteal takes its origin by numerous short radiated branches in one of the Villi, on the internal surface of the Intestines; each radiating branch has an orifice by which it absorbs Chyle, and being four or six in number, they unite and form the Lacteal trunk, which runs a little way obliquely through the coats of the intestine, uniting with other trunks of the same kind, and becoming larger.

Q. What course do the Lacteals take?

A. They accompany the blood-vessels, but being more numerous, one or two are generally situated on each side of them.

Q. Do no *Lymphatics* arise from the Intestines?

A. Yes; Lymphatics appear between the peritoneal and muscular coats of the Intestines, run along them, and have fewer anastomoses than the Lacteals.

Q. Do these *Lymphatics* and the *Lacteals* unite?

A. Yes; they unite, and their different trunks form a plexus, which runs between the two layers of the Mesentery and Meso-colon.

Q. From which of the Intestines do the greatest number of Lacteals arise?

A. From the Jejunum the largest size, and greatest number of them arise; but from the termination of the Duodenum, and the upper portion of the Ilium, a great many also arise.

Q. Do the *Lacteals* pass through *Glands?*

A. Yes; a great number of Glands is situated in adipose substance between the layers of the Mesentery, at small distances from each other, and the Lacteals all pass through one or more of these Mesenteric Glands in their way to the Thoracic Duct.

Q. Are the Mesenteric Glands of the same structure as Absorbent Glands in other parts of the system?

A. Yes; they are whitish when containing Chyle, are flattened, and of different sizes, from a mere point to a half, or two-thirds, of an inch in diameter.

Q. Are the Mesenteric Glands continued from the intestines to the Thoracic Duct?

A. No; They are seldom seen nearer to the Intestines than two or three inches, and they become fewer in number near to the Thoracic Duct.

Q. What is supposed to be the *use of the Mesenteric Glands?*

A. Their use is not known; but it is probable that they entangle noxious and poisonous particles, and prevent them from getting easily into the mass of blood: and in this they agree with Lymphatic Glands in other parts of the system.

Q. Where do the Lacteals terminate?

A. After they have passed through the different Mesenteric Glands, they unite into two, or three, or more trunks, which accompany the branches of the Superior Mesenteric Artery, and at the right side of the Aorta terminate in the beginning of the Thoracic Duct; or, sometimes, in the trunks of the Lymphatics of the Inferior Extremities, and thus constitute the commencement of the Thoracic Duct.

LYMPHATICS OF THE OTHER VISCERA.

Q. Are the *Lymphatics of the Colon* as large and numerous as those of the small Intestines?

A. No; they are smaller, and comparatively fewer in number.

Q. Do they pass through Glands?

A. Yes; they pass through Glands situated between the layers of the Meso-colon.

Q. Are these *Meso-colic Glands* numerous and large?

A. They are neither so numerous nor so large as those of the Mesentery.

Q. Where do the *Lymphatics of the Colon* terminate?

A. Those of the Caput Caecum, and right portion of the Colon, join the trunks of the Mesenteric at the root of the Superior Mesenteric Artery; while those of the left portion of the Colon join large trunks near the root of the Inferior Mesenteric, and terminate either in the Lumbar Glands, or in the commencement of the Thoracic Duct itself.

Q. How are the *Lymphatics of the Stomach* disposed?

A. Into two fasciculi; the one, composed of branches from both sides of the stomach, occupies the small curvature, and passes through a few small glands situated at the junction of the Omentum Minus with the Stomach; uniting and forming larger trunks the Lymphatics of this fasciculus enter other Glands together with the deep-seated Lymphatics of the Liver, and with them, terminate in the Thoracic Duct. The other fasciculus, formed like the former by branches from both sides of the stomach, occupies the large curvature; some of its vessels running to the left, and receiving the Lymphatics of that side of the Omentum Majus, pass through two or three small glands on the left of the curvature, and, together with the Lymphatics of the Spleen and Pancreas, terminate in the Thoracic Duct: others of its vessels running to the right receive the Lymphatics of the right side of the Omentum, pass through two or three

Glands situated on the right, descend by the Pylorus, and, together with the plexus of the small curvature, and with the deep-seated Lymphatics of the Liver, terminate in the Thoracic Duct.

Q. Describe the *Superficial Lymphatics of the Liver?*

A. The Superficial communicate freely with the deep-seated Lymphatics of the Liver. They form a plexus on its convex surface, which sends several trunks to the Suspensory, and Lateral Ligaments; these trunks receiving others from its concave surface perforate the Diaphragm, pass through Glands situated upon the anterior part of the Œsophagus, and of the Pericardium, or in some contiguous part, and then terminate in the Thoracic Duct.

Q. Do some of the Superficial Lymphatics of the Liver not terminate differently sometimes?

A. Yes; They sometimes run up between the layers of the Mediastinum Anterius, or in company with the Internal Mammary blood-vessels, and terminate either in the upper part of the Thoracic Duct, or in the large Lymphatic trunks on the right side of the neck.

Q. Where do the Lymphatics on the concave surface of the Liver direct their course?

A. They converge and run towards the Porta, where they are united with the deep-seated Lymphatics.

Q. Describe the course, and termination of the *Deep-seated Lymphatics of the Liver?*

A. They accompany the blood-vessels, and biliary ducts in the substance of the Liver, pass through several Glands situated around the trunk of the Vena Portae, and, near the root of the Superior Mesenteric Artery, terminate in the Thoracic Duct.

Q. Describe the *Lymphatic Vessels of the Spleen?*

A. The Lymphatics of the Spleen form a plexus upon its surface, accompany its blood-vessels, pass through Glands situated around the Splenic Artery, receive the Lymphatics of the Pancreas in their course, unite with

some Lymphatics of the Stomach, and with some from the concave surface of the Liver, they form a plexus near the head of the Pancreas, from which considerable branches are sent out, passing on both sides of the Duodenum to terminate in the Thoracic Duct near the entrance of the Lacteals.

Q. Describe the *Lymphatics of the Kidneys?*

A. The Lymphatics of the Kidney are seldom seen, excepting when the Kidney is in a diseased state. They, however, converge towards the pelvis, where the Superficial and deep-seated unite, forming a plexus round the blood vessels, which sends out trunks that pass through some of the Lumbar Glands, and terminate in the large Lymphatics near the Aorta.

Q. Where do the *Lymphatics of the Renal Capsules* terminate?

A. They are numerous, and all go to join the Renal Plexus.

OF THE THORACIC DUCT.

Q. What vessels form the commencement of the Thoracic Duct?

A. The lower extremity of the Thoracic Duct is formed by the junction of the trunks of the Lymphatics of the right, and left Inferior Extremities, and of the Lacteal Vessels.

Q. In what part of the spine does that union take place?

A. Generally on the anterior part of the third Lumbar Vertebra.

Q. Describe the course of the Thoracic Duct?

A. The Duct so formed is large, and placed behind the Aorta; it crosses obliquely to the right, and ascends on the right side of the Aorta. At the first Lumbar Vertebra it dilates into an oval or pyriform shape, called the *Receptaculum Chyli*, situated above the right Renal Artery, and behind the right crus of the diaphragm;

from this the Duct ascends between the crura of the Diapbragm into the Thorax, and there runs on the anterior part of the Spine in the Mediastinum posterius, still on the right of the Aorta, and on the left of the Vena Azygos. About the fourth Dorsal Vertebra, it ascends obliquely over to the left side of the spine, behind the Œsophagus and descending Aorta, till it reaches the left Carotid; it rises from the Thorax behind the Longus Colli and Internal Jugular Vein, to the sixth Cervical Vertebra, where it bends forwards and downwards, and terminates in the left Subclavian Vein, at the upper and back part of the angle formed by tbe termination of the Internal Jugular.

Q. Does the *Thoracic Duct* observe a straight, or winding course?

A. It forms several windings, and not unfrequently divides and unites repeatedly in its course: some of its divisions pass over the Aorta occasionally into the left side, and return and join the ascending trunk before its termination.

Q. Is the *Thoracic Duct* furnished with *Valves?*

A. Yes; it has a great many valves in its internal surface.

Q. By what powers does it convey its contents upwards?

A. By its elastic contractile power, which is often increased by the division of the duct into branches, (for the smaller the vessel the greater is its elastic power, aided sometimes perhaps by capillary attraction,) by the pulsation of the Aorta, by the valves, and the Vis a tergo, after the fluid is put in motion.

Q. Describe the course, and termination of the *Intercostal Lymphatics?*

A. One or two trunks accompany the Intercostal blood-vessels in the intercostal spaces, and all of them pass through glands situated near the dorsal vertebrae, and then terminate in the Thoracic Duct.

Q. Describe the *Lymphatics of the Lungs?*

A. The superficial ones form Areŏlae, which run between the Lobules, and cover almost the whole surface; they run towards the bronchia, and pass through the Bronchial Glands, where they are united with the deep-seated Lymphatics, which follow the blood-vessels and bronchial tubes in the substance of the lungs.

Q. Where do they terminate?

A. The greater number of the *left lung* forms a trunk, which terminates in the Thoracic Duct, behind the bifurcation of the Trachea; the rest pass through Glands behind the arch of the Aorta, and terminate also in the Thoracic Duct near its end. Those of the *right Lung*, after passing through the Bronchial Glands, terminate partly in the Thoracic Duct, and partly in the common trunk from the right side of the neck.

Q. Describe the course, and termination of the *Lymphatics of the Heart?*

A. Numerous small branches unite into trunks, which follow the course of the Coronary Arteries; the right passes over the arch of the Aorta, goes through a gland behind the origin of the Carotid Artery, and terminates in the Common Lymphatic Trunk on the right side of the neck; the left Lymphatic trunk of the heart being the larger, composed of a branch running between the ventricles on its upper part, and of another running in the groove between them on its under part, runs through a gland placed behind the Pulmonary Artery, between the arch of the Aorta, and division of the Trachea, and terminates in the upper end of the Thoracic Duct.

LYMPHATICS OF THE SUPERIOR EXTREMITY.

Q. Describe the Lymphatics of the *Hand?*

A. The lymphatics of the Superior Extremity, like those of the Inferior, are divided into superficial and deep-seated. The superficial commencing upon the

fore and back parts of the fingers, have frequent communications with each other, and soon form a plexus upon the back of the hand, and also in the palm, from which trunks ascend upon the fore-arm.

Q. Do the Superficial Lymphatics observe any definite course in the *fore-arm*?

A. No; they are found generally near to the veins; hence they may be said to accompany the numerous ramifications of the Cephalic and Basilic Veins. The Lymphatics on the Anconal aspect divide; some turn obliquely over the Radial Muscles, and run up in the course of the Radius; others turn over those of the Ulna and follow the Basilic Vein.

Q. Do these Lymphatics pass through glands anywhere?

A. Not generally in the fore-arm; but while they ascend on the inner and fore part of the Humerus, they pass through several small glands in the course of the Humeral Artery, and the rest go into the Axillary Glands.

Q. Do these Superficial Lymphatics anastomose with the deep-seated?

A. Yes; and very frequently with each other round the whole arm, till they terminate in the Axillary Glands.

Q. Where have the deep-seated Lymphatics of the Arm their course and termination?

A. They run on each side of the Arterial branches and trunks the whole way up the arm, and terminate in the Axillary Glands.

Q. What other Lymphatics terminate in the Axillary Glands?

A. Besides the Superficial and Deep-seated of the Arm, the Lymphatics of the Mamma, and lateral part of the Thorax, after passing through some small glands at the edge of the large Pectoral Muscle, and the Subcutaneous Lymphatics from the back part of the Thorax, from the integuments and muscles of the Scapula, terminate all in the Axillary Glands.

Q. Describe the *Axillary Glands?*

A. These Glands vary in size and number, but are considerable in both respects; they are situated in the hollow of the Axilla, between the Pectoralis Major and Latissimus Dorsi, embedded in adipose substance, and connected by it with the blood-vessels and nerves.

Q. What *Vasa Efferentia* go out from the Axillary Glands?

A. Several large vessels go out from them, pass under the clavicle, and there unite into a trunk, which, in the right side, receives, or joins, the short trunk forming the general termination of the Lymphatic System on this side; and which, in the left side, generally terminates in the Thoracic Duct.

LYMPHATICS OF THE HEAD AND NECK.

Q. What Lymphatics do we find on the *Occiput?*

A. A great many accompanying the different branches of blood-vessels pass through small glands behind the ears, and over the Mastoid processes.

Q. What is the course of the Lymphatics on the *sides of the Head?*

A. They accompany the branches of the Temporal Arteries, pass down through glands either situated at the root of the Zygoma, or through others connected with the Parotid Gland.

Q. Describe the course of the Lymphatics of the *face?*

A. These Lymphatics also follow the general course of the blood-vessels; some of them passing through glands situated on the outside of the Buccinator, others through large glands at the outer and under part of the Inferior Maxilla.

Q. What course do the Lymphatics of the *nose* and *mouth* take?

A. Those of the inner parts of the Nose accompany the branches of the Internal Maxillary Artery; those of the Tongue, Muscles, and parts about the Os Hyoi-

des, pass through glands situated behind the angle of the Lower Jaw.

Q. What course do all these Lymphatics take in the *Neck?*

A. Both the Superficial and Deep-seated follow the External and Internal Jugular Veins and Carotid Arteries, receiving many branches as they descend from the integuments and muscles of the Neck, and forming a remarkable plexus, which goes through numerous small glands, called *Concatenatae*, situated around these blood-vessels.

Q. Where do these *Lymphatics of the Neck* terminate?

A. After that plexus has passed through the *Glandulae Concatenatae*, the different Lymphatics unite into one trunk, which, in the right side, goes into the General Lymphatic trunk, and which, on the left, enters the Thoracic Duct near its termination.

Q. Describe the *General Lymphatic Trunk* in the right side?

A. It is large and scarcely half an inch long; it is formed by the Lymphatics of the right Lung, right side of the Heart, of the Diaphragm, and of the Liver; and also by the Lymphatics of the right arm, right side of the Neck, and of the Thyroid Gland, and of the Head.

Q. Do all the Lymphatics on the left side terminate in the Thoracic Duct.

A. Yes; almost all of them terminate in it, excepting one or two occasionally in the Internal Jugular, or Subclavian Vein.

Q. Are there no *Lymphatics in the Brain?*

A. Anatomists have not been able to trace them satisfactorily; but it is highly probable that they exist in the Brain, because they have been supposed to have been seen on its membranes; because they have been found occasionally in the passages of the blood-vessels; because the Lymphatic Glands of the occiput and neck have become enlarged from diseases of the Brain; be-

cause Lymphatics have been found in the Brain of Fish ; and because effusion of serum in several diseases of the brain has been removed by suitable remedies.

Remarks.

Q. Is the *Chyle* completely formed in the intestines before it is absorbed by the Lacteals ?

A. It has been supposed that its passage through the Mesenteric Glands, along the Thoracic Duct, and through the Lungs, is necessary for proper Chylification. But although it may perhaps be purified in passing through the Mesenteric Glands, yet it seems perfectly formed by the chemical changes in the Alimentary Mass previous to its absorption.

Q. By what outlets are the Lymph and its vitiated particles, taken up from decayed parts, cast out of the system ?

A. By the four *Emunctories*, viz. the faeces, urine, perspiration, and exhalation from the Lungs.

Q. Can the discharge of noxious particles from the blood be accelerated ?

A. Yes ; by means of medicines which stimulate the Intestines, the Kidneys, Skin, and Lungs to increase their peculiar discharges ; together with which the vitiated Lymph is carried off.

OF THE NERVOUS SYSTEM.

Q. What membranes form the theca of the *Spinal Marrow ?*

A. The same membranes, which surround the Brain, are continued down the spinal canal, and form the sheath of the Medulla Spinalis, and it receives a partial ligamentous covering also from the ligament lining the vertebral canal.

Q. Do these membranes embrace the *Spinal Cord* closely ?

A. No; the involucra envelope the spinal marrow loosely, so as to admit of the flexions of the spine without inconvenience.

Q. Does the Spinal Marrow consist of a *Cineritious* and *Medullary* substance, as the Brain does?

A. Yes; but they are placed the reverse of the Brain; the Medullary matter being exterior, and the Cineritious interior.

Q. Is the *Spinal Cord* of the same size during its whole length?

A. No; it is much larger near the lower part of the cervical, and lumbar vertebrae, than in the dorsal.

Q. Why is it larger in these places?

A. Because the large nerves which are sent to the Superior Extremities, pass out from the Spinal Marrow through the four lowest cervical holes; and the large nerves, also, which send off those of the Inferior Extremities, come out from the Spinal Marrow through the holes between the Lumbar Vertebrae; whereas the dorsal spinal cord only gives off the Intercostal Nerves, which are comparatively small.

Q. Is the *Spinal Cord* made up of different portions corresponding to the crura of the Cerebrum and Cerebellum?

A. Yes; there are an anterior and a posterior fissure on its surface, which form two lateral portions; and these again are subdivided by a lateral fissure into a large anterior, and a small posterior portion.

Q. Are *these four portions* firmly united?

A. They seem united only by fine cellular substance to near their middle, where cineritious substance, passing from one to another, connects them intimately.

Q. In what manner are the Nerves, sent out from the Spinal Cord, formed from these portions?

A. A flat fasciculus of nervous filaments is sent off from the anterior, and another from the posterior surface of the lateral portions; each is furnished with a sheath proper to itself, and the two sheaths are connected by

cellular substance till they get into the hole between the vertebrae.

Q. When they get there what happens?

A. Between the vertebrae, each posterior fasciculus forms a Ganglion, from the opposite part of which a nerve issues, which is immediately joined by the anterior fasciculus to constitute the origin of a spinal nerve.

Q. Is any provision made for preventing the spinal marrow and the delicate filaments of the fasciculi from being overstretched and ruptured?

A. Yes; the Ligamentum Denticulatum seems of that description; it is attached to the Dura Mater, where it comes out of the cranium, accompanies the spinal cord to its lowest extremity, and from its opposite side, sends off Denticuli, which run transversely among the nervous filaments, and support them.

Q. What happens when the *Spinal Nerves* come out from the holes between the vertebrae?

A. Each sends branches backwards to the muscles, and others forwards to join the Great Sympathetic Nerve; while the trunk itself passes on to its place of distribution.

Q. How many pairs of *Spinal Nerves* go out from the Cord?

A. Thirty pairs; *one* sub-occipital; *seven* cervical; *twelve* dorsal; *five* lumbar; and *five* sacral.

Q. Describe the origin, and course of the SUB-OCCIPITAL NERVES?

A. The Sub-occipital nerve on each side arises from the beginning of the spinal marrow by an anterior and a posterior fasciculus, which fasciculi form a ganglion in passing out between the bones, from which one nerve goes out under the Vertebral Artery, and over the transverse process of the Atlas to the neck, where it is connected above to the ninth pair by an arch; and below, to the first cervical also by an arch; anteriorly to the upper ganglion of the Great Sympathetic by small bran-

ches, while the trunk of the Sub-occipital itself divides, and is dispersed among the muscles.

Q. Describe the origin, and course of the first CERVICAL NERVE?

A. It passes out from the Spinal Cord between the Atlas and Vertebra Dentata, and immediately divides into an anterior, and a posterior branch.

Q. Describe the *anterior branch* of the first Cervical Nerve?

A. It passes under the transverse process of the Atlas, and is joined by an arch to the Accessorius, and by branches to the ninth pair, and by a pulpy enlargement to the uppermost ganglion of the Great Sympathetic, from which a branch is sent down to the second cervical nerve; filaments also go to the muscles.

Q. Describe its *Posterior branch?*

A. It is the larger of the two, perforates the muscles, giving off branches to them, ascends upon the *occiput*, dividing into many branches, which are dispersed among the muscles and integuments, and communicate with branches of the Frontal Nerve, and Portio Dura.

Q. Describe the *Second Cervical Nerve?*

A. After being formed by two fasciculi in the ordinary way, and passing out between the vertebrae, it sends off a branch to the middle ganglion of the Great Sympathetic; another downwards to join the third cervical, sends branches to the Sterno-Mastoideus, communicates with the Accessorius behind it, and more forwards with the Descendens Noni; it also sends off a small branch to assist in the formation of the *Phrenic Nerve;* it is ultimately divided into branches, some of which form the cutaneous nerves, and others are spent among the muscles of the neck.

Q. Describe the *Third Cervical Nerve?*

A. It is formed and passes out as the others, and then sends a branch to the middle ganglion of the Sympathetic, another to the fourth Cervical, another towards the formation of the *Phrenic* or *Diaphragmatic Nerve*, and a filament to the Descendens Noni; it afterwards

divides into posterior and anterior branches, which are dispersed among the muscles.

Q. Describe the connexions of the *Fourth Cervical Nerve?*

A. It communicates with the middle ganglion of the Sympathetic, it sends one or two filaments to the formation of the *Diaphragmatic Nerve*, and then it joins the fifth Cervical.

Q. Describe the *other Cervical Nerves?*

A. The fourth runs downwards, joins the fifth, their trunk running down joins the sixth, and then the seventh behind the clavicle, and lastly to this is added the First Dorsal Nerve over the first rib. These four Cervicals and the first Dorsal are of large size, and pass between the anterior and middle Scaleni Muscles, and then between the Subclavius and first rib, at the lateral side of the Subclavian Artery into the Axilla, where they separate, unite, and separate repeatedly, forming a plexus which surrounds the artery.

Q. What Nerves are sent out from the *Axillary Plexus?*

A. Nerves are sent from it to the muscles behind, and the Thoracics accompanying the blood-vessels to the Pectoralis, Mamma, and Integuments. The nerves of the Superior extremity, viz. the Scapularis, Articularis, Cutaneus, Musculo-Cutaneus or Perforans, the Spiral-Muscular, the Median or Radial, and the Ulnar, all proceed from the Axillary Plexus.

NERVES OF THE SUPERIOR EXTREMITY.

Q. Describe the *Scapular Nerve?*

A. It generally arises from the fourth and fifth Cervicals, passes through the semilunar notch of the Scapula, and is dispersed upon the Supra and Infra-Spinatus muscles.

Q. Describe the *Articular Nerve?*

A. It arises from the common trunk of the fourth and fifth Cervicals, sinks deep in the axilla, then follows

the course of the Posterior Circumflex Artery, and is spent upon the Teres Minor, Capsular ligament, and Deltoid muscle.

Q. Describe the *Cutaneous Nerve?*

A. It comes off from the trunk common to the last Cervical and first Dorsal, and is much increased by fibrillae from the latter, runs down the inner and fore part of the arm, giving off small branches to the muscles, integuments, and coats of the blood-vessels; and near the bend of the fore-arm it divides into an *external* and *internal*, which are dispersed over the elbow-joint and fore-arm.

Q. Is there not another *Cutaneous Nerve?*

A. Yes; the *Cutaneous Internus* of WRISBERG, which arises from the Axillary Plexus, descends a little and divides into two branches; the larger runs down the inner edge of the Triceps, and is dispersed upon it and the integuments near the elbow; the smaller, turning to the *anconal* aspect of the arm, is dispersed upon the Triceps and skin.

Q. Describe the *Musculo-Cutaneus*, or *Perforans* CASSERII?

A. It arises by filaments from almost all the nerves forming the Axillary Plexus, perforates the upper end of the Coraco-Brachialis, to which it gives twigs, passes down between the Biceps, and Brachialis Internus, giving filaments to both; at the elbow-joint it passes on the out or radial side of the tendon of the Biceps, down the fore-arm between the Supinator Longus and the Integuments, giving twigs to them in its course, as far as the thumb and back of the hand.

Q. Describe the *Spiral*, or *Spiral-Muscular Nerve?*

A. It is formed by fibrillae, from the Cervical Nerves entering the Axillary Plexus, it is larger than the rest of this extremity, and is distinguished by its spiral course. It is situated in the Axilla between the great artery and the ulnar nerve, turns obliquely downwards between the two heads of the Triceps, and then behind the Os Humeri to the radial side of the elbow, where it descends

as far as the hand among the muscles of the fore-arm. In its whole course it gives twigs to the muscles and integuments.

Q. Describe the *Median* or *Radial Nerve?*

A. It is composed of fasciculi from all the nerves forming the Axillary Plexus, descends along the anterior surface of the Humeral Artery, to which, and the deep Veins, it is firmly connected by cellular substance; at the elbow it passes over the tendon of the Brachialis Internus, and perforates the back part of the Pronator Teres, and passes along between the Flexor Carpi Radialis, and Flexor Sublimis in its way to the hand.

Q. Mention particularly the branches, and termination of the *Radial Nerve?*

A. This Nerve at the elbow-joint gives branches to the integuments, the Pronator and Flexor muscles, and sends off the Interosseous Nerve, which is spent on the Flexors of the thumb and fingers; at the wrist it passes under the annular ligament, and below the Aponeurosis Palmaris, and superficial arterial arch; it is divided into seven branches, two of which go to the opposite sides of the thumb, one to the side of the fore-finger next it, the others are divided, and run along the ulnar side of the fore, and back sides of the middle, and the radial side of the ring finger; these unite at the point of the fingers: other small filaments are sent to the Lumbricales, integuments of the palm, and contiguous parts.

Q. Describe the origin, and course of the *Ulnar Nerve?*

A. It is of considerable size, arises chiefly from the last cervical and first dorsal nerves, runs along the inside of the Triceps, and at the elbow gets into the groove between the Olecranon, and inner Condyle, perforates the heads of the flexors of the fore-arm, and follows the course of the ulnar artery to the wrist, where it sends off the *Dorsal* Nerves, and, together with the artery, passes over the Annular Ligament into the Palm, where it is covered by the Aponeurosis Palmaris.

Q. Describe the course, and termination of the *Dorsal Branches* of the Ulnar Nerve?

A. They have their course between the Flexor Ulnaris and Ulna, to the back of the hand, and, in their course, they give twigs to the integuments of the wrist and metacarpus, and anastomose with others of the Spiral Nerve. One of them runs to the Ulnar side of the little finger, where it divides into two branches, one continues its course along the ulnar side of that finger; the other is subdivided, one of its branches runs along the radial side of the little finger, and the other along the ulnar side of the ring finger.

Q. Describe the distribution of the Ulnar nerve after it has passed into the Palm of the hand?

A. In the palm the Ulnar Nerve is divided into *Superficial* and *Deep-seated* branches. The Superficial are sent to the Ulnar and Radial sides of the little, and to the Ulnar side of the ring finger, and to the muscles in their course. The Deep-seated form an arch, from which branches go to the muscles, as the Abductor Minimi Digiti, Flexor Brevis, Abductor Pollicis, Lumbricales and Interossei; and also to the adjacent parts.

NERVES OF THE THORAX.

Q. What large trunks of Nerves are found within the Thorax?

A. On each side of it we find the Phrenic or Diaphragmatic, the Par Vagum, and the Great Sympathetic, descending behind the Pleura to their different destinations; and, besides, we find the Cardiac, Pulmonary, and the Intercostal Nerves.

Q. Describe the origin, and course of the *Phrenic* or *Diaphragmatic Nerve?*

A. On each side it derives its origin partly from the *second*, but chiefly from the *third* and *fourth Cervical* Nerves, descends in the neck along the fore and lateral part of the Scalenus Anticus, enters the Thorax between the Subclavian Artery and Vein behind the anterior

extremity of the first rib, passes over the root of the Lungs, then along the Pericardium, to which it adheres, in its course to the Diaphragm, upon the superior surface of which the Nerve divides into branches, and is dispersed in the form of radii towards the fleshy parts of that muscle.

Q. Describe the general course of the *Par Vagum* or *Pars Vaga?*

A. This eight pair of Nerves arises from the Medulla Oblongata, passes out of the cranium by the Foramen Lacerum Posterius, descends behind the Carotid Artery, inclosed in the same sheath: enters the Thorax between the Subclavian Artery and Vein, passes behind the bronchia or root of the Lungs, descends with the Œsophagus through the Diaphragm into the Abdomen.

Q. What principal Branches are sent off from the *Pars Vaga* in the Thorax?

A. The Recurrent Nerve; filaments to assist in forming the Anterior Pulmonary Plexus; six or seven branches to form the Posterior Pulmonary Plexus; lastly, it divides to form the Great Œsophageal Plexus.

Q. Describe the *Recurrent Nerves?*

A. The *right* Recurrent is reflected upwards behind the Subclavian Artery; and the *left* behind the Arch of the Aorta: each ascends in the neck at the posterior and lateral part of the Trachea, and sends filaments to the internal Membrane of the Trachea, Œsophagus, Pharynx, Thyroid Gland, Larynx, and its different muscles.

Q. What connexions does the *Recurrent Nerve* form in the Thorax?

A. The Recurrent near its origin, is connected with one or two branches of considerable size, from the middle, and lowest ganglia of the Great Sympathetic; it sends off branches to assist in forming the Anterior Pulmonary Plexus; and, a little higher, it sends filaments to join the Superficial and Deep Cardiac Nerves.

Q. Describe the formation, and situation of the *Anterior Pulmonary Plexus?*

A. Filaments sent from the Par Vagum, the Recur-

rent, and the Cardiac branches of the Great Sympathetic, on each side meet, and by their varied connections form this Plexus, situated on the largest branches of the Pulmonary Artery at the root of the lungs. From this Anterior Pulmonary Plexus, filaments are sent to the Pericardium, and Cardiac Nerves; and many follow the Bronchial Tubes, and are dispersed through the substance of the Lungs.

Q. What Nerves form the *Posterior Pulmonary Plexus?*

A. The branches sent across from the one Par Vagum to the other, when running down behind the root of the Lungs, form the Posterior Pulmonary Plexus, from which several nerves arise, and following the Pulmonary Vessels, are distributed through the substance of the Lungs.

Q. How many *Plexuses* are formed on the *Œsophagus?*

A. Two; the *Small Œsophageal Plexus*, formed by twigs sent off from the Paria Vaga, and from the roots of the Recurrents, sends nerves to the fleshy parts of the Trachea, near to the Œsophagus, upon which this plexus lies, and gives many nerves to it: and the *Great Œsophageal Plexus*, embracing the tube and sending filaments to all its substance, is formed by the division of the two Paria Vaga into several Cords, between which funiculi run, and form a plexus.

NERVES OF THE HEART.

Q. From what sources does the Cardiacus Magnus Profundus arise?

A. On the right side the *Cardiacus Magnus Profundus* arises from branches sent from the second Cervical Ganglion of the Great Sympathetic, from the Cardiacus Supremus or Superficialis, and from the Par Vagum, it descends between the Superior Cava and Ascending Aorta, joins the Cardiac Branches of the left side be-

hind the Aorta, and forms the *Plexus Cardiacus Magnus*, from which is formed the Ganglion Cardiacum.

Q. Does the *Cardiacus Magnus Profundus* on the left side rise in a different manner?

A. It derives its origin from several filaments sent from the middle and lowest Ganglions of the Sympathetic, passes down across the arch of the Aorta, then receives the Cardiac branch of the Par Vagum, and shortly afterwards joins the Right Cardiacus Profundus to form the Plexus Cardiacus Magnus.

Q. Describe the *Nervus Cardiacus Minor?*

A. It is found only in the right side; it arises from the lowest cervical Ganglion of the Sympathetic, crosses over the Arteria Innominata and Aorta, and terminates in the Reticulum of nerves dispersed upon the left side of the Aorta Ascendens.

Q. Describe the origin, and course of the *Cardiacus Supremus*, or *Superficialis?*

A. This Superficial Cardiac Nerve arises from the highest ganglion of the Sympathetic, and from the Superior Laryngeal, descends in the right side and joins the Superficial Cardiac branch of the eighth pair before the Subclavian Artery; in the left side it terminates in the Cardiac Plexus.

Q. Whence is the *Right Coronary Plexus* formed?

A. It proceeds from the Reticulum of nerves situated on the left part of the ascending Aorta, passes between the Pulmonary Artery and Aorta, and then follows the course of the right Coronary Artery to be dispersed upon the right side of the Heart.

Q. Describe the *Left Coronary Plexus?*

A. The Great Cardiac Plexus, having sent filaments to the Lungs, gives out branches, which unite and form the Great Cardiac Nerve of a gangliform appearance, situated on the left side of the Pulmonary Artery; from which nerve numerous branches arise, which form the Coronary Plexus of the left side, and communicate freely with the right.

OF THE GREAT SYMPATHETIC.

Q. Describe the origin, and course of the Great Sympathetic nerve into the Thorax ?.

A. It arises by two or three filaments sent off from the *Sixth Pair* in the Cavernous Sinus, descends forming a Plexus around the Internal Carotid Artery, where it receives the *Retrograde Nerve* from the Second Branch of the Fifth Pair, it descends through the Foramen Caroticum, is included in the same sheath with the Carotid Artery and Par Vagum, and, after forming three ganglia, and making numerous communications with other nerves in the neck, it splits into two portions, one of which goes down before, and the other goes down behind the Subclavian Artery, they immediately unite into a trunk, which runs down the Thorax near the heads of the ribs.

Q. Describe the connexions of the *Sympathetic* in the Thorax ?

A. The Sympathetic Nerve having got into the Thorax, forms a ganglion at the head of every rib, which receives two or three short branches from the commencement of each Intercostal Nerve. From many of the dorsal ganglia, small filaments are sent to the coats of the Aorta.

Q. Do any *particular Nerves* arise from these Dorsal Ganglions of the Sympathetic ?

A. Yes; from the sixth, seventh, and eighth dorsal Ganglia branches are sent off, which pass obliquely down over the side of the Vertebrae, and unite into a trunk called *Nervus Splanchnicus*, which goes into the Abdomen.

Q. Is another nerve not generally found of the same sort ?

A. Yes; another Splanchnic Nerve, called *Secundarius*, or *Accessorius*, arising from the ninth and tenth ganglia, descends into the Abdomen, and terminates with the former.

OF THE INTERCOSTAL NERVES.

Q. Describe the origin, and course of the *Intercostal* or *Dorsal Nerves?*

A. They arise from the Spinal Cord in the manner already described, pass out laterally between the Vertebrae, and run between the layers of intercostal muscles along the groove in the lower margin of the ribs to the anterior part of the Thorax, where they are dispersed.

Q. What branches do the *Intercostal Nerves* send off?

A. After they emerge from between the Vertebrae, they are connected by two or three short twigs to the ganglia of the Sympathetic, and opposite to which they send some principal branches backwards to the muscles situated near the Spine; in their course forward between the external and internal layers of Intercostal muscles, they send off branches to these and other muscles, to the integuments of the Thorax, and other parts of the Abdomen.

Q. Do not some of the *Intercostal Nerves* contribute to the formation of the *Axillary Plexus?*

A. Yes; the first Intercostal Nerve sends a branch along the margin of the first rib, but enters itself into the Axillary Plexus. The branches reflected from the *Second* and *Third* Intercostals are also dispersed by numerous filaments upon the Axillary Glands, and their integuments, and upon the back part of the arm, and Latissimus Dorsi.

Q. Have these branches of the three or four upper Intercostal Nerves any particular names?

A. Yes; they are called from their origin and destination *Intercosto-Humeral*, which communicate with the Cutaneous Nerve of the arm, and with each other.

NERVES OF THE ABDOMEN.

Q. What nerves are dispersed upon the Chylopoietic, and assistant Chylopoietic Viscera?

A. The Paria Vaga, Rami Splanchnīci, and the Sympathetic.

Q. Describe the course, and termination of the *Left Par Vagum?*

A. It enters the abdomen at the anterior part of the Cardia, sends several filaments to the left Hepatic Plexus, and then ramifying, is spent on the anterior or upper and left portion of the Stomach.

Q. Describe also the course, and termination of the *Right Par Vagum?*

A. It descends upon the posterior part of the Cardia, soon divides into two fasciculi, of which the one proceeds to the root of the Hepatic Plexus, and to the Coeliac Ganglion; the other, being the principal, is ramified on the posterior or under and left portion of the Stomach.

Q. Describe the termination of the *Rami Splanchnīci?*

A. The two Splanchnic Nerves on each side arising from the dorsal ganglia of the Sympathetic, perforate the lateral and upper part of the smaller muscle of the Diaphragm, divide into a number of branches, which incorporate with the sides of the great *Semilunar Ganglion.*

Q. Describe the *Semilunar* or *Solar Ganglion?*

A. It is composed of the Splanchnic Nerves, and the branches of the Par Vagum on both sides; it is long and curved in figure, with its convexity downwards, and seems made up of a congeries of smaller ganglia, of different sizes and shapes, called the Coeliac Ganglia.

Q. What is the situation of these *Coeliac Ganglia?*

A. They are situated upon the Aorta at the roots of the Coeliac and Superior Mesenteric Arteries, and extend upon the fleshy crura of the Diaphragm.

Q. Do many *Nerves* issue from the *Coeliac Ganglia?*

A. Yes; innumerable nerves issue from them in every

direction, forming the *Solar Plexus*, which lies along the Coeliac and Superior Mesenteric Arteries.

Q. What nerves arise from the *Solar Plexus*?

A. Various Plexuses of nerves arise from it, named after the arteries which they embrace, such as the Hepatic, the Splenic, Superior Mesenteric, Aortic, &c.

Q. Describe the *Hepatic Plexus*?

A. It follows the course of the Hepatic Artery, gives filaments to the Renal Capsules, to the Diaphragm along its arteries; it divides into a right and left hepatic Plexus, following the division of the Hepatic Artery: the right sends branches to the Pancreas, Pylorus, Duodenum, and gives origin to the Gastro-epiploic Plexus: the left sends branches to the Stomach, and is afterwards spent in the left lobe of the Liver.

Q. Describe the *Splenic Plexus*?

A. It embraces the Splenic Artery, and sends branches to the Pancreas in its vicinity.

Q. Describe the *Superior Mesenteric Plexus*?

A. It embraces the trunk of the Mesenteric Artery, and sends filaments along its different branches to the Glands of the Mesentery, to the Small Intestines, and right portion of the Colon.

Q. Describe the *Aortic Plexus*?

A. It closely embraces the Aorta, and is joined by nerves from the Sympathetic. From this plexus the *Inferior Mesenteric Plexus* is sent off, which is distributed to the left portion of the Colon, and to the Rectum.

Q. Do any other Nerves arise from the *Aortic Plexus*?

A. Yes; the Aortic Plexus descends, receiving additions from the Sympathetics of both sides, under the name of the *Hypogastric Plexus*, which, at the lower end of the Aorta, divides into a right and left Plexus, which descend into the Pelvis, and are dispersed upon its different viscera.

Q. Describe the *Renal Plexus*?

A. It is sent off from the Coeliac Ganglia, and receives some filaments from the Ganglia of the Sympathetic; it soon divides into an anterior and a posterior

plexus, which run along the corresponding surface of the Renal Artery, and are dispersed in the substance of the Kidney.

Q. Do any *Nerves go off* from the *Renal Plexus?*

A. Yes; some twigs are sent off to the Renal Capsule, which receives other branches from the Coeliac Ganglia; tbe Renal Plexus also gives filaments to the upper part of the Ureter, and to the Spermatic Cord.

Q. Describe the *Hypogastric Plexus?*

A. It is a continuation of the Aortic Plexus, receiving filaments from the Sympathetics, and Sacral Nerves; it gives off branches to the Rectum, Urinary Bladder, and Spermatic Cord in the male, and to the Uterus and Vagina in the female.

Q. Describe the *Spermatic Nerves?*

A. They are of small size, and given off from the Renal and Hypogastric Plexuses; they accompany the Spermatic Arteries in the cord, and through the substance of the Testicles. They also receive a filament or two from tbe Second Lumbar Nerve; but they are spent upon the Substance of the Cord, Cremaster Muscle, and Scrotum, chiefly, and partly upon the Testicle, in the male; and upon the Round Ligament, Uterus, Vagina, Mons Veneris, and Labia Pudendi in the female.

Q. Describe the *Nerves of the Uterus* particularly?

A. They are sent from the Hypogastric Plexuses chiefly, and partly from the Spermatics; they enter the Uterus by tbe lateral broad Ligaments near its cervix, and are dispersed through its substance, communicating freely with one another.

Q. Describe the *Nervi Pudīci?*

A. The Pudic Nerve on each side arises in two Fasciculi, formed by fibrillae from the branches whicb compose the Sciatic Nerve; these fasciculi pass through the Notch of the Ilium, then between the Sacro-Sciatic Ligaments, following the course of the Pudic Arteries.

Q. To what parts are the *Pudic Nerves* distributed?

A. In their course they give many branches to the Muscles, Anus, Perineum, and Penis. On this last,

the superior fasciculus forms the Dorsalis Penis, situated between the Artery and Vein, sending branches to the upper part of the Penis, and the inferior fasciculus supplying its under part.

OF THE LUMBAR, AND SACRAL NERVES.

Q. What situation do the *Sympathetic Nerves* occupy in the *Loins?*

A. After entering the Abdomen, the Sympathetics pass obliquely towards the Mesial line of the Lumbar Vertebrae, between the tendinous Crura of the Diaphragm, and the Psoas, forming Ganglia, from each of which two or three filaments are sent backward to join the root of the Lumbar Nerves; and others forward to the Aortic Plexus.

Q. What course does the *Sympathetic* take in the *Pelvis?*

A. It descends at the inner or mesial side of the sacral foramina, becoming of smaller size it forms an arch with its fellow on the surface of the Os Coccygis, and thus terminates. In passing down, however, it forms Sacral Ganglia, from which nerves are sent out to join the Sacral Nerves, and others to the parts lining the Pelvis, and to the Rectum.

Q. Describe the five *Lumbar Nerves?*

A. They emerge between the Vertebrae, form connexions with one another upwards and downwards, with the Sympathetics by branches running obliquely over the Vertebrae, and they send large branches backwards to the large muscles and integuments of the Loins.

Q. What Nerves form the *Lumbar Plexus?*

A. The different connexions of the Lumbar Nerves with each other form a sort of Plexus, situated behind the Psoas, from which nerves are sent to the Quadratus Lumborum, and Flexors of the Thigh.

Q. Describe the *first Lumbar Nerve* particularly?

A. It is connected by a branch to the last Dorsal, and by its trunk to the second Lumbar Nerve. It sends

filaments to the Muscles of the Loins, and a principal branch over the Quadratus Lumborum towards the spine of the Ilium, where it is ramified on the Integuments of the Pelvis, on the upper and outer part of the Thigh, on the lower part of the abdominal muscles, groin, pubis, and scrotum, or labia pudendi.

Q. Describe the *Second Lumbar Nerve*, also, particularly ?

A. It perforates the Psoas, to which it gives several twigs, and then unites with the third Lumbar. It sends off the *External Spermatic*, which generally receives some twigs from the first Lumbar ; this Spermatic perforates the upper part of the Psoas, near Poupart's Ligament it divides into two branches, one of which passes through the abdominal Ring, and is dispersed upon the Pubis, Spermatic Cord, Scrotum and Testis, and Round Ligament, Uterus, and Labia Pudendi ; the other passes out with the femoral artery, and is dispersed upon the inguinal glands, and contiguous integuments.

Q. Are the other *three Lumbar Nerves* connected in like manner ?

A. Yes ; they unite also and form a plexus.

Q. Do any other Nerves arise from the *Lumbar Nerves ?*

A. Yes ; the Cutaneous Externus, the Obturator, and the Crural Nerve.

Q. Describe the *External Cutaneous ?*

A. It arises from the second and third Lumbar, passes behind the Psoas, and across the Iliacus Internus to the Superior Anterior Spinous Process of the Ilium, goes out over Poupart's Ligament, and is dispersed on the Vastus Externus, and Integuments of the Thigh.

Q. Describe the *Obturator Nerve ?*

A. It is of very considerable size, and arises from the Second, Third, and Fourth Lumbar Nerves, passes between the External and Internal Iliac blood-vessels, along the side of the Pelvis ; accompanies the obturator artery through the upper part of the obturator Muscles, and Ligament ; and having sent branches to the Obtu-

rator, and Pectineus, it divides into an anterior and a posterior fasciculus, the former is dispersed upon the two small Adductors, and Gracilis, the latter upon the Adductor Magnus.

Q. Describe the *Crural Nerve?*

A. It arises chiefly from the Third and Fourth, and partly also from the First and Second Lumbar Nerves; its different origins unite, and form a trunk of great size. This Crural Nerve passes behind the Psoas muscle, and descends at its lateral side, passes out under the Crural Arch at the outside of the Femoral Artery, where it is soon separated into branches.

Q. What are the *principal branches* of the *Crural Nerve?*

A. The Cutaneous Medius, Anterior, Internus, and the Saphænus.

Q. Describe these *Cutaneous Nerves?*

A. They descend upon the fore and internal parts of the thigh, and are distributed to the integuments and cellular substance, as far as the knee.

Q. Describe the *Nervus Saphaenus?*

A. This nerve descends among the muscles, and gives branches to them; passes behind the tendon of the Sartorius to the inside of the Tibia, and is ramified upon the integuments, and cellular substance of the leg, generally following the veins down to the inner ankle, and foot.

OF THE SACRAL NERVES.

Q. How many pairs of Sacral Nerves are there?

A. Five pairs; each of which is divided into a small posterior, and a large anterior trunk.

Q. Describe the course of the *Posterior Trunks* of the Sacral Nerves?

A. They pass out of the Vertebral Canal by the small holes in the posterior part of the Os Sacrum, and are dispersed upon the Muscles and integuments there.

Q. Describe the connexions of the *Anterior Sacral Nerves?*

A. They go out hy the large anterior holes of the Os Sacrum. The *first*, *second*, and *third*, are the largest; they receive hranches from the sympathetic, unite into a trunk which joins the trunk of the fourth and fifth Lumbar, they form a Plexus, from wbicb the *Sciatic Nerve* takes its origin.

Q. Describe the destination of the *fourth and fifth* Sacral Nerves?

A. They send brancbes to the Hypogastric Plexus, to the Muscles and Ligaments of the Os Coccygis; and then run outwards to be dispersed upon the parts about the Anus.

Q. Describe the course of the *Sciatic Nerve?*

A. The Sciatic Nerve, the largest of the body, issuing from the Plexus, formed hy the three upper Sacral, fourth and fifth Lumhar, and hranches from the Sympathetic Nerves, goes througb the Notch of the Ilium, under the Pyriform muscle, over the short Rotators, and gets between the Tuher Ischii and Trochanter Major; it then descends in the back part of the Thigh, between the Flexors and Adductor Magnus, twisting gradually into the ham, where it is called the Popliteal Nerve.

Q. What particular branches does the *Sciatic Nerve* give off?

A. In the thigh it gives rise to various irregular branches, which are ramified among the muscles, integuments, scrotum, Lahia externa, anus, perineum; and several of them descend, spreading on the back part of the Thigh even to the ham.

Q. As we have already described the Pudic, describe now the *Gluteal Nerves?*

A. The Glutcal Nerves arise hy a superior fasciculus sent off from the common trunk of the fourth and fifth Lumhar, and by an inferior fasciculus from the same Lumhar, and first Sacral Nerves; they hoth pass through the notch of the Ilium; the former fasciculus is dispersed upon the Glutei medius and minimus, and the latter upon the Gluteus Maximus, and integuments.

Q. Describe the *Popliteal Nerve?*

A. It has the tendons forming the ham-strings on each side, the blood-vessels below and the integuments above; a short space above the bend of the knee it divides into a small external or Fibular, and a large internal or Tibial Nerve.

Q. Describe the *Fibular or Peroneal Nerve?*

A. It passes down over the head of the Fibula, and divides into superficial and deep branches.

Q. What *superficial branches* does the *Fibular Nerve* send off?

A. The *Cutaneous Externus* sent to the Biceps, Gastrocnemius, and integuments; the superficial Fibular perforates the Peroneus Longus, passes over the Peroneus Brevis, giving filaments to both, and becoming subcutaneous about the middle of the leg, sends branches to the Metatarsus, Extensor Digitorum Brevis, and other branches, which anastomose on the upper part of the foot, and send dorsal branches to the toes.

Q. Describe the *Deep Branches* of the *Fibular Nerve?*

A. It crosses over the Fibula higher than the Superficial, sends a reflected branch to the soft parts of the joint, a branch to the Peroneus Longus, another to the Tibialis Anticus, others to the Extensor Pollicis, and Extensor Digitorum Longus, filaments to the Periosteum of the Tibia. The part, which seems the trunk of the nerve, accompanies the Anterior Tibial Artery, divides into branches upon the foot, which are dispersed upon the Extensor Digitorum Brevis, Interossei, and toes; one passes with a branch of the Artery into the sole, and forms a connexion with the plantar Nerves.

Q. Describe the *Tibial Nerve?*

A. It passes down between the heads of the Gastrocnemius Externus, perforates the Internus, and follows the Posterior Tibial Artery between the Flexor Digitorum Longus, and the Gastrocnemius Internus, passes in the sinuosity of the Os Calcis into the sole, where it divides into the External and Internal Plantar Nerves.

Q. What branches does the *Tibial Nerve* give off in its course down the leg?

A. The Communicans Tibiae, which is distributed to the back part of the leg, and external side of the foot, various other nameless branches to the muscles and integuments.

Q. Describe tbe *Internal Plantar Nerve?*

A. It runs on the tibial side of the sole, giving twigs to the muscles, divides into four nerves, which split into others that run along the plantar sides of the three first toes, and tibial side of the fourth, accompanying the arteries.

Q. Describe the *External Plantar Nerve?*

A. It gives twigs to the heel, and runs with the artery along the Fibular edge of the sole, and ultimately divides into three principal branches; two run along the contiguous sides of the fourth and fifth toes, and fibular side of tbe little toe; the third gives filaments to the muscles. These Plantar Digital Nerves furnish twigs to the integuments, and communicate freely with one another, and also with the Dorsal Digital branches.

OF DISEASES OF THE NERVES.

Q. What Diseases are Nerves subject to?

A. It is impossible to answer tbis question in the present state of our knowledge of the Nervous System; for various morbid affections of the Nerves take place without our being able by dissection to ascertain the cause.

Q. Is not the *Nervous Energy* of the whole system sometimes *preternaturally increased?*

A. Yes; in Mania the Nervous Energy given to the muscles increases their strength and powers sometimes to an amazing degree. In Epileptic and Hysterical fits too, the Nervous Energy tbrown into particular muscles, especially Flexors, is for a time excessive and morbid.

Q. Is not the *Nervous Energy* of the body sometimes *morbidly diminished?*

A. Yes; from any inordinate pressure of the Brain, or on a part of it, or on some of the large nerves, the

Brain or Nerves are impeded in the performance of their functions, and, in consequence, cannot give Nervous Energy to the muscles necessary for their healthy actions. Something analogous to this seems to take place in some Fevers, where the nervous debility is extreme.

Q. Are *Nerves* subject to *tumefaction?*

A. Yes; when a nerve is punctured it swells considerably, to a greater or less extent, according to the nature of the injury.

Q. Are *Tumours* not found in Nerves independent of puncture?

A. Yes; a tumour attended with the most excruciating pain, in a few rare instances has occurred; it has a cyst which contains blood; and when divided it seems composed of thick viscid jelly, in which are a few white fibres.

Q. When *Nerves* are divided across, *do they re-unite?*

A. Yes; when kept in contact the divided extremities of nerves reunite by real nervous matter, as repeated experiments have demonstrated.

Q. Are *Nerves* subject to *Inflammation?*

A. Yes; they are affected with local Inflammation, and this seems the reason why symptomatic Fever is excited, and a constant concomitant of acute local Inflammation.

FINIS.

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