

**Guide to the method of dissection for the use of the students of practical anatomy in the University of Glasgow / by Allen Thomson and John Cleland.**

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# GUIDE

TO THE

# METHOD OF DISSECTION.

FOR THE USE OF THE

STUDENTS OF PRACTICAL ANATOMY

IN THE

UNIVERSITY OF GLASGOW.

BY

ALLEN THOMSON, M.D.,

AND

JOHN CLELAND, M.D.

GLASGOW, 1861.

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## GUIDE, & c.

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### I. GENERAL MANAGEMENT OF THE DISSECTIONS.

1. THE object of the following Directions is not to take the place of a descriptive Manual of Dissection, but to serve as a short and simple Guide to the manner in which dissections are to be conducted, the various organs and their parts being mentioned in the order in which they ought to be exposed, and such methods being indicated as may enable Students to obtain the greatest amount of information from their dissections, and prevent interference among the neighbouring dissectors as much as possible.

2. According to the method followed in this School, each subject is distributed in ten parts, five on each side of the middle plane of the body. The attention of Students is particularly called to the description of the situation and boundaries of the several parts, so as to avoid any interference between the different dissectors.

3. It is to be observed that, although in the Special Directions, all the organs mentioned are supposed to be brought under review in one dissection, it may be necessary for the Student, in order to obtain a full knowledge of them, to dissect each of the parts more than once. This is especially the case with the Head and Neck. It is incumbent therefore upon the Student to make a selection of different objects in each dissection, under the guidance of the Demonstrator, in order that he may progressively obtain a complete view of the whole.

4. The time allowed for the dissection of a subject is six weeks. Students are recommended to devote not less than two hours daily to dissection, and whenever possible a longer time.

5. In the case of a Male Subject, a day is set apart at the commencement for the dissection of the perinæum. Thereafter, and in the case of a Female Subject immediately on its being brought into the Rooms, the subject is first placed with the face downwards for four days, during which time the posterior regions are to be dissected, in so far as within reach, in the order afterwards mentioned for each part. It is then turned and laid upon its back, when the dissection of the various parts in front is to be made.

6. The dissection of the Head and Neck and of the Limbs is to be begun when the subject is first laid upon its face; that of the Abdomen as soon as it is turned on the back, and that of the Thorax when the upper Limbs are removed. The Limbs are not to be removed before the tenth day, and the further dissection of the several parts is to proceed in accordance with the methods suggested in the Special Directions.

7. Those Students who have not previously dissected, are recommended to take the limbs for their first and second dissections, after they shall have obtained a sufficient knowledge of the Bones and Joints; and for the most part, the Junior Students ought not, in a first or second dissection, to attempt to expose more than the muscles and the largest vessels and nerves. In their third and subsequent dissections they will gradually be enabled to make a more complete display of all the parts.

8. In the dissection of the Limbs, no interference between the Dissectors of opposite sides can occur; but in the Head and Neck, Thorax and Abdomen, there is a necessity for the Students who possess the parts of opposite sides to act in concert. The Viscera must be examined by them together, and it will frequently happen that the dissectors of both sides cannot work at the same time. When such is the case, the one Dissector should give his assistance to the other by reading or otherwise; and it will sometimes be found advantageous for them to make in concert different kinds of dissections on the opposite sides of the body; such as the Muscles chiefly on one side, and the Vessels and Nerves on the other, or the Orbit from above on one side, and in a lateral view on the other, &c.

## II. SPECIAL DIRECTIONS FOR THE DISSECTION OF EACH PART.

### I.—HEAD AND NECK.

THE right and left sides of this region constitute each a part. Its dissection may occupy the full time, or about six weeks; two hours or more daily being devoted to it. Its inferior boundary extends from the sternum along the clavicle, to the acromion process; and thence to the spinous process of the third cervical vertebra. It may be found impossible to follow out in one part the whole of the dissections indicated below; and therefore the dissector ought rather, if his time is limited, to make a selection for repeated dissections, following, as nearly as possible, the methods described. Many smaller points of detail may be passed over by the Junior Student; and there are some which can only be observed in the most favourable condition of the subject.

1. **Integument of the Cranium.**—The subject being placed with the face downwards, during the first two days, the scalp and the back of the neck (to the third cervical vertebra) are to be dissected; and while this is being done, only one dissector should work at a time. An incision is to be made along the middle line, from the spinous process of the third cervical vertebra, forwards over the head, to the root of the nose, and another from immediately behind the ear to meet the first at the vertex, care being taken not to cut deeper than through the skin. The flaps of integument thus marked out are to be reflected from above downwards, the posterior one first.

At the back of the neck the posterior and upper parts of the trapezius and sternomastoid muscles will be laid bare; and, between these, part of the splenius muscle, and, when the trapezius is not strongly developed, a small angle of the complexus muscle will be brought into view. These muscles are to be left undivided at this stage. On the posterior part of the cranium the structures to be examined are the occipital artery and vein, and the great occipital nerve, which pierces the complexus and trapezius

muscles; the small occipital nerve, which passes upwards along the posterior border of the sternomastoid muscle; and, beneath these, the occipital part of the occipito-frontalis muscle. Behind the ear are the retrahens auriculam muscle and the posterior auricular artery and nerve; above the ear is the attollens auriculam muscle; and in front of the ear the attrahens auriculam muscle connected with the attollens, the temporal artery and vein, the small temporal branch of the third division of the fifth nerve, and the superior branches of the facial nerve. Passing upwards on the forehead, are the frontal part of the occipito-frontalis muscle, the frontal vein, the supraorbital and frontal arteries, and the supra-orbital and supratrochlear nerves.

2. **Interior of the Cranium and Brain.**—During the third and fourth days the brain and its membranes are to be removed and studied, and the interior of the base of the skull dissected to show the sinuses, bloodvessels, and nerves; and, if there is time (as may be the case, should the head have been previously opened), the orbit may be examined from above. To remove the calvarium, the temporal aponeurosis and upper part of the temporal muscle having been dissected, let the scalpel be carried round the cranium from a point a little above the occipital protuberance, so as to pass across the forehead at about an inch above the orbits; and having cleared a small portion of the bone on the circle so made, let the external table of the skull be sawn through, leaving the inner table undivided. Let the inner table be cracked completely round by a few smart strokes of the chisel and mallet, and the calvarium may then be pulled away from the dura mater which lines it. The superficial aspect of the dura mater and the superior longitudinal sinus having been examined, the dura mater is to be divided on a level with the sawn edge of the skull, excepting where it touches the middle line; and the arachnoid membrane and pia matter may be examined, as well as the cerebral veins entering the superior longitudinal sinus. The falx cerebri is then to be separated from its attachment to the crista galli and thrown backwards.

It will now be in the dissector's option to remove the brain at once from the body, or to examine it in situ as far as the ventricles.

The first of these plans is to be followed if the brain is to be placed in alcohol for the purpose of hardening, and its examination deferred. In that case, after removal of the brain from its place, the membranes must be carefully dissected off the whole surface, and round the divided roots of the nerves and trunks of the principal arteries previous to immersion in alcohol. If, however, the brain is to be examined in the fresh state, which is generally to be preferred, the second plan should be carried out as follows:—The dissectors ought first to examine the convolutions of the upper aspect of the brain; they will then slice away the hemispheres to the level of the corpus callosum, and observe the extent of that structure, its transverse markings, the raphe and the longitudinal lines. They will proceed, by incisions at the sides of the corpus callosum, to open the lateral ventricles separately, so as to expose their cavities with the anterior and posterior cornua and the parts lying on their floor: they must afterwards cut across the corpus callosum near the forepart, and raising it carefully, divide with scissors the septum lucidum which separates the lateral ventricles, and notice between its layers the fifth ventricle. The lateral ventricles having been thus thrown into one, the structures forming their floor are more fully seen, viz., the corpora striata, tæniæ semicirculares, the optic thalami in part, the choroid plexus, the upper surface of the fornix, the foramen of Monro, the anterior and posterior cornua, and the hippocampus minor. The descending cornu is now to be exposed, on one side only, by cutting away the cerebral substance above and external to it, and in it will be found the hippocampus major, pes hippocampi, tænia hippocampi, and fascia dentata.

Let the fornix be divided immediately behind the foramen of Monro and reflected. The velum interpositum having then been examined and removed, follow the anterior crura of the fornix as far as possible, and study the objects seen in and near the third ventricle: viz., the optic thalami, the three smaller commissures, viz., anterior, middle, and posterior, the pineal body and its crura, the corpora quadrigemina, and the anterior opening of the iter a tertio ad quartum ventriculum. The transverse fissure of the cerebrum ought now to be opened by division of

the remains of the corpus callosum and fornix in the middle line, and it may be followed in its whole extent to the extremity of the descending cornu. By this proceeding the veins of Galen will be traced back through the velum interpositum to the margin of the tentorium, and the valve of Vieussens and the origin of the fourth nerve, as well as that of the optic tract, may be seen; but if the view of these objects should not be satisfactory, they may be again examined after removal of the brain from the skull.

The lower part of the brain is to be removed by cutting the tentorium on each side sufficiently to allow the cerebellum to be raised, and dividing the spinal cord and vertebral arteries as low as possible, the spinal-accessory and suboccipital nerves, and the cranial nerves in order from behind forward, with the infundibulum and internal carotid arteries. If the subject has been placed on its back, the nerves will be cut in order from before backward, and the spinal cord last of all. The brain is now to be laid on a flat plate with the base uppermost. In studying the base of the brain, let the distribution of the arteries be first observed, with their union in the circle of Willis. After they are removed, and the less adherent portions of the arachnoid membrane and pia mater stripped off, except from the angle between cerebellum and medulla oblongata, let the principal parts of the brain visible from the base be examined. These are:—the fissure of Sylvius separating the anterior from the middle lobe, and contained in it the concealed convolutions or island of Reil; at the entrance of the fissure the locus perforatus anticus, and terminating in it the inferior part of the transverse fissure of the cerebrum; also, the crura cerebri emerging from before the pons Varolii, the anterior extremity of the corpus callosum lying in the bottom of the great longitudinal fissure, and behind it, in the middle line, the optic commissure, the lamina cinerea, tuber cinereum, the infundibulum, the corpora albicantia, and the locus perforatus posticus. The principal objects to be noted on the medulla oblongata are the anterior pyramids with their decussation and the olivary bodies on the front, and the restiform bodies on its lateral aspect; posteriorly are the posterior pyramids, and the calamus scriptorius, and its prolongation down-

wards into the minute remains of the central canal of the spinal cord. The fourth ventricle, situated between the medulla oblongata and cerebellum, is thus brought into view, and at its sides will be observed the fringes of pia mater called choroid plexus of the fourth ventricle, the two small lobules of the cerebellum at the sides of the medulla oblongata named the flocculi or sub-peduncular lobes, and behind them the amygdalae; and above the medulla, the parts belonging to the middle lobe of the cerebellum, afterwards more fully noticed.

The origins of the cranial nerves will now be examined. The first pair or olfactory tracts and bulbs are seen on the anterior lobes, and should be traced back to the white striae by which they arise at the inside of the fissure of Sylvius: the second and fourth nerves are seen passing round the crura cerebri, the second by the optic tracts from the corpora quadrigemina, optic thalami and corpora geniculata, the fourth from the valve of Vieussens; the third pair lie close together on the inner aspects of the crura cerebri; the fifth pair emerge by two roots from the front of the pons Varolii; the sixth in front of the anterior pyramids; the seventh nerve in two parts, the portio dura and portio mollis, in the angle between the medulla oblongata, pons Varolii and cerebellum; the eighth pair in three parts, the glosso-pharyngeal, vagus or pneumogastric and spinal-accessory in front of the restiform body; the ninth pair in front of the olivary body; and the suboccipital (or first cervical nerve of some authors), close below the ninth. The cerebellum is to be separated from the structures to which it is attached by division of its superior, middle, and inferior crura. The general disposition of its convolutions and the superior vermiform process will be noted, as also the parts entering into the formation of the inferior vermiform process lying in the vallecule beneath, viz., the pyramid, uvula, and laminated tubercle, together with the posterior velum. Sections of the cerebellum are to be made to exhibit the arbor vitae and the grey centre known as the corpus dentatum rhomboideum. In conclusion, sections may be made of the medulla oblongata to show the olivary nucleus or corpus dentatum, and of the crura cerebri to show the locus niger.



The venous sinuses, arteries, and nerves in the base of the skull ought now to be examined, if there is time, before the subject is turned on its back. The superior longitudinal sinus, the inferior longitudinal and the straight sinus (with the veins of Galen entering it), and the posterior occipital sinus are to be traced to the torcular Herophili; and the lateral sinuses from that point to the jugular foramina. The cavernous sinuses, joined together by means of the circular sinus, are then to be opened; and the superior and inferior petrosal sinuses, and the transverse sinus. In the vicinity of the cavernous sinus the relations of the 3d, 4th, 5th, and 6th nerves are to be exhibited, and also the internal carotid artery and the Gasserian ganglion; after which the nerves are to be replaced in situ and protected with cotton dipped in spirits, that they may be ultimately traced forward in the dissection of the orbit. The pituitary body is to be removed from its position in the sella turcica, and its form and structure examined.

If the above examination of the sinuses cannot be accomplished at this stage of the dissection, the interior of the skull must be carefully cleaned, and protected from the air by replacing the skullcap or otherwise. The Dissectors must also attend to the preservation of the parts at the back of the neck before the subject is turned.

**3. Cervical Region superficially, and Posterior Cervical Triangle.**—It is essential that within four days after the subject has been laid upon its back, the dissection of the posterior and inferior triangle of the neck be completed, so that the third part of the subclavian artery may be seen to advantage before the clavicle and the vessels and nerves of the superior extremity are divided.

With this view, begin by a superficial dissection of the whole cervical region. Make an incision in the middle line from the sternum to the chin; another from the acromion, along the clavicle, to the sternum; and a third from the chin to the back of the ear; and let the flaps so marked out be reflected backwards; care being taken not to injure the fibres of the platysma myoides, nor the nerves which lie in the superficial fascia. The platysma is to be examined and reflected upwards; after which, let the

external and anterior jugular veins be laid bare, and also the cutaneous branches of the cervical plexus of nerves, viz.:—superiorly, the superficial cervical, great auricular, and small occipital nerves; and, inferiorly, the suprasternal, supraclavicular, and supra-acromial nerves: these will be traced most easily from their line of emergence at the posterior border of the sternomastoid muscle. Let the disposition also be noted of the deep cervical fascia.

The dissector will then cut down through the fat at the lower part of the posterior border of the sternomastoid muscle, and uncover the omohyoid muscle, whose posterior belly emerges from behind it and forms the superior boundary of the inferior division of the posterior triangle. He will remove the fat and lymphatic glands from the inferior triangle, until the scalenus anticus muscle is reached, which will serve as a guide to the third part of the subclavian artery and vein, and the superior trunks of the brachial plexus of nerves. Besides these structures, the dissector will observe, while engaged with this space, if the sternomastoid muscle is narrow, the phrenic nerve upon the surface of the scalenus anticus muscle; he will find the supra-scapular nerve and the small branch to the subclavius muscle both coming from the trunk formed by the fifth and sixth nerves, the transverse cervical and suprascapular arteries, and part of the scalenus medius and posticus muscles, as well as the lower set of the chain of lymphatic glands which lie along the line of the sternomastoid muscle. The superior part of the posterior triangle is next to be dissected by clearing the upper attachments of the scaleni muscles, with the splenius colli and levator scapulæ, when the arrangement of the cervical plexus will be seen, together with the origin of the phrenic nerve; also the spinal-accessory nerve emerging from the substance of the sternomastoid muscle, and forming connexions with the cervical plexus before it disappears beneath the trapezius muscle. The seven cervical and first dorsal nerves are to be cleaned up to their emergence from the intervertebral foramina, the communicating branches of the sympathetic nerve being preserved if possible; and the posterior thoracic nerve and the branch to the rhomboid muscles are to be found.

4. **Anterior Triangle and Deep parts of the Neck.**—Let a dissection of the deep fascia and of the sternohyoid and sternothyroid muscles be made in the middle line between the larynx and sternum, to exhibit the relations of the trachea as connected with the operation of tracheotomy; in particular noticing the position of the innominate artery, the common carotid arteries, the thyroid body, the inferior thyroid veins, and the *arteria thyroidea ima*, if it be present. The dissection of the anterior triangle of the neck is now to be proceeded with, by cleaning the whole of the sternomastoid, sternohyoid and sternothyroid muscles, and the anterior belly of the omohyoid muscle; and in front of the sheath of the great vessels the *descendens noni* nerve, with its twigs to the three last named muscles, is to be laid bare. Let the sheath of the vessels be opened, and the upper part of the common carotid artery exposed, with the pneumogastric nerve and internal jugular vein beside it; mark the place of its division into external and internal carotid arteries, and examine the first part of these two vessels, following the external carotid up to the parotid gland. Let the digastric and stylohyoid muscles be cleaned, and the parts be exposed in the submaxillary triangle, viz., the superficial part of the submaxillary gland, the submental branch of the facial artery, and the mylohyoid muscle, with the nerve that supplies it and the anterior belly of the digastric muscle; observe also the ninth cranial or hypoglossal nerve lying close to the stylohyoid muscle, and dissect out its branch to the thyrohyoid muscle.

The sternomastoid muscle is to be divided about three inches from its upper end, and the superior part is to be dissected quite up to the bone, care being taken not to cut the spinal accessory nerve which pierces it. The sternohyoid and sternothyroid muscles ought now to be divided near their lower end, the thyroid body dissected, and its form and relations noted. The dissector will then direct his attention to the branches of the external carotid artery, he will dissect the superior thyroid artery, and note its sternomastoid branch (already cut), and the hyoid, laryngeal, and cricothyroid branches; he will dissect also the commencement of the ascending pharyngeal artery, the occipital artery as far as the

occipital groove of the temporal bone, the posterior auricular artery, the lingual artery as far as the border of the hyoglossus muscle, and the facial artery as far as the lower jaw; he will also lay bare the pneumogastric nerve as far as convenient, tracing the superior and external laryngeal branches.

In the lower part of the neck, the subclavian artery is now to be examined in the three parts of its course; and the different relations of the subclavian and common carotid arteries in the first part of their courses on the two sides of the body are to be carefully compared. The internal jugular and the subclavian veins, with the branches joining them, are to be dissected, and on the left side the arched part of the thoracic duct descending into the angle of junction of these two veins. The branches of the subclavian artery are to be displayed, viz., the vertebral and internal mammary arteries, the thyroid axis, from which arise the inferior thyroid giving off the ascending cervical artery, the suprascapular artery, and most frequently the transverse cervical dividing into the superficial cervical and posterior scapular; lastly, there are the deep cervical and superior intercostal arteries coming off either as a single trunk or separately. The frequent origin of the posterior scapular artery from the third part of the subclavian artery and other varieties will here require to be attended to. The trunk of the sympathetic nerve is to be dissected, with its three cardiac and its other branches, as high as the first cervical nerve; and the recurrent laryngeal branch of the vagus nerve is to be found between the gullet and trachea, and traced up to the larynx.

5. **Superficial Dissection of the Face.**—In proceeding with this region, the dissectors ought to expose in concert the superficial muscles of the face on one side, keeping only the principal blood-vessels and nerves. They ought likewise to make a more detailed exposure and dissection of these vessels and nerves on the other side, for which purpose the superficial muscles must be in some measure sacrificed. If this plan cannot be carried out in concert, each dissector must display as much as possible all the parts on his own side, in which case he will begin with the superficial muscles.

To exhibit the superficial muscles of the face, the skin is to be reflected from the middle line, from which one or two such transverse incisions as shall seem necessary are to be directed outwards. It is most convenient to begin with the orbicularis palpebrarum muscle, removing the skin from the circumference to the margin of the eyelids, and dividing it along these margins. The muscles between the eye nose and upper lip may then be exposed, the principal of which are these:—the compressor naris, the levator labii superioris alaeque nasi, the levator proprius labii superioris and the zygomatici, more deeply the corrugator supercilii, the levator anguli oris, \*the pyramidalis nasi continued from the frontalis, the dilatator naris, &c. Below the mouth the depressor anguli oris and depressor labii inferioris will be seen. A more complete view of the orbicularis oris may be obtained by dissecting it from the inner aspect of the lips; and the levator menti is best displayed by making an incision down to the bone in the middle line, and dissecting outwards.

To expose the nerves and blood vessels of the face, the skin having been reflected from the middle line outwards, the surface of the parotid gland is to be cleaned, and search made for the branches of the facial nerve as they emerge from below its upper and anterior margins. The duct of the parotid gland, and the transverse facial artery are also to be dissected. The branches of the facial nerve are to be followed forward, and, where possible, their connexions with the infraorbital, buccal and inferior labial branches of the fifth nerve are to be traced. Let the dissector cut the superior attachment of the levator proprius labii superioris muscle, and, dissecting down upon the infraorbital foramen, follow out the distribution of the infraorbital nerve and artery emerging from it. Let him also cut carefully down upon the mental foramen, and follow out the inferior labial nerve and artery emerging thence.

The facial artery and vein with their branches are to be dissected out from the point to which they have been previously traced at the border of the jaw. The principal branches of the artery, such as the inferior labial, the superior and inferior coronary, the lateral nasal and the angular, are to be exposed.

The branches of the facial nerve should be traced backwards through the parotid gland to the emergence of the main trunk from the stylomastoid foramen; and the twigs to the posterior belly of the digastric muscle and the stylo-hyoid muscle should be sought for, as also the connexions of this nerve with the auriculo-temporal branch of the fifth and with the great auricular nerve. The continuation of the external carotid artery into the superficial temporal will also be seen; and in dissecting out the remains of the parotid gland, the deeper relations of that gland can be studied. In this part of the dissection the student should also observe the connexions of the part of the cervical fascia which separates the parotid and submaxillary glands, and which is continuous with the strong band known as the stylomaxillary ligament. Finally, the dissector may clean and examine the tarsal and nasal cartilages.

6. **Deep Dissection of the Face**—Let the masseter muscle, and the nerve and artery which enter its deep surface from the sigmoid notch of the lower jaw be examined, and let the temporal fascia be removed, the orbital twig of the superior maxillary nerve being sought between its layers. By means of the saw and bone-nippers let the zygomatic arch be divided in front and behind in such a manner as exactly to include the origin of the masseter muscle, which is then to be turned downwards and backwards; the masseteric nerve and artery being in the meantime preserved. Let the coronoid process be divided by a vertical and horizontal incision with the saw and nippers as low down as possible, care being taken not to cut the buccal nerve, which lies in close contact with the temporal muscle. Reflect upwards the coronoid process with the temporal muscle attached. Divide the neck of the jaw a little below the condyle, and remove as much of the ramus of the jaw as can be cut away without injury to the inferior dental artery and nerve as they enter the foramen. The internal maxillary artery with its branches is to be exposed as far as can be done without injury to the external pterygoid muscle, on whose outer surface it generally lies: it is frequently, however, covered by it. The gustatory and inferior dental nerves will be seen below the inferior border of the external pterygoid muscle, the latter nerve

giving off the mylo-hyoid branch before entering the inferior dental canal. Above the superior border of the same muscle will be seen the anterior and posterior deep temporal arteries and nerves, and between the two parts of the same muscle, the buccal nerve and vessels. After the external pterygoid muscle has been examined, the temporo-maxillary articulation is to be opened by cutting the external lateral ligament and dividing the capsule of the joint above and below the interarticular fibro-cartilage, and the condyle of the jaw is to be disarticulated; care being taken not to cut the auriculo-temporal division of the inferior maxillary nerve, which is in close contact with the inner side of the capsule. The external pterygoid muscle may now be turned forward along with the head of the jaw, and its nerve found; after which it may be removed, observing at the same time the internal lateral ligament of the jaw.

The branches of the internal maxillary artery, in the vicinity of the pterygoid muscles are thus brought fully into view, viz.: in the first part of its course, the inferior dental, the middle meningeal giving off the small meningeal artery, the two deep temporal, the pterygoid and other muscular branches: next, more deeply within the pterygoid muscles, the posterior superior dental and the infraorbital branches; the chorda tympani nerve is to be dissected upwards to the fissure of Glaser, from its point of junction with the gustatory nerve, and the branches of the inferior maxillary nerve are to be traced back to the foramen ovale: the auriculo-temporal nerve will frequently be found embracing the middle meningeal artery. The internal pterygoid muscle is to be examined as far as it can be laid bare. The auriculo-temporal division of the inferior maxillary nerve is then to be traced to its distribution, and the pinna of the ear is to be dissected so as to show the form and extent of its cartilage, the small muscles on its surface, and the final distribution of its nerves.

7. **The Orbit.**—The dissection of the orbit and the parts passing into it may next be proceeded with. Let a vertical cut be made with the saw through the frontal bone, to near the inner angle of the orbit immediately above the fovea trochlearis; and another from above the ear, downwards and forwards, through the

lateral wall of the skull, towards the sphenoidal fissure. Remove the outer part of the malar bone with the bone-nippers, separate carefully with the handle of the knife the periosteum and contents of the orbit from the upper and outer walls, and unite the inner saw-cut with the sphenoidal fissure, immediately outside the optic foramen, by means of the chisel; then, with the bone-nippers, remove the isolated piece of bone so as to unroof the orbit. Detach the periosteum from the contents of the orbit. On the upper surface the fourth nerve is to be traced forwards from the cavernous sinus to the trochlearis muscle, and that muscle is to be displayed. The frontal nerve, occupying the middle of the space, is to be traced back to its origin from the ophthalmic division of the fifth nerve. The lachrymal gland is to be exposed; and from its posterior border the lachrymal nerve is to be traced back to its origin from the ophthalmic nerve, while at the same time its malar branch and palpebral distribution may also be seen. The levator palpebrae muscle, and the inferior, external, and internal recti muscles are to be displayed; as well as the sixth nerve ending in the external rectus, and the third in the other three recti muscles. These nerves are now to be traced backwards between the two heads of origin of the external rectus muscle to the cavernous sinus. Below the superior rectus muscle the nasal nerve will be seen crossing the optic nerve; it will be followed to the anterior internal orbital foramen, and its infratrochlear branch traced to the lower eyelid; it is then to be dissected back to its origin, and the long and delicate root of the lenticular ganglion sought for on the outer side of the optic nerve. The ophthalmic or lenticular ganglion is on the outside of the optic nerve, and may be most easily found by tracing the short and thick twig which runs into it from the inferior division of the third nerve. In front of the ganglion its ciliary branches may be seen. The remainder of the fat is to be removed from the lower part of the orbit; the distribution of the ophthalmic artery is to be displayed; and the lower division of the third nerve is to be traced forwards to the inferior rectus and obliquus muscles. By a slight dissection from the front of the orbit the insertions of these muscles may be more fully displayed. The contents of the orbit may be afterwards



divided behind and turned forward, to admit of the tensor tarsi muscle and the lachrymal sac being dissected. Finally, if the subject be favourable, the nasal nerve may be traced through the ethmoid bone to its distribution in the interior of the nares, and its external twig to the tip of the nose seen.

8. **Deep view of the Fifth Nerve. Spheno-palatine and Otic Ganglia. Organ of Hearing.**—The foramen rotundum and infraorbital canal are to be laid open, and the superior maxillary nerve and its orbital and dental branches dissected. Remove with the saw a further portion of the skull towards the meatus externus, reaching as far as the foramen spinosum, and with the chisel or nippers cut down close to the foramen ovale; remove also a portion of the bone above the pterygoid processes so as to open up the spheno-maxillary fossa, and the spheno-palatine ganglion will be brought into view. The connexion of the ganglion with the superior maxillary nerve may then be made out. Trace the nasal and naso-palatine branches of the ganglion through the spheno-palatine foramen, and the palatine branches passing downwards. Lay open the Vidian canal and dissect the Vidian nerve back to the great superficial petrosal nerve. At the same time the infraorbital, spheno-palatine, descending palatine and Vidian branches of the internal maxillary artery will be noted. The otic ganglion may also be in part seen by breaking open the foramen ovale, following upwards the nerve of the internal pterygoid muscle, and slightly everting the trunk of the inferior maxillary nerve. The twigs from this ganglion to the tensor palati and tensor tympani muscles may be found. The Eustachian tube may be laid bare in the posterior part of its course, and may be opened, and the attachment of the tensor tympani above it shown.

By now sawing the wall of the skull down to the margin of the external auditory meatus, and removing with the bone-nippers cautiously the anterior part of the bony meatus, the membrana tympani may be exposed; and by unroofing the tympanic cavity in continuation of the Eustachian tube backwards, the malleus, incus and stapes, as well as the tendon of the tensor tympani muscle will be brought into view. The mode of action of the

latter on the membrana tympani may be studied. Note also the chorda tympani nerve traversing the cavity; then remove the malleus and incus, and, placing one point of the bone-nippers in the internal auditory meatus, lay open with the other the vestibule and cochlea, and let the relation of the portio mollis and portio dura nerves to these cavities be observed. The stapes and stapedius muscle may also be examined.

9. **Submaxillary and Sublingual Regions.**—Let the lower jaw be divided in front of the masseter muscle, and let the gustatory and mylo-hyoid nerves be followed from the pterygoid into the submaxillary region. The anterior belly of the digastric muscle is to be divided at the chin and turned down. The mylo-hyoid muscle is to be separated from its fellow in the middle line and from the hyoid bone, and reflected toward the jaw, in order to expose the deeper parts. The tongue is to be put on the stretch by fastening it forward; the lower jaw is to be divided by a vertical saw-cut between the first and second incisor teeth, leaving intact the attachment of the genio-hyoid muscle; the fragment of loose bone is to be raised, and the mucous membrane of the mouth slit up to the tip of the tongue. The dissector will first trace carefully out the gustatory nerve, where it is in contact with the submaxillary gland, and will exhibit the submaxillary ganglion connected with it. He will then isolate the submaxillary and sublingual glands, and will observe the relations of Wharton's duct, the sublingual ducts, and the gustatory and hypoglossal nerves. He will examine the hyo-glossus muscle, the genio-hyoid, the genio-hyo-glossus, stylo-glossus, and stylo-pharyngeus muscles; also the glosso-pharyngeal nerve, and the stylo-hyoid ligament. On dividing the hyo-glossus muscle, the subjacent part of the lingual artery may be followed into its sublingual and ranine branches; its small hyoid branch and its branch to the dorsum of the tongue may also be seen; as well as those deep branches of the facial artery which have not yet been examined, viz., the ascending palatine and the tonsillar branches.

10. **Parts close to the external basis of the Cranium.**—If the styloid process be nipped through at its base and thrown down with the three styloid muscles attached, the dissector will be

enabled to examine more particularly the pharyngeal plexus of nerves. He may then also examine the relations of the internal carotid artery and internal jugular vein; and he will follow up the hypoglossal, spinal-accessory, pneumo-gastric, glosso-pharyngeal, and sympathetic nerves to the basis of the skull; examining the connexions of the superior ganglion of the latter with the other nerves mentioned, and with the anterior divisions of the upper cervical nerves. The jugular foramen and the carotid canal are to be opened up; and the eighth nerve, and the internal carotid artery with the carotid plexus accompanying it, are to be followed into the interior of the cranium. When these have been completed the dissectors ought to make together a complete revision of all the parts in connexion with the basis of the cranium.

11. **Pharynx, Larynx, Palate, Tongue, Nares, &c.**—Let the remains of the carotid arteries be removed, and the pharynx drawn away from its loose connexion with the upper cervical vertebrae; and let the base of the skull be divided between the pharynx and the recti capitis antici muscles; then, leaving the neck and back part of the skull for a later examination, let the pharynx, with the parts in its vicinity, be prepared for dissection by distending its walls with tow. The constrictor muscles of the pharynx are to be cleaned and examined, as also the origins of the levator and circumflexus palati muscles. The next step is to open the pharynx from behind, by an incision in the middle line, and a transverse one close to the base of the skull; and to examine the apertures of the nares, fauces, glottis, oesophagus, and Eustachian tubes. The muscles of the soft palate are then to be dissected; more particularly the insertions of the levator and circumflexus palati; the palato-pharyngeus and palato-glossus corresponding in position to the posterior and anterior pillars of the fauces, and in the middle line the azygos uvulæ. The Eustachian tube should also be dissected and its cartilage examined.

The larynx and tongue are to be separated from the upper jaw, and the surface of the tongue and the tonsils examined, as well as such of the intrinsic muscles of the tongue as may be visible. The dissector will then proceed to the study of the larynx, carefully cleaning it; and after the glottis and true and false vocal cords

have been sufficiently inspected, he may remove the mucous membrane, tracing at the same time the distribution of the superior and inferior laryngeal nerves, and the laryngeal branch of the superior thyroid artery. The muscles of the larynx will then be fully dissected. The crico-thyroid, the arytenoid, the arteno-epiglottidean, and the posterior crico-arytenoid muscles can be seen without injuring the cartilages; but to expose the lateral crico-arytenoid and the thyro-arytenoid muscles, it is necessary to remove the upper part of one ala of the thyroid cartilage. Lastly, the ventricles and pouches of the larynx are to be examined, the vocal ligaments are to be dissected out; and, the muscular substance having been removed from the cartilages, their uniting ligaments, and the joints by which they move on one another, are to be studied.

In concluding this stage of the dissection, let a vertical section of the nares and hard palate be made on one side of the septum nasi. Let the meatus of the nose, the nasal duct, and the maxillary antrum be examined; and, if the subject is in good condition, a view may be obtained of the palatine and nasopalatine branches of the spheno-palatine ganglion as well as of the distribution of the descending palatine artery in the palate.

## 12. Deep Muscles and articulations of the Neck and Head.—

The muscles attached to the cervical vertebræ are now to be examined. In front of the vertebral column, the student will observe the *scaleni*, *longus colli*, *recti capitis antici major* and *minor*, and *rectus lateralis* muscles; then turning to the posterior aspect, he will dissect the remains of the *levator anguli scapulæ*, *splenius*, *trachelo-mastoid* and *complexus* muscles to their attachments, and notice the portion of the occipital artery covered by the *splenius*, with its branch the *princeps cervicis*. The *recti capitis postici major* and *minor*, and the *obliqui capitis superior* and *inferior*, with the suboccipital nerve supplying them, are to be dissected out, and the course of the vertebral artery displayed as it lies in the groove of the atlas. Lastly, the arches of the vertebræ are to be removed, and the joints and ligaments examined, especially those between the atlas, axis, and occipital bone, among which the transverse ligament of the atlas and the crucial and odontoid ligaments require particular attention.

## II.—UPPER LIMBS OR SUPERIOR EXTREMITIES.

THE right and left limbs constitute each a part. Their dissection should extend over a period of not less than four weeks. They each include, along with the limb itself, the axilla or armpit, and the structures which lie between the trunk of the body and the bones of the shoulder and arm. The muscles of the back and the spinal cord are also to be dissected by those having the upper limbs. The omo-hyoid muscle, however, and the upper parts of the trapezius, levator anguli scapulæ, splenius, trachelo-mastoid, and complexus muscles should be left uninjured for the dissectors of the head and neck. The inferior boundary of this part on the trunk of the body is indicated by a line passing along the outer and lower borders of the latissimus dorsi, the serratus magnus, and the pectoralis major muscles.

1. **Muscles of the Back; Spinal Cord.**—During the first four days, while the subject is lying on its face, the dissection of the back and spinal cord below the level of the third cervical vertebra is to be completed. Let an incision be made in the middle line from the level of the third cervical vertebra to the sacrum, a second from the acromion to the spine of the seventh cervical vertebra, and a third from the point where the fold of the axilla meets the arm to the acromion. If the student be a beginner, let him at once dissect out the trapezius muscle in the direction of its fibres (except the part of it which falls within the boundary of the dissection of the head and neck), and afterwards the latissimus dorsi, following up its fibres as close as possible to the tendon of insertion; but let him not reflect the skin further than is necessary to exhibit the anterior border of the latissimus dorsi. If the student be a senior, he will, previous to the dissection of these muscles, also display the cutaneous nerves which lie upon their surface.

The trapezius muscle is to be divided by a vertical incision at the distance of two inches from its vertebral attachment, and on its deep aspect the spinal-accessory nerve and the superficial cervical artery are to be displayed. The rhomboid and levator

anguli scapulæ muscles, and the nerve to the rhomboids may then be dissected. The latissimus dorsi muscle is to be divided by means of a cut carried along its attachment to the lumbar fascia from its superior border, at about three inches from its vertebral attachment, downwards and outwards towards the external border, leaving uncut the slips attached to the lower ribs and crest of the ilium. The rhomboid muscles are also to be divided, and the posterior scapular artery dissected. The serrati postici superior and inferior muscles may then be dissected, and the vertebral aponeurosis seen; after which a view may be obtained of the serratus magnus muscle from its internal aspect.

The posterior serrati muscles and the vertebral aponeurosis may now be divided, and the dissection of the muscles composing the erector spinæ may be proceeded with. Beginning with the iliocostalis or sacro-lumbalis muscle, the student will dissect first its six or seven slips of direct insertion into the lower ribs, then the slips attached to the upper ribs, constituting the musculus accessorius ad ilio-costalem: he will afterwards turn the muscle outwards and trace the separate heads of origin of the musculus accessorius from the lower ribs into their insertions above; and also the similar origins of the ascendens cervicis muscle from the upper ribs. He will next treat the longissimus dorsi muscle in the same manner, dissecting first the costal insertions on its outer side, and then, having separated it from the spinalis dorsi muscle (which always requires the division of a tendon running between the two muscles), make out the insertions into the transverse processes of the vertebræ. The issue of posterior branches of spinal nerves, and of intercostal and lumbar vessels, will guide the dissector to the separation of the masses of muscle. The continuation of the long muscles into the ascendens cervicis and transversalis cervicis, and the origins of the trachelo-mastoid, are then to be traced upwards in the neck. To see the last named muscle, however, the splenius muscle must be dissected and divided; and the complexus and semispinalis dorsi and colli muscles may then be examined. Lastly, the deepest muscles, multifidus spinæ, rotatores spinæ, interspinales, and intertransversales are to be dissected.

At this stage of the dissection a good view may be obtained of the posterior margins of the obliquus externus and obliquus internus muscles of the abdomen, and of the posterior and middle layers of the lumbar aponeurosis, which are continuous behind with the transversalis muscle: the dissection of these muscles, however, belongs to the abdomen, and they must not be injured.

The next proceeding for a senior dissector is to lay bare the spinal cord; for this purpose he will straighten as much as possible the lumbar vertebrae, by placing blocks underneath the abdomen, and will let the neck hang slightly downwards. He will then saw through the laminae of the dorsal and lumbar vertebrae on each side, keeping the edge of the saw directed slightly inwards, and will continue the saw-cuts below on the back of the sacrum, so as to meet each other where the sacral canal becomes incomplete. The part so isolated may easily be raised with the chisel, and with the bone-nippers the whole laminae of the vertebrae may be removed, attached to one another by their elastic ligaments. In several spaces of the lower dorsal region the articular processes of the vertebrae may be removed, so as to expose one or more of the spinal nerves issuing from the canal, and these, being dissected for a little distance beyond their ganglia, may be afterwards taken out along with the cord. The theca of dura mater ought now to be made as clean as possible, by removing the fat from its surface, and, after being examined, should be slit open, that the other membranes and the relations of the cord may be examined in situ; more particularly, the ligamentum denticulatum, the position of the lower extremity of the cord, the cauda equina, and the filum terminale will be observed. The spinal cord and its membranes are then to be removed from the body and stretched out upon a table, when the anterior and posterior roots of the nerves and some of the ganglia in connexion with the latter may be observed; also the external form and structure of the cord, with the anterior, middle, and posterior columns, the anterior and posterior fissure, &c.; and, lastly, several sections of the cord, in different places, may be made to exhibit the relations of the grey and white matter within.

2. **Pectoral Region and Axilla.**—Within four days after the

subject has been laid upon its back, the pectoral region and the axilla are to be dissected. Let a median incision be made in front of the sternum, and from its upper end let another be carried along the clavicle to the acromion, and thence downwards to the inside of the middle line of the arm, a little below the fold of the axilla, and a third horizontally outwards from the lower end of the sternum. Then let the skin be reflected from the pectoralis major muscle, and let the senior student in doing this preserve the fibres of the platysma myoides and the suprasternal and supraclavicular branches of the cervical plexus of nerves descending over the clavicle, the anterior cutaneous branches of the intercostal nerves, with the accompanying twigs from the internal mammary artery near the middle line, and two or three small anterior twigs of the lateral cutaneous branches of the intercostal nerves appearing round the lower border of the muscle. If the subject be a female, let him also dissect the mammary gland, and in raising the general integument leave the skin of the nipple, by carrying a circular incision round it of about two inches in diameter. By raising the skin within this circle the lactiferous ducts and sacculi will be brought into view.

Let the clavicular portion of the pectoralis major muscle now be divided near the clavicle for the examination of the subclavicular space, preserving the external anterior thoracic nerve as it passes to that muscle; and let the costo-coracoid membrane and sheath of the axillary vessels be examined. Then let the sheath be removed, and let the termination of the cephalic vein and the parts of the axillary artery and vein brought into view be studied, and also the superior or short thoracic, acromio-thoracic and thoracico-humeral branches.

For the dissection of the axillary space, the skin and the fascia are to be separately raised from its surface, and in the first place the great vessels and nerves of the limb should be carefully exposed as they pass from the axilla into the brachial region, but without much disturbing their position. The axillary artery and vein are then to be followed upwards, and the fat removed from within the space, when the long thoracic vessels will be found chiefly along the anterior border, the subscapular vessels



principally along the posterior border, and the alar twigs more in the middle. At this stage there will also be seen on the inner wall of the axilla the intercosto-humeral with other lateral cutaneous branches of intercostal nerves piercing the serratus magnus muscle, the posterior thoracic nerve descending on the surface of that muscle to supply it, and on the posterior wall the three subscapular nerves. When the axilla has been sufficiently studied, the remainder of the pectoralis major muscle is to be divided; the pectoralis minor muscle also is to be dissected and divided, and the internal anterior thoracic nerve, which supplies it, is to be found. By this proceeding the axillary vessels will be exposed in their whole course, and the origins of the branches of the axillary artery may be more fully examined, viz., the acromio-thoracic, the alar thoracic, short and long thoracic, and subscapular arteries, and the anterior and posterior circumflex arteries. Three cords of the brachial plexus will also be seen; the outer one giving off the musculo-cutaneous, the external anterior thoracic, and the outer head of the median nerve; the inner giving off the inner head of the median nerve, the internal cutaneous nerve, the nerve of Wrisberg and the ulnar; the posterior giving off the three subscapular nerves, the circumflex, and the musculo-spiral nerve. At this time, after removing the costo-coracoid fascia, the subclavius muscle should be cleaned and examined.

On the fourth day after the subject has been placed upon its back, the clavicle is to be sawn through the middle, or disarticulated at its sternal end, if this should be recommended by the demonstrator. The dissector of the arm may then, in company with the dissector of the head and neck on the same side, obtain a continuous view of the upper part of the brachial plexus, and trace the origins of the suprascapular and posterior thoracic nerves. The axillary vessels and the main trunks of the brachial plexus of nerves are afterwards to be securely tied together opposite the outer border of the first rib, and divided above the ligature; the lower parts may subsequently be secured in their places by tying them to the portion of the clavicle left with the arm. This will allow the serratus magnus muscle to be put upon the stretch and to be fully studied before the removal of the arm.

3. **Scapular Muscles, Vessels, and Nerves.**—After the arm has been removed, the first duty of the dissector is to clean the parts which have been already laid bare, and to dissect all the cut muscles, so as to bring their attachments completely into view. He may then remove the redundant masses which are no longer required, and preserving only such portions of tendons and muscles as may be necessary for the later study of their relations to the joints and their attachments to the bones. He will then clean the deltoid muscle, beginning from behind, so as to save as much as possible the cutaneous branches of the circumflex nerve. He will dissect the teres major muscle, and the quadrangular and triangular intervals which are separated by the long head of the triceps muscle and lie between the teres muscle and the scapula; and he will lay bare, as far as can be done without injury to the muscles, the structures which pass through these intervals, viz., in the upper or quadrangular one, the circumflex nerve with its branch to the teres minor muscle and the posterior circumflex artery, and in the lower or triangular interval the dorsal branch of the subscapular artery. The deltoid muscle is next to be removed from the whole of its superior attachment, and beneath it will be seen the bursa that lies between the acromion and shoulder joint, and the branches of the circumflex vessels and nerve. The teres minor, infra-spinatus and supra-spinatus muscles are to be dissected and reflected, and the distribution of the supra-scapular nerve and artery traced. While this is done, neither the coraco-acromial ligament nor acromion need be divided. The subscapular muscle is likewise to be examined, with the two short subscapular nerves which supply it; and on reflecting this muscle, the subscapular bursa will be observed communicating with the shoulder joint. In removing the muscles attached to the scapula, the student should bring into view the anastomoses of the posterior scapular, supra-scapular, acromio-thoracic, dorsal branch of the subscapular and circumflex arteries. The scapular muscles may then be cut short at their attachments to the humerus.

4. **Brachial Region superficially.**—In proceeding with the dissection of the arm, if the part be in a condition favourable for

the purpose, the dissector may at once display the cutaneous nerves and veins as far as the wrist. He will, in that case, make an incision all the way down to the wrist in front of the limb; or should it be deemed advisable not to remove the integument so far, he may terminate his incision half way down the fore-arm. For the easier preservation of the cutaneous nerves, which lie close to the aponeurosis of the limb, he will remove the subcutaneous fat by reflecting it in the direction from above downwards. The intercosto-humeral nerve is to be traced down to its distribution. The nerve of Wrisberg and the internal cutaneous branch of the musculo-spiral nerve will be most easily traced from their deep origins. The internal cutaneous nerve will be found piercing the aponeurosis on the inside of the arm in two separate places, a few inches above the elbow; and on the outer side will be found the two external cutaneous branches of the musculo-spiral nerve, appearing in the line of the external intermuscular septum; while at the bend of the elbow, towards the outer side, the musculo-cutaneous, or external cutaneous nerve will be observed emerging from the deep parts. Near the elbow on the inner side, there is a small lymphatic gland, and on the olecranon a small synovial bursa. Further down, there may be seen on the inner side a cutaneous branch from the ulnar nerve, below the middle of the fore-arm; on the outer side the radial nerve becoming superficial two or three inches above the wrist; and in front the palmar cutaneous branch of the median nerve immediately above the annular ligament. On the fore-arm will be found the radial, median and ulnar veins; in front of the elbow the median-cephalic and median-basilic veins, together with the deep median branch; and in the upper arm the cephalic and basilic veins.

5. **Brachial Region more deeply.**—The student will now remove the aponeurosis from the front of the arm. He will first dissect out the brachial artery, with the venæ comites clinging to it and intercommunicating round it, and the median nerve crossing in front. Arising from the inner side of the artery he will find the superior profunda branch turning backwards with the musculo-spiral nerve, a little farther down the inferior profunda branch accompanying the ulnar nerve, and a little

above the elbow, the anastomotic resting on the brachialis anticus muscle; while from the outer side of the brachial artery a variety of muscular branches are observed to spring. The inferior profunda sometimes arises from the superior profunda branch. Not unfrequently two large arteries will be found in the arm, in consequence of a high division of the main trunk; the radial or ulnar artery, most frequently the former, being given off from the brachial at a higher point than usual, and sometimes even as high as the axillary artery. In some of these cases the artery which arises out of place lies superficially to the aponeurosis of the limb. The biceps and coraco-brachialis muscles are next to be dissected, and the deep part of the musculo-cutaneous nerve, which gives them branches. The dissector will be careful to preserve the aponeurotic slip of insertion of the biceps, which lies superficially to the vessels at the bend of the arm. The aponeurosis is to be removed from the back of the arm, and the intermuscular septa are to be examined; the triceps muscle is to be dissected, and the superior profunda artery and musculo-spiral nerve are to be traced to its outer side. The musculo-spiral nerve is to be followed to its division into the radial and posterior interosseous trunks, and its branches to the brachialis anticus, supinator longus and extensor carpi radialis longior displayed. The space in front of the elbow should next be dissected, so as to show the relations in it of the brachial, ulnar, and radial arteries, with the radial recurrent and anterior ulnar recurrent branches, and the median, ulnar, and radial nerves. The brachialis anticus muscle should also at this time be fully exposed down to its place of insertion.

6. **Shoulder Joint, &c.**—The Articulations at the upper part of the arm ought now to be examined. The conoid and trapezoid parts of the ligaments uniting the clavicle to the coracoid process are first to be dissected, and their uses studied; then the acromio-clavicular articulation, and the suprascapular and coraco-acromial ligaments of the scapula; lastly, the shoulder joint is to be dissected, the capsule is to be cleaned, the coraco-humeral ligament dissected, and the tendons of muscles in close relation with the joint examined. When lastly the capsule is opened, the origin of the long head of the biceps in connection with the glenoid

ligament will be seen, and also the prolongations of the synovial membrane round the long head of the biceps and beneath the subscapular muscle.

7. **The Fore-arm in front.**—Let the aponeurosis be removed from the front of the fore-arm, and let the five superficial muscles arising from the inner condyle of the humerus be dissected; beginning with the pronator radii teres, exhibiting its two heads of origin with the median nerve between them, and proceeding successively to the flexor carpi radialis, palmaris longus (which, however, is often absent), flexor sublimis digitorum and flexor carpi ulnaris; displaying the branches of the median nerve to the first four muscles, and that of the ulnar nerve to the last mentioned muscle and to the flexor profundus digitorum. The course of the radial and ulnar arteries and nerves in the fore-arm is also to be studied. From the radial artery will be seen given off the radial recurrent, the muscular branches, the anterior carpal branch and the superficial volar; while arising from the ulnar artery will be seen the anterior and posterior ulnar recurrent, and the interosseous, dividing into anterior and posterior interosseous, and giving off the branch to accompany the median nerve. This last branch, the *comes nervi mediani*, derives importance from being not unfrequently developed as a third principal trunk of the fore-arm, which passes down into the superficial palmar arch. The muscular branches of the ulnar artery, and its anterior and posterior carpal branches, are also to be exposed. The deep layer of muscles, consisting of the flexor longus pollicis, flexor profundus digitorum and pronator quadratus, are next to be dissected; and along with them, lying on the interosseous membrane, and giving twigs to the muscles, the interosseous branch of the median nerve, and accompanying it, the anterior interosseous artery.

8. **The Hand in Front.**—For the dissection of the front of the hand, let an incision be made down the middle of the palm, a second transversely through the skin above the division of the fingers, and others down the middle of each finger. Let the palmar aponeurosis be exposed, preserving the palmaris brevis muscle which is attached to its inner margin; and let the skin be

reflected from the front of the fingers and thumb, so as to exhibit the sheaths for the tendons, and the two digital branches of the artery and nerve on each. The palmar aponeurosis is then to be removed, and the trunks of the ulnar and median nerves will be brought into view, as also the ulnar artery, the superficial volar branch of the radial artery, and the superficial palmar arch. The short muscles of the thumb, viz., the abductor, opponens, flexor brevis, and adductor pollicis, are to be dissected, with the twigs of the median nerve supplying the three first, and the insertion of the flexor longus pollicis; then the abductor, opponens, and flexor minimi digiti, with the twigs of the ulnar nerve supplying them, and its deep branch piercing them. The annular ligament is to be cleaned and the synovial sheath behind it examined; the tendons of the superficial and deeper flexors are to be followed to their insertions, and the lumbricales muscles dissected. The deep branch of the ulnar artery may now be traced to the deep palmar arch, and that of the ulnar nerve to its distribution in all the interossei, two of the lumbricales, the adductor pollicis, and the inner part of the flexor brevis pollicis muscle. The deep palmar arch and its branches are also to be fully examined.

9. **The Fore-arm and Hand Posteriorly.**—For the dissection of the back of the fore-arm and hand let the remainder of the integument and aponeurosis be carefully reflected, and let the distribution of the ulnar and radial nerves to the dorsal aspects of the fingers be traced. The muscles are then to be dissected in the following order, viz., the supinator longus, extensores carpi radiales longior and brevior, extensor carpi ulnaris, extensor communis digitorum and extensor minimi digiti, the extensor indicis, the three extensores pollicis, and, lastly, the anconeus and supinator brevis muscles. There will be found passing through the fibres of the last mentioned muscle, the posterior interosseous nerve; and on the interosseous membrane the posterior interosseous artery, with its recurrent branch: they are both to be traced to their distribution. The lower part of the radial artery which has hitherto been hid from view may also now be studied: its posterior carpal and its metacarpal branch will be seen, together with the dorsal branches to the thumb and index finger. The termination on the

back of the wrist of the anterior interosseous artery after passing through the interosseous membrane is also to be noticed. Finally, the interossei muscles are to be dissected on both the palmar and dorsal aspects of the hand.

10. **Articulations of the Fore-arm and Hand.** The dissector may now return to an examination of the elbow joint and other articulations of the upper limb. In connexion with the elbow joint, he will first make a revision of the relations of the soft parts to the joint, such as those of the triceps, brachialis anticus and supinator brevis muscles, the muscles attached to the outer and inner condyles of the humerus, and the median, musculo-spiral and ulnar nerves, together with the anastomoses of the superior and inferior profunda and the anastomotic branches of the brachial with the two ulnar, the radial and the interosseous recurrent arteries. The dissector will then proceed to examine in detail the internal and external lateral ligaments, the anterior and the thin posterior ligaments, the orbicular ligament, the synovial membrane, and the cartilaginous surfaces of the bones. The dissector should carefully observe the different kinds of motion of which the parts are capable, and the variations in the tightness of the ligaments and in the relations of external parts induced by these motions. In examining the lower radio-ulnar articulation, the dissector will particularly study the relations of the triangular fibro-cartilage, and the nature of the movements in pronation and supination of the hand; and, in the carpal joints, the extent of the synovial cavities and the position of the cartilages and interosseous ligaments. In dissecting the metacarpo-digital and digital articulations, he will examine carefully their lateral ligaments and anterior fibrous plates, and the disposition of the retinacula of the tendons.

### III.—THORAX.

THE right and left sides of this region constitute each a part. Its dissection may be completed within three weeks. It includes the deep dissection of the thoracic parietes, the viscera of the thoracic cavity, together with the upper surface of the diaphragm. It is indispensable that the dissectors of opposite sides should be present together and act in concert.

1. **Parietes and Pleura.**—The dissection is to be commenced on the fifth day after the subject has been placed upon its back, that is, the tenth day after it has been first placed in the rooms. The external and internal intercostal muscles, and the intercostal arteries and nerves in the anterior part of their course, together with the parietal pleura, are to be first dissected. Then let the internal mammary artery on the right side be laid bare by the removal of the 2nd, 3rd, 4th, 5th, and 6th costal cartilages, in order that its relation to the sternum, and its anterior intercostal and perforating branches may be observed. Let the body of the sternum be separated from the manubrium and from the cartilages of the seventh pair of ribs, and let the cartilages of the six upper ribs of the left side be divided with the bone-nippers, and on the portion of the thoracic wall thus loosened let the triangularis sterni muscle and its relation to the internal mammary artery be examined. The dissectors will next examine the anterior mediastinum, observing in its upper part the remains (if any) of the thymus body, and in its lower part the pericardium in relation to the lungs and the walls of the thorax. That this may be done more effectually, the lungs should be inflated through a tube introduced into the throat or wind-pipe, and their different positions and relations in the inflated and collapsed state attentively examined. The ribs already mentioned are then to be divided on both sides as smoothly as possible about three inches beyond their angles; in doing which the dissectors must be careful to avoid injuring their hands upon the sharp spicula of the sawn extremities of the ribs. The reflections of the pleura are to be carefully studied: in making this



dissection the student may be required to separate the parietal from the pulmonary pleura, by breaking up with his fingers, or the handle of the knife, the inflammatory adhesions which are often met with. Great care must be taken to clean with a sponge and wash the interior of the chest and the surface of the lungs, first with water, and subsequently with preserving fluid.

2. **Parts External to the Pericardium.**—The phrenic nerve will be seen on each side beneath the pleura in front of the root of the lung, and is to be dissected out; when its relation to the internal mammary artery, which it crosses at the upper part of the chest, and the branch of the latter artery which accompanies it, are to be observed. The structures above the pericardium are then to be dissected. Foremost will be found the innominate veins and superior vena cava, with the termination of the vena azygos, and several smaller veins, viz., the inferior thyroid, internal mammary, superior intercostal, and bronchial veins; and behind the veins, the innominate, left carotid, and left subclavian arteries arising from the arch of the aorta. The pneumo-gastric nerves will also be found, that of the right side lying external to the innominate artery, and its recurrent branch turning round behind the subclavian artery; and that of the left side passing down in front of the arch of the aorta, with its recurrent branch winding behind the aorta. Likewise crossing the arch of the aorta, on their way to the superficial cardiac plexus, will be found the cervical cardiac branch of the left pneumo-gastric nerve, and, usually, the superior cardiac branch from the sympathetic nerve on the left side. The other cardiac nerves, viz., the cervical cardiac branch of the right pneumo-gastric nerve, the thoracic cardiac branches of both pneumo-gastric nerves, the three cardiac branches of the sympathetic chain of the right side, and the middle and inferior branches of the left side, are to be sought on the front and sides of the trachea, as they pass down to the deep cardiac plexus. The distribution of the pneumo-gastric nerves is then to be traced to the lungs and oesophagus; and, as far as possible, the posterior and anterior pulmonary plexuses are to be brought into view. After that has been done, the roots of the lungs are to be fully dissected, the relations of the pulmonary arteries and veins

and the bronchi observed, and the bronchial arteries traced to their origins.

3. **Interior of the Pericardium and Heart.**—The pericardium having been examined on its outer aspect, is then to be cut open, and its interior carefully inspected; after which it is to be removed, its remains being cleared away from the trunks of vessels entering and emerging from the heart. The arch of the aorta may now be fully studied, and the cord of the ductus arteriosus displayed passing between the commencement of the left pulmonary artery and the arch of the aorta. The students will then proceed to the dissection of the heart, examining first its external form, and afterwards dissecting the right and left coronary arteries and the coronary vein. They will then make an opening into the right auricle, by means of one incision from the point of entrance of the vena cava superior to near the entrance of the vena cava inferior, and another from the auricular appendage to the middle of the first incision. They will remove and wash out the blood from the right side of the heart, and will particularly observe in the auricle the arrangement of the muscoli pectinati, the annulus ovalis, the Eustachian valve guarding the vena cava inferior, the orifice of the coronary vein with the valve of Thebesius, and the foramina Thebesii. When the examination of the right auricle has been completed, the dissector will pass the forefinger of his left hand through the auriculo-ventricular orifice, and open the right ventricle by two incisions, one along the anterior border, close to the septum of the heart, prolonged upwards to the commencement of the pulmonary artery, and the other passing from the first, along the superior border of the ventricle, immediately below the auriculo-ventricular sulcus, care being taken not to injure the anterior segment of the tricuspid valve. The principal objects to be noted in this ventricle are the tricuspid valve with the chordae tendineae and muscoli papillares which act upon it, the other arrangements of columnae carnae, the infundibulum, and the semilunar valves of the pulmonary artery on their cardiac aspect. In exposing the latter, the incision into the ventricle should be carried into the pulmonary artery between two of the segments of the valve. To examine

the left side of the heart, let the inferior vena cava be dissected a little out of its aperture in the diaphragm, and let it be divided, and the heart thrown upwards. The left auricle is then to be opened by a transverse incision near its ventricular margin, and by two short incisions at right angles to the first; and after being carefully sponged out, its cavity and auricular appendage, the remains of the valve of the foramen ovale, and the entrance of the pulmonary veins on each side will be examined. The left ventricle is to be opened by a process similar to that employed for opening the right; and after it is carefully cleaned, the mitral valve and its relations to the aortic orifice, and the cardiac aspect of the semilunar valves which guard the latter are to be studied.

4. **Deep Cardiac Nerves, Bronchi, &c.**—The aorta is to be divided within an inch above its origin, and the first part of the vessel is to be opened to examine the semilunar valves and the sinuses of Valsalva. At this stage of the dissection a fuller examination may be made of the cardiac nerves as they enter the superficial and deep cardiac plexus: the cardiac ganglion will also be found, and the coronary plexus traced a short way along the coronary vessels. The dissectors may then divide the trachea an inch or two above its bifurcation, remove the heart and lungs, and examine more in detail the disposition and structure of these organs.

5. **Parts in the Posterior Mediastinum, &c.**—Returning to the thoracic cavity, the dissectors will examine the oesophagus, the descending aorta with its intercostal branches, the main vena azygos and its left branch, and, lying between the vena azygos and aorta, the thoracic duct. The thoracic duct may be followed, with the concurrence of the dissectors of the head and neck, to its termination in the angle of junction of the left internal jugular and subclavian veins; and, with the assistance of the dissectors of the abdomen, it may be also followed down to its commencement under the right crus of the diaphragm. The sympathetic nerve with its chain of ganglia, is now to be traced over the heads of the ribs and the vertebral column: its communications with the intercostal nerves are to be made out, and the splanchnic nerves arising from it dissected.

The upper surface of the diaphragm having been cleaned with the knife, the dissectors of the thorax will examine along with those of the abdomen the anatomy of this muscle, directing their attention to its various muscular and tendinous parts, and to the apertures for the passage of the aorta, gullet, and vena cava inferior, and observing the distribution of nerves and bloodvessels in its substance.

6. **Articulations.**—When the dissection of the rest of the thorax has been completed, the dissectors will, if the subject be favourable, make an examination of the articulations of the vertebral column and ribs. Let them study, in particular, the anterior and posterior common ligaments, the intervertebral substance, the ligamenta subflava of the arches, the form and movements of the articular processes, and the various costo-vertebral, costo-transverse and other ligaments. In doing this, the dissectors should make an attentive examination of the nature and extent of the movements of the different ribs, and the manner in which they are influenced by the movements of the vertebral column.

#### IV.—ABDOMEN AND PELVIS.

THE right and left sides of these regions constitute each a part. Their dissection should not be completed in less than four or five weeks. It comprehends the examination of the perinæum and genital organs, the abdominal parietes over the whole of the external oblique muscles, extending in front to the linea alba and below to Poupart's ligament, the viscera and deeper parts of the abdomen and pelvis, and the lower surface of the diaphragm.

1. **Perinæum.**—If the subject be a male, the first day on which it is in the rooms will be set apart for the dissection of the perinæum ; and of this opportunity the dissectors of the abdomen must avail themselves. A lithotomy staff having been passed into the bladder, and the hand and foot of each side having been tied together, the subject is to be placed in the same position as for the operation of lithotomy, near the edge of the table. A block is then to be placed below the pelvis, and the penis and scrotum are to be tied up to the handle of the staff. The proper position of the body, however, for this dissection may be more conveniently maintained by means of an apparatus constructed for the purpose. A careful incision is to be made in the middle line from the back of the scrotum to the anus, and, being carried round the margin of the anus, is to be prolonged as far as the coccyx ; while a transverse incision is to be directed across the middle line in front of the anus from one ischial tuberosity to the other. Let the dissector reflect the flaps of skin, exposing the external sphincter, and clear out the fat completely from the ischio-rectal fossa of the left side, taking care not to injure the reflection of fascia which bounds it in front in a line with the central point of the perinæum ; and let him study the walls of the fossa. On the right side, enough of fat ought to be left in the ischio-rectal fossa to protect the levator ani and obturator fascia ; the inferior hæmorrhoidal vessels and nerve may be dissected towards the border of the sphincter, and the hæmorrhoidal branch of the 4th sacral nerve may be seen emerging from

between the levator ani and coccygeus muscles. The two layers of the superficial fascia in the part of the perinæum anterior to the anus are to be distinguished; the most superficial corresponding to what may most correctly be termed the subcutaneous adipose tissue, and being continued over the ischio-rectal fossa, while the deeper layer terminates behind by dipping deeply in front of that fossa. The most superficial layer having been removed, the blow-pipe may be introduced beneath the deep layer in the anterior half of the perinæum, so that by inflating the connective tissue underneath it, its external limits, its septum in the middle line, and its continuity forwards may be demonstrated. It may then be slit open, and will be found to be attached to the arch of the pubes externally, to be continuous with the dartos in front, and to be reflected backwards to the triangular ligament behind. Underneath it will be found the three long scrotal nerves, viz., the two superficial perineal branches of the pudic and the inferior pudendal branch of the small sciatic nerves, which are to be traced backwards: also the superficial and transverse perineal arteries are to be dissected out. The muscles on which these structures lie are then to be cleaned, viz., the accelerator urinae embracing the urethra, the erector penis lying upon the crus penis, and the transversalis perinæi. In the area between these muscles, subjacent to them, will be observed the triangular ligament or anterior layer of the subpubic fascia; and its relations, especially to the urethra, are to be studied. It is then to be divided near the bone, and on its deep aspect the deep transversalis muscle, the constrictor urethrae, and the artery of the bulb are to be dissected. The deep transversalis muscle is to be divided, and Cowper's glands are to be sought for beneath it. On the left side are to be traced out the pudic artery and nerve; in doing which the branches of the artery to the bulb and the corpus cavernosum should be observed. Lastly, a good view of the inferior aspect of the prostate gland may be obtained by dividing the sphincter ani from the accelerator urinae muscles at the central point of the perinæum. In the dissection of the perinæum constant reference should be made to the bearing of its anatomy on the operations of lithotomy. At

this period the dissectors may remove one of the testicles for the sake of dissecting it while fresh.

2. **Abdominal Wall Anteriorly.**—The dissection of the abdominal parietes, in either sex, is to be commenced on the day on which the subject is laid on its back, with a careful examination of the fascia of the inguinal region, on each side, as far as Poupart's ligament. This should, if possible, be undertaken in association with the dissector of the lower limb. An incision is to be made in the middle line from the xiphoid cartilage to the pubes, avoiding the umbilicus, and a transverse one meeting the first, inwards from the anterior superior spine of the ilium. Let the dissector raise the lower of the two flaps of skin thus marked out, remove the subcutaneous layer of fat and fascia, and reflect the deeper layer, usually called superficial fascia, in the same direction as the skin, so as to see the manner in which it is bound down in the line of Poupart's ligament. Let him at the same time observe the superficial epigastric and circumflex iliac arteries and veins, and the continuation of the superficial fascia over the region of the spermatic cord towards the scrotum in the male, or to the labia in the female. He will also examine the external abdominal ring, its pillars, the intercolumnar fascia, and the emergence of the spermatic cord in the male, or the round ligament of the uterus in the female; and he will notice the terminal branches of the ilio-inguinal and ilio-hypogastric nerves.

The integument is next to be removed from the upper part of the abdomen, and along with it the subcutaneous fat; only a sufficient thickness of superficial fascia being at first left to preserve the cutaneous nerves. These will be found in two ranges, the one situated near the middle line, and consisting of the anterior branches of the lower intercostal nerves, the other range emerging laterally, and consisting of the lateral cutaneous branches of the same nerves. Let the external oblique muscle then be fully dissected, its posterior border being brought, if possible, at the same time into view. The aponeurosis of the external oblique muscle is next to be divided by an incision carried transversely inwards from the anterior superior spine of the ilium, the inferior part of the aponeurosis being left for future

examination; and the dissector will proceed to separate successively the attachments of the muscle to the crest of the ilium and each of the eight lower ribs, and will reflect the muscle towards the middle line as far as it admits of it. The internal oblique muscle, having next been examined, is to be reflected in the same way, and the transversalis muscle exposed and examined.

The deeper parts involved in the descent of inguinal hernia are now to be studied. For this end, the remaining part of the aponeurosis of the external oblique muscle is to be divided along its inner attachment, down to the symphysis pubis; the lower border of the internal oblique muscle is to be examined, and, in the male, the cremasteric muscular fibres which are continuous with it are to be followed down to the testicle. The lower parts of the internal oblique and transversalis muscle are to be successively detached from Poupart's ligament and turned inwards, and their conjoined tendon is to be made evident. The fascia transversalis, with the internal abdominal ring, is now brought into view, and the subperitoneal fat may be seen shining through it. The student will observe particularly the structures which lie in contact with the spermatic cord in its course from the internal to the external abdominal ring, and which are described as forming the walls of the inguinal canal. He will also raise the fascia transversalis, and note the infundibuliform fascia and the circumflex iliac and epigastric arteries; and will acquaint himself with the relations of the latter to the direct and oblique varieties of inguinal hernia, and with the coverings which these herniæ receive in their descent.

Poupart's and Gimbernat's ligaments may now be examined from the deep aspect, and, by separating the subperitoneal fat from the junction line of the fascia transversalis and fascia iliaca, the student will obtain a view of the deep crural arch, the crural ring, and the septum crurale:—structures which are to be noted in relation to femoral hernia. He will then open the sheath of the rectus muscle; dissect it and the pyramidalis muscle; follow the epigastric artery in the substance of the rectus muscle from below, and the abdominal branch of the internal mammary artery from above; and will, at the same time, examine the deficiency in



the lower part of the posterior wall of the sheath of the rectus muscle, and the semilunar fold of Douglas.

3. **Male Genital Organs.**—If the subject be a male, the penis ought at this time to be dissected. On removal of the skin, the dorsal arteries, vein, and nerves, together with the suspensory ligament will be brought into view. The corpora cavernosa, corpus spongiosum, and glans are then to be dissected; and the glans may, with care, be separated from the corpora cavernosa. The pendulous portion of the penis is to be cut across, the section examined, and the urethra slit open.

The testicles and spermatic cord will next be dissected. The fascia cremasterica is to be laid open, and the cremasteric branch of the epigastric artery and genital branch of the genito-crural nerve found. The fascia propria is to be removed, and the elements of the cord examined, viz., the vas deferens and the spermatic artery, veins, and nerves. The testicle may then be removed, the tunica vaginalis opened, the organ of Giraldès sought for, and the appearance and relations of the epididymis and vas deferens noticed. The caput epididymis, in front of which will be seen the hydatid of Morgagni, is to be raised from the tunica albuginea, and the epididymis and coni vasculosi are to be dissected out. The tunica albuginea must then be divided, and the arrangement of the tubuli seminiferi in the lobules made apparent under water, and the mediastinum exhibited.

4. **Abdominal Cavity: Peritoneum; position of the Viscera: Intestinal Canal.**—The cavity of the abdomen is to be opened by a vertical and a transverse incision crossing one another on the left side of the umbilicus; but the vertical incision is, in the first instance, to be arrested at the umbilicus, in order that the urachus and the fossæ into which the peritoneum is thrown by the obliterated hypogastric arteries may be examined.

The peritoneal cavity, especially the pelvic part, is to be carefully sponged out and all grumous fluid removed from it; and a piece of cotton soaked with spirit is to be laid in the recto-vesical fossa: on the adoption of these precautions the practicability and comfort of the later parts of the dissection materially depend. The general arrangement of the viscera is first to be examined,

including the position and relations of the stomach, spleen, liver, duodenum, jejunum, ileum, cœcum and other parts of the colon, the rectum, and the kidneys. The folds of the peritoneum are next to be studied. This membrane should be followed transversely and vertically throughout the abdominal cavity, and the line of attachment of the mesentery to the posterior wall of the abdomen should be displayed. The disposition of the foramen of Winslow and the great omentum should then be investigated, and, in order that the interior of the sac of the great omentum may be seen, a transverse cut should be made into it between the stomach and transverse colon, by which the posterior surface of the stomach and the anterior surface of the pancreas will also be brought into view. When the disposition of the great omentum has been observed, the small or gastro-hepatic omentum, the gastro-splenic omentum, the meso-colon, and the relations of the duodenum to the peritoneum will be easily followed.

After the study of the peritoneum has been completed, the transverse colon is to be lifted upwards, and the small intestines turned over to the left side, so as to display the whole of the upper or right side of the mesentery; and the superior mesenteric artery, from the lower border of the pancreas downwards, with the accompanying vein and part of the plexus of nerves, is then to be carefully dissected.

From its right side the artery will be seen to give off the middle colic, right colic, and ileo-colic branches, and from its left side about a dozen branches to the small intestines; and of these intestinal branches the dissector may trace the primary, secondary and tertiary arches of anastomosis. If the left branch of bifurcation of the middle colic artery be followed, it will lead the dissector to the left colic, and through it to the trunk of the inferior mesenteric artery, with its accompanying vein and nerves, situated to the left of the mesentery; and to study these the intestines must now be turned over to the right side. In addition to the left colic, the sigmoid branch of the inferior mesenteric artery will then also be seen, and the first part of the superior hæmorrhoidal vessels before they descend into the pelvis upon the mesorectum.

The dissector will now tie the intestine, a little below the termination of the duodenum, with two ligatures about an inch and a half distant, and will divide it between the ligatures; in like manner he will secure and divide the great intestine at the lower extremity of the sigmoid flexure: he will then remove from the body the whole length of intestine between the upper and lower ligatures. To do this properly, he must begin from above, and pulling the ligatured extremity upwards with his left hand, with his right apply the scalpel lightly to the edge of the mesentery, close to the bowel. By this means the whole small intestines may with ease be removed, and the mesentery left in the abdomen. The large intestine may now also be removed as far as the rectum. The intestines are to be taken to the trough, and there they are to be thoroughly cleaned, by having water run through them from the jejunal end. They may then be spread out on a table and inflated, in order that the relative length and diameter of the different parts may be observed, the arrangement of muscular bands on the colon, and other facts as to their structure. The small intestine is to be separated from the great, several inches above the cœcum. A portion near the upper end may be cut separate, inflated and dried, in order to show the valvulae conniventes which are thus put upon the stretch. The remainder is to be slit open in its whole extent, which may be best done with a pair of scissors, one of the points of which has been blunted with a little sealing-wax; the appearance of the mucous membrane in the different parts is then to be studied, attention being particularly directed to the distribution of the villi and valvulae conniventes, and to the patches of Peyer's glands. The great intestine is next to be divided some inches beyond the cœcal valve, and the remainder is to be slit up and its mucous membrane examined. Lastly, the cœcum is to be very carefully washed, and the structure and action of the cœcal valve studied, by filling the portion of colon with water. The water will be retained although the portion of ileum be left untied, and the position of the valve when closed may thus be seen. The cœcum may then be slit open on the side opposite the valve, and the vermiform appendage may also be opened to observe its glandular structure.

### 5. Stomach and Duodenum; Pancreas, Spleen and Liver.

—The duodenum and stomach are to be slightly inflated, and the arteries arising from the cœliac axis are to be dissected. The student may begin by dissecting the splenic artery, following its course to the spleen, and observing its branches to the pancreas, to the stomach, the vasa brevia, and the left gastro-epiploic artery. Let him next trace the coronary artery of the stomach along the small curvature of that organ. Then, in following out the hepatic artery to its division into right and left branches, he will find the pyloric branch anastomosing with the coronary artery; the cystic branch going to the gall bladder; and the gastro-duodenal branch dividing into the right gastro-epiploic which anastomoses with the left gastro-epiploic, and the superior pancreatico-duodenal which anastomoses with the inferior pancreatico-duodenal branch of the superior mesenteric artery.

The inferior mesenteric vein will be traced upwards behind the pancreas to join the splenic vein, which, passing transversely onwards to meet the superior mesenteric vein, will be seen to form with it the trunk of the vena portae. The position of the common bile duct with reference to the hepatic artery and portal vein is to be observed, and the duct is to be traced up into the hepatic and cystic ducts and downwards to the duodenum. The relations and structure of the pancreas are then to be examined, and the pancreatic duct is to be traced along its posterior aspect to its termination in the duodenum along with the common bile duct. The spleen may now be removed, its blood vessels dissected, a section made of it, and some of the pulp may be washed away to show the trabecular structure in the interior of the organ. The stomach may now be removed along with the duodenum, and a careful examination made of the structure of these organs; the shape of the stomach, its three layers of muscular fibres, and the construction of the pyloric valve being specially noted.

The liver is next to be studied. Its ligaments, viz., the falciform ligament, the round ligament or obliterated umbilical vein, the coronary, and the two lateral or triangular ligaments are first to be examined; after which the organ may be removed from the body. In doing this the inferior vena cava must be divided both

above and below the liver. The dissectors may now observe the division of the liver into a right and left lobe, as also the quadrate, Spigelian, and caudate lobes: they will likewise note the various fissures viz., the transverse or portal; the longitudinal or antero-posterior, divided into an anterior part containing the remains of the umbilical vein, and a posterior part in which the remains of the ductus venosus are situated; the fissure or fossa of the gall bladder, and the fissure or fossa of the vena cava. He will observe the openings of the hepatic veins into the part of the vena cava imbedded in the posterior border of the liver, and follow the divisions of the hepatic arteries, portal vein and hepatic ducts, as far as possible into the substance of the liver. In doing this the capsule of Glisson sheathing these parts is to be observed: the appearance of the substance of the liver may then be exhibited by minuter dissection; and the gall bladder having been opened and washed, the structure of its coats and the peculiar reticulated arrangement of its mucous membrane may be examined.

6. **Deep Posterior part of the Abdominal Cavity.**—On returning to the examination of the parts remaining in the abdomen, the dissectors will begin by tracing out the plexuses of the sympathetic nerves. The superior and inferior mesenteric plexuses, in connexion with the aortic plexus, are to be traced upwards into the solar plexus, and the nerves proceeding from the aortic plexus downwards into the hypogastric plexus. The solar plexus will be found surrounding the aorta at the root of the cœlic axis; also, its semilunar ganglia, and the splanchnic nerves passing through the crura of the diaphragm to terminate in them. The dissectors will now follow the plexiform nerves which emanate from the solar plexus and surround the arteries in the neighbourhood—viz., the cœliac plexus subdividing into hepatic, splenic and coronary; also, the suprarenal and renal, and the spermatic plexuses. In doing this the suprarenal capsules will fall under observation: and after they have been carefully cleaned, these bodies may be examined by incisions into their substance.

The aorta and inferior vena cava are then to be dissected, and also the common and external iliac arteries and veins, together with the kidneys and ureters. The branches of the aorta to be

examined are the inferior phrenic, the cœliac axis, the superior mesenteric, the suprarenal, the renal, the spermatic, the inferior mesenteric, the origins of the four pairs of lumbar arteries, and, continuing the direction of the aorta from its point of bifurcation, the middle sacral artery. The two common iliac arteries and veins must also, at this time, be cleaned, and the dissection may be carried down along the external iliac vessels, as far as the origin of the epigastric and circumflex iliac arteries; in doing which the relations of the iliac arteries and veins will be carefully observed. The position and relations of the kidneys are now to be examined, and more particularly the position of the renal artery, renal vein, and ureter as they enter the gland. The kidneys having been removed from the body, are to be opened by a transverse vertical section, to exhibit the pelvis, calices and pyramids, the cortical and internal tubular substances, and the Malpighian glomeruli: the fibrous tunic which invests the kidney is also to be observed. The receptaculum chyli or commencement of the thoracic duct is to be found beneath the right crus of the diaphragm, as also the commencement of the vena azygos in connexion with some of the lumbar veins.

7. **Upper and Posterior Wall of the Abdomen.**—The diaphragm is now to be dissected. Anteriorly will be found its attachments to the six lower ribs interdigitating with those of the transversalis muscle; posteriorly will be found the two crura and the ligamenta arcuata externa and interna; while the fibres passing from all those parts will be traced to their connexion with the central tendon; and the openings for the aorta, oesophagus, and vena cava inferior will be examined. The surface of the psoas magnus muscle is next to be cleaned, as well as that of the psoas parvus lying superficial to it (if it be present); and, emerging from the fibres of the psoas magnus, the genito-crural nerve will be found and followed downwards. The other nerves of the lumbar plexus will be found principally on the outer and inner aspects of the psoas muscles. The fibres of these muscles are to be dissected away from the nerves of the lumbar plexus. In addition to the communicating branches of the plexus, there will be observed, proceeding from the anterior

division of the first lumbar nerve, the ilio-hypogastric and ilio-inguinal nerves, often united into one; from the second lumbar nerve the external cutaneous and genito-crural nerves; from the second, third, and fourth lumbar nerves together, the anterior crural and the obturator nerves; and, lastly, the lumbo-sacral cord, formed by the union of a part of the fourth with the whole of the fifth nerve. On the bodies of the vertebrae will be found the lumbar part of the chain of sympathetic ganglia; the branches of communication between which and the spinal nerves are to be dissected.

At this time the dissectors ought to revert to the arrangement of the posterior part of the transversalis muscle. This they will find to be continued into an aponeurosis which is connected internally with three layers; of these the most posterior is the fascia lumborum observed in the dissection of the back, the second lies in front of the erector spinæ muscle, and the foremost is a much thinner membrane placed in front of the quadratus lumborum muscles. The quadratus lumborum and iliacus muscles are now to be dissected. On removing the iliacus from the iliac fossa, the distribution of the ilio-lumbar artery will be traced, and its anastomoses with the last lumbar and the circumflex iliac artery exhibited.

**8. Dissection of the Pelvis.**—The pelvis with several of the lumbar vertebrae ought now to be separated from the rest of the trunk, and before proceeding further, the dissector should carefully remove the superfluous masses of muscle and other soft parts which may have been left adherent to the outer surface of the bones.

**Female Genital Organs.**—If the subject is a female, the perinæum is first to be dissected. The exact position of the orifice of the urethra is to be examined with reference to the passing of a catheter. The fat is to be removed from between the ischium and rectum; and as this is being done the inferior hæmorrhoidal and superficial perineal vessels and nerve will be brought into view. The sphincter muscles of the rectum and vagina, the levator ani and transversalis muscles, and the obturator fascia will be seen. From among the fat on the fore part are to be dissected out the crura of the clitoris and the erector muscles

embracing them; and on the side of the vulva the bulbus vestibuli. The glands of Bartholin are to be sought at the back part of the lower end of the vagina, and the duct of each followed to its orifice by the side of the hymen or carunculæ myrtiformes. Internal to the crus clitoridis the triangular ligament or subpubic fascia will be found extending from the pubic arch to the vagina.

Let the bladder now be partially inflated, and let the reflections of the peritoneum in the pelvic cavity be examined, especially the posterior, lateral, and anterior false ligaments of the bladder, and in the female the broad ligament of the uterus, with the ovary, Fallopian tube and round ligament. Let the peritoneum then be reflected from the walls of the pelvis so as to exhibit the lateral and anterior true ligaments of the bladder, and the whole internal aspect of the pelvic fasciæ. In order to have a complete view of these fasciæ, it will be necessary to remove a portion of the os innominatum of one side. This must be done in such a manner as not to interfere with the attachments of the fasciæ: while, therefore, the anterior and lower part of the bone with the acetabulum is to be removed, the brim of the pelvis and the boundary of its outlet are to be preserved, as well as the sacro-sciatic foramina. With a little care and preliminary observation of the form of the innominate bone in the skeleton, this may be done by means of a single section with the saw, carried close by the brim of the pelvis, and downwards in such a direction as to remove the greater part of the thickness of the ischial tuberosity and pass as near as possible to the sacro-sciatic notches, without breaking into them. Should the hip joint connected with the piece of bone thus removed not have been dissected along with the leg, to which it properly belongs, the dissectors of the abdomen may now have an opportunity of examining it: in doing so they will especially observe the action of the ligamentum teres, by removing the deep part of the acetabulum, while the capsule of the joint is left intact.

Returning to the pelvis, the opening in its lateral wall is to be enlarged if necessary with the bone-nippers, and the obturator internus muscle is to be carefully removed, and the peculiar arrangement of its tendon remarked. On the inner aspect of that



muscle will be found superiorly the undivided pelvic fascia, inferiorly the obturator fascia, and between the two the white band stretching from the symphysis pubis to the spine of the ischium, which marks the level at which the pelvic fascia splits into the recto-vesical and obturator fasciæ; while in the upper part of the obturator foramen the obturator vessels and nerve will be seen issuing from the interior. If the ischio-rectal fossa be now thoroughly cleaned, a complete view of the layers of fascia will be obtained, and of their relation to the levator ani muscle. The brim of the pelvis is next to be sawn through near the symphysis pubis, on the side on which the dissection has been made, and is to be removed as far back as the sacro-iliac articulation. By this means, if the subject be a male, the relations of the fascia to the prostate gland will be better seen. The ureters and the vasa deferentia are to be followed as far as the bladder; the sympathetic nerves of the hypogastric plexus are to be traced in their distribution to the pelvic viscera; and the branches of the internal iliac vessels are to be dissected. The internal iliac artery will be found to give off the following vessels, viz.: to the walls and external parts, the gluteal, ilio-lumbar, and lateral sacral arteries, constituting the branches of its posterior division; the obturator, internal pudic, and sciatic arteries in connexion with its anterior division: and to the viscera, the superior vesical with the obliterated hypogastric artery, the inferior vesical giving the middle hæmorrhoidal, and, in the female, the uterine and vaginal arteries. The first group may perhaps be best seen on the entire side, and the second and third group on the dissected side of the pelvis. On the former side the sacral nerves are to be displayed, and the origin of the pyriformis muscle examined. The junction of the lumbo-sacral cord with the anterior divisions of the three first sacral nerves and a branch of the fourth, to form the sacral plexus, will now be brought into view. The gluteal nerve will be found proceeding from the lumbo-sacral cord; and arising from the sacral plexus will be found the great and small sciatic nerves, the pudic nerve, the nerve to the obturator internus muscle, and other muscular branches. The remaining branches of the fourth sacral nerve will be found to aid the hypogastric plexus in the

supply of nerves to the viscera ; at the same time the small fifth sacral and coccygeal nerves may also be dissected. The coccygeus and levator ani muscles are to be cleaned on their upper aspects, when they will be seen to form a continuous muscular floor to the pelvic cavity. The chains of sympathetic ganglia are then to be dissected in front of the sacrum, and, if possible, the lowest parts traced to their junction in front of the coccyx.

9. **Pelvic Viscera.**—It may be proper to examine the muscular walls of the bladder in the inflated condition of the organ, before its removal from the pelvis : after which the viscera are to be separated from their attachments to the walls of the pelvis, and removed in one mass.

The rectum may then be carefully dissected away from the rest of the viscera, the extent of its connexion with them being at the same time observed. Its muscular coats having been sufficiently examined, it is to be slit open and washed, in order that the general appearance and folds of its mucous membrane may be seen. In the male subject the prostate gland enveloped in its fibrous covering, the vesiculæ seminales, and the vasa deferentia are to be carefully dissected ; the bladder is to be opened from before, the neck being left in the first instance entire ; and the openings of the ureters and urethra, with the trigone between them, are to be examined. The prostatic, membranous and bulbous parts of the urethra are then to be slit open from above, the varying diameter of the urethra observed, as also in its prostatic part, the verumontanum or caput gallinaginis, the sinus pocularis, and the orifices of the common ejaculatory ducts. The junction of the vast deferens and vesicula seminalis to form the common ejaculatory duct is to be displayed ; and a longitudinal section of the prostate gland may be made to show its thickness, consistence, and structure : the relations of its base to the neck of the bladder should be particularly observed, with the circle of veins of the vesical plexus in the angle between them.

In the female subject the bladder is to be opened and examined as in the male, and the length and diameter of the urethra observed. The vagina is then to be cut open a little on one side of the middle line in front, when the rugæ of its mucous membrane

will be seen; also, at its entrance, the carunculæ myrtiformes, and, projecting into it above, the cervix uteri. The ovary with its ligament and mesovarium, the Fallopian tube, the round ligament of the uterus, and, between the ovary and Fallopian tube, the tubules termed parovarium or organ of Rosenmüller are next to be dissected, and the external configuration of the uterus examined. The student will then notice the position and appearance of the os uteri externum, and will open the uterus on its anterior aspect by a cut which, by dividing into two superiorly, is prolonged to both of the cornua. He will thus see the size and shape of the triangular cavity of the uterus, the cavity of the cervix, the rugæ of its mucous membrane, and the os uteri internum.

10. **The Pelvic Ligaments.**—At the conclusion, the articulations of the pelvic bones may be examined, if they are still in a condition fit for dissection. The symphysis pubis with its concentric laminae of fibro-cartilage is first to be examined; then the articulation of the pelvis with the fifth lumbar vertebra, especially the sacro-vertebral and ilio-lumbar ligaments; the great and small sacro-sciatic ligaments should be cleaned, and, by removing the remains of the origin of the obturator internus muscle, the obturator membrane.

The anterior and posterior ligaments and the intervertebral disc of the sacro-coccygean articulation are to be observed: lastly, the strong posterior and the thinner anterior sacro-iliac ligaments having been dissected, the last mentioned is to be divided, and the cartilaginous surfaces of the sacro-iliac synchondrosis are to be brought into view by forcing open the articulation.

## V.—LOWER LIMBS OR INFERIOR EXTREMITIES.

THE right and left limbs constitute each a part, the dissection of which should extend over a period of not less than four weeks. It includes the whole limb below Poupart's ligament and the crest of the ilium, but not the perinæum.

1. **The Gluteal Region.**—The dissection of the gluteal region, the back of the thigh, and the popliteal space is to be completed in the four days during which the subject lies on its face. To remove the integument from the buttock let an incision be carried along the crest of the ilium, brought downwards in the middle line of the sacrum and curved outwards in the fold of the nates, then directed obliquely to the outside of the thigh about five or six inches below the great trochanter. The junior student will at once proceed to clean the gluteus maximus muscle in the direction of its fibres. The senior student will examine the arrangement of the cutaneous nerves in this region. Of these he will find, descending over the crest of the ilium, in order from before backwards, the lateral branches of the last dorsal and ilio-hypogastric nerves, with several branches of the lumbar nerves; and, piercing the gluteus maximus muscle near its posterior attachment, some small cutaneous twigs from the posterior divisions of the upper sacral nerves; lastly, turning round its inferior border, branches from the small sciatic nerve. It will be observed that the fascia lata, which is strongly developed over that part of the gluteus medius which lies in front of the gluteus maximus muscle, on reaching the upper border of the gluteus maximus, divides into two laminae, of which one is continued on the superficial, and the other on the deep aspect of that muscle. Care is to be taken to lay bare the inferior border of the gluteus maximus in its whole extent; and a synovial bursa over the tuberosity of the ischium is to be sought for. The muscle is then to be divided close to its iliac and sacral attachment, and in turning it forward, the sciatic artery and the superficial branch of the gluteal artery will come into view. The branches of these arteries and of the

small sciatic nerve which enter the muscle are to be followed out to some extent, and they may then be divided to permit the complete reflection of the muscle. While this is being done a large synovial bursa will be found between the trochanter major and the insertion of the gluteus maximus into the fascia lata.

The fascia lata is to be removed from the upper part of the gluteus medius muscle, and the parts exposed by the removal of the gluteus maximus are to be cleaned in their order from above downwards, viz.: the back part of the gluteus medius muscle, the gluteal vessels, the pyriformis muscle, the sciatic vessels and the great and small sciatic nerves, the gemelli muscles, superior and inferior, with the tendon of the obturator internus muscle between them. The tendon of this muscle may now be dissected from between the gemelli, divided and turned back, to show the synovial cavity in which it plays upon the smooth trochlear surface of the ischium. The quadratus femoris, the tendon of the obturator externus muscle situated more deeply, the upper part of the adductor magnus muscle, and the origin of the hamstring muscles are then to be exposed. From the small sciatic nerve the inferior pudendal branches will be seen given off, in addition to those already mentioned, and from the sciatic artery, besides muscular branches, the coccygeal branch, the branch to the great sciatic nerve, and that by which it anastomoses with the internal circumflex artery may be traced. On the spine of the ischium also will be seen the pudic vessels and nerve, and the nerve to the obturator internus muscle, and descending under cover of the tendon of the obturator internus and the gemelli is the small nerve to the quadratus femoris.

The gluteus maximus muscle having been entirely removed from its upper attachment, and the tendon of insertion being left, the gluteus medius is to be raised from the ilium in three-fourths of its extent; its anterior border and that of the gluteus minimus muscle being left for dissection from the front. The attachments of the gluteus medius muscle are to be observed, as also the superior and inferior deep branches of the gluteal artery, and the distribution of the gluteal nerve. The posterior part of the gluteus minimus may then be raised from the ilium to show the extent of

its attachment to that bone, and its relation to the capsule of the hip joint.

2. **The Popliteal Space.**—It is advisable to dissect this space before the posterior femoral region. In order to open it the integument may be divided by a longitudinal incision of considerable length, which may be crossed if necessary by a transverse one in the middle of the space, sufficient to allow the integument to be thrown freely back. On removal of the superficial fat, the fascia lata which is strong in this region will come into view, and, in the lower part of the space, the terminal twigs of the small sciatic nerve, and the upper part of the short saphenous vein. The fascia lata is to be divided, and the fat carefully removed from the space, its boundaries cleaned, and the vessels and nerves with their branches traced. Superiorly the biceps muscle on the outside, and the semitendinosus and semimembranosus muscles on the inside, and inferiorly the heads of the gastrocnemius muscle with the small belly of the plantaris will thus be exposed.

Lying in the space the dissector will find the external and internal popliteal nerves giving off their communicating, articular, and sural branches, and more deeply the popliteal vessels in a common sheath. He will follow out the branches of the popliteal artery, viz., its five articular branches, the superior, azygos and inferior, and its sural branches. On the surface of the popliteal artery, where it enters the space, may be found a twig of the obturator nerve.

**Posterior Femoral Region.**—When the dissection of the popliteal space has been completed, it is to be united to that of the gluteal region by an incision along the posterior part of the thigh. The course of the small and great sciatic nerves will thus be laid bare, together with the biceps, semitendinosus and semimembranosus muscles, the twigs of the great sciatic nerve supplied to these muscles and to the adductor magnus, and the four perforating branches of the deep femoral artery; the whole of the flexor muscles and the posterior aspect of the adductor magnus muscle will also be exposed.

3. **The front of the Thigh.**—On the day on which the subject is laid upon its back, the student should begin the dissection of the front of the thigh, by studying the fasciæ and other parts con-

nected with the descent of femoral hernia. For this purpose an incision is to be made from the neighbourhood of the anterior superior spinous process of the ilium inwards, in the line of the groin, and carried half way down the inside of the thigh. The large flap of integument thus marked out is to be raised and turned outwards. The subcutaneous fascia is then to be laid bare by the removal of fat, and it will be advantageous if this can be done in concert with the dissector of the abdomen. Various small superficial arteries and veins will be seen, viz.: the superficial epigastric, superficial circumflex iliac, and superior and inferior superficial pudic. The fascia lata will be laid bare, and the cribriform fascia overlying the saphenous opening. On the surface of the fascia lata will be brought into view the internal or long saphenous vein passing into the saphenous opening, frequently presenting two branches; nearly in front of the femoral artery, the crural branch of the genito-crural nerve; and internal to the anterior superior spine of the ilium, the external cutaneous nerve. A twig of the ilio-inguinal nerve may also be seen distributed to the skin of a small part of the thigh close to the pubis. The border of the saphenous opening is to be made distinct by removing the cribriform fascia, and in doing this the superior cornu or falciform process is to be shown with its attachment to the pubic portion of the fascia lata. This falciform process is then to be separated from the fascia lata and turned to the outside sufficiently to expose the infundibuliform or crural sheath, investing the femoral vessels, and the dissector may examine the three compartments into which this sheath is divided, and which contain respectively the artery, the vein, and a lymphatic gland; the latter blocking up the crural aperture between the femoral vein and Gimbernat's ligament, through which femoral hernia descends. All the relations of these parts are to be carefully studied with special reference to the operations for strangulated femoral hernia.

The incision on the inner side of the thigh is now to be prolonged downwards towards the middle line beyond the knee, and the dissection of the front of the thigh continued. The two middle and the two internal cutaneous branches of the anterior crural nerve, together with the branch from the internal saphenous

nerve to the integument of the knee, and the internal saphenous vein, will be dissected out, and the fascia lata in front of the thigh made clean. The fascia is then to be removed, and the communications of the internal cutaneous, internal saphenous, and obturator nerves sought in the lower part of the inner aspect of the thigh. Scarpa's triangle is now to be cleaned, and the dissection of the femoral vessels both in that space and in the after part of their course is to be studied. Towards its termination below the middle of the thigh, the femoral artery will be observed to be covered by a tendinous expansion, which conceals it for a part of its course before it pierces the tendon of the adductor magnus muscle: in the passage so formed, known as Hunter's canal, the femoral artery is accompanied by the femoral vein and the saphenous nerve, and will be seen to give off the anastomotic branch.

The profunda or deep femoral artery should be dissected as far as the upper border of the adductor longus muscle; and the origins of its first branches are to be brought into view, viz.: the internal circumflex artery, and the external circumflex artery, dividing into ascending, transverse, and descending branches. One or both of the circumflex arteries often arise from the femoral artery immediately above the origin of the deep femoral. The sartorius muscle is to be cleaned, and likewise the gracilis muscle, and the adductors; the relations of the inferior tendons of the sartorius, gracilis and semitendinous muscles may also be exposed. The student will then direct his attention to the outer part of the thigh near the hip. He will there dissect the fascia lata from the remaining part of the gluteus medius muscle, and from the tensor vaginae femoris muscle, leaving at first a strip of fascia extending down to the knee on the outside of the leg, and he will afterwards expose the deeper band of the fascia which passes inwards to the hip joint from within the upper part of the muscle. He will also find the branch of the gluteal nerve to the tensor vaginae femoris by dissecting between it and the gluteus medius muscle. Let him divide successively the tensor vaginae femoris and the remains of the gluteus medius and minimus, and dissect the two last muscles down to their inferior attachments, so



as to exhibit the bursae between them and the trochanter major, and the connection of the gluteus minimus with the capsule of the hip joint. While engaged with this proceeding he will be enabled to dissect more particularly the ascending and transverse branches of the external circumflex artery, and to examine their anastomoses with the gluteal artery. Let him then clean the rectus muscle, trace its anterior and posterior heads close to their origins, and observe the positions of the limb in which they are respectively tightened. The trunk of the anterior crural nerve is now to be cleaned, its branches to the extensor muscles are to be dissected, the internal saphenous nerve laid bare as far as the knee, and the slender twigs to the pectineus muscle seen passing behind the femoral vessels. These last may be most easily found if the common femoral artery be previously divided. If the accessory obturator nerve is present, it will now be seen passing over the brim of the pelvis to the outer border of the pectineus muscle which it partly supplies. The pectineus and adductor longus muscles are then to be divided, and their attachments carefully dissected. The continuation of the profunda femoris artery behind the adductor longus is to be cleaned; and its four perforating branches, of which the fourth is the continuation of the artery, will be seen piercing the adductor magnus muscle. When the pectineus muscle has been reflected, the accessory obturator nerve may be traced to its communication with the main obturator nerve, to the pectineus muscle, and to the hip joint. The anterior division of the obturator nerve is to be traced down in front of the adductor brevis muscle, and on division of the pectineus muscle the posterior division to the adductor magnus will come into view. The obturator nerve will be observed to supply all the adductor group of muscles. The dissector will now trace the internal circumflex artery; he will find it dividing into two branches, one of which passes inwards in front of the obturator externus and adductor brevis muscles, while the other is directed backwards to anastomose with the sciatic artery, and gives off a branch to the hip joint which enters it by the notch of the acetabulum. The obturator externus muscle is to be cleaned, and the external and internal

divisions of the obturator artery are to be laid bare from among its fibres.

The adductor magnus muscle is then to be cleaned and examined : after it, the conjoined insertion of the psoas and iliacus muscles ; and on the outside, the branches of the external circumflex artery, the vastus externus, vastus internus and crureus muscles, together with the fibres called sub-crureus inserted into the synovial membrane of the knee-joint.

4. **The Hip Joint.**—When this stage of the dissection has been reached, the student may either saw through the femur and leave the hip joint to a more convenient opportunity, or dissect the joint at this time, and afterwards disarticulate the femur. The latter plan is usually to be preferred. In that case, the attachments of all the muscles which act upon or are related to the hip joint are to be reviewed, and those which remain uncut are to be severed ; the capsular ligament is to be cleaned ; its thinness or deficiency on the posterior aspect, and the thick accessory or ilio-femoral ligament, strengthening it in front, are to be noted. The relation of the head of the femur to the acetabulum in the various positions of the limb and foot are to be observed. The capsule may then be opened, and the cotyloid, transverse, and round ligaments examined, together with the articular surfaces and synovial membrane : the limb may then be removed from the body.

5. **The Back of the Leg.**—After the separation of the limb from the trunk, and when the divided structures have been cleaned and cut conveniently short, the student will proceed with the dissection of the calf and back of the leg, by directing an incision down the middle of the limb to the heel, and reflecting the skin to each side. He will trace the external and internal saphenous veins as far as the outer and inner ankle ; accompanying the latter he will find the internal saphenous nerve, and along with the former he will find the external saphenous nerve arising from the union of the communicans tibialis and communicans fibularis branches of the internal and external popliteal nerves respectively. He will also find another cutaneous branch of the external popliteal nerve ramifying on the outer side of the leg. The gastrocnemius muscle is then to be cleaned, and the nerves

and vessels entering it are to be more particularly dissected. Its thin and flat tendon is then to be carefully divided at its lower part from that of the soleus, and the muscle is to be turned upwards. The soleus muscle will thus be brought into view, and, resting upon it the plantaris (which however is sometimes absent). Between the soleus muscle and the knee joint the popliteus muscle will be seen protected by the popliteal aponeurosis, and, crossing it, the lower part of the popliteal vessels and internal nerve giving off branches to these muscles. The popliteus muscle is to be preserved to be dissected more particularly with the knee joint. The plantaris and soleus muscles are to be separated from their superior attachments, and the nature and connections of the tendo Achillis examined; after which the latter may be divided near its insertion. The deep fascia is then to be divided, and the flexor longus digitorum, tibialis posticus, and flexor longus pollicis muscles are to be dissected. The anterior tibial artery will be seen perforating the interosseous membrane to arrive at the front of the leg, and the posterior tibial artery, venae comites, and nerve are to be studied, and the branches of the nerve to the popliteus and other three deep muscles followed; while the peroneal artery is to be traced downwards in the fibres of the flexor longus pollicis muscle, and will be observed to give off the anterior peroneal and a communicating branch to the posterior tibial artery. The relations of the tendons, artery and nerve behind and below the inner ankle are to be particularly noted.

6. **The Sole of the Foot.**—The skin is to be reflected by means of an incision along the middle line of the heel and sole, and a transverse one across the balls of the toes. The plantar cutaneous branch of the posterior tibial nerve is to be traced to its distribution; and on removing the fat from the plantar aponeurosis, an outer and inner set of small nerves and vessels will also be found perforating the latter. Below the inner ankle the internal annular ligament is to be cleaned, and the tibialis posticus muscle is to be dissected to its insertion. The skin is to be divided up the middle of the toes; the sheaths for the flexor tendons are to be exhibited, and the digital arteries and nerves on both sides of each of them are to be traced. The plantar aponeurosis is then to be removed

by dissection from the muscles which it covers as much as possible, so as to expose the abductor pollicis, flexor brevis digitorum, and abductor minimi digiti muscles. The insertions of the tendons of the flexor brevis digitorum are to be followed by dividing the sheaths on the toes; its posterior attachment is to be divided, and the branch of the internal plantar nerve which supplies it sought. This will bring into view the tendons of the flexor longus digitorum and flexor longus pollicis, the union of which will be noted; the flexor accessorius and the lumbricales muscles will now also be dissected. Crossing the flexor accessorius muscle are the external plantar artery and nerve; the artery is to be followed to the deeper part of its course where it forms the plantar arch. The branches of the nerve to the flexor accessorius and abductor minimi digiti are to be found, its distribution to the two outer toes is to be traced, as also the origin of its deep branch. The flexor accessorius muscle is to be removed from its broad origin, and the tendons of the flexor longus pollicis and flexor longus digitorum are then to be divided. The internal plantar artery is to be dissected forwards to the inner side of the great toe; and the internal plantar nerve, after giving branches to the abductor pollicis, flexor brevis pollicis and two inner lumbricales muscles, will be traced forwards to its distribution on both sides of the three inner toes and one side of the fourth toe. The deep branch of the external plantar nerve is to be traced to its distribution in the two outer lumbricales, the transversus pedis, adductor pollicis, and all the interossei muscles, except the two outermost which, together with the flexor minimi digiti, are supplied by the external digital branch. The arch of the external plantar artery will at the same time be traced to the first interosseous space, and its digital and other branches dissected. After these parts have been examined, the attachments of the flexor brevis and adductor pollicis, transversus pedis, and flexor brevis minimi digiti muscles are to be fully studied.

7. **The Front of the Leg, and Dorsum of the Foot.**—The remaining integument having been removed from the front of the leg and upper surface of the foot, the dissector will trace the cutaneous veins and nerves in this region. On the inner border

of the foot will be found the small terminal twigs of the internal saphenous nerve, and in front of the inner ankle the commencement of the great saphenous vein: while on the foot externally, and passing behind the outer ankle, will be observed the external or posterior saphenous vein and nerve. On the middle of the leg externally, the musculo-cutaneous nerve will be seen piercing the aponeurosis and becoming superficial, and its distribution is to be traced to the inner side of the great toe and to the adjacent sides of the toes in the three outer interdigital spaces; while the first interdigital space will be found supplied by a branch continued from the anterior tibial nerve. Immediately above and to the inside of the ankle joint will be found the upper transverse and the lower oblique parts of the anterior annular ligament or retinaculum binding down the tendons of the extensor muscles. These are to be preserved, the rest of the aponeurosis being removed: there will thus be exposed in order from within outwards, the tibialis anticus, extensor pollicis, extensor longus digitorum, and peroneus tertius muscles, which are to be dissected to their insertions. On the dorsum of the foot the extensor brevis digitorum is also to be dissected; preserving at the same time the anterior tibial vessels and nerves, and the musculo-cutaneous nerves already mentioned. Arising from the outer aspect of the fibula, the peroneus longus and brevis muscles are then to be cleaned: the latter is to be traced to its insertion, but the course of the tendon of the peroneus longus across the sole of the foot will be more fully seen when the ligaments are dissected. The musculo-cutaneous nerve is to be traced upwards to its origin from the external popliteal or peroneal nerve, and, as it pierces the fibres of the peronei muscles in its course round the fibula, its branches to these muscles will be seen. The anterior tibial nerve is then to be traced beneath the muscles and round the fibula, and downwards on the front of the interosseous membrane, and will be found to supply in the leg the extensor longus digitorum, tibialis anticus, extensor pollicis, and peroneus tertius muscles, and on arriving at the foot, the extensor brevis digitorum. The anterior tibial artery will at the same time be dissected, and its branches traced, viz., its recurrent branch

passing upwards on the tibia through the origin of the tibialis anticus muscle, to anastomose with the articular branches of the popliteal artery; its muscular branches, and its external and internal malleolar branches: here there will generally be seen the anastomoses between the external malleolar and the anterior peroneal arteries. The continuation of the anterior tibial artery as the dorsal artery of the foot is to be traced forwards to its junction with the plantar arch in the first interosseous space, and its tarsal and metatarsal branches are to be examined with the branches supplied by the latter to the three outer interosseous spaces. Finally, the interossei muscles are to be dissected and examined in their dorsal and plantar aspects.

8. **The Knee Joint, Ankle Joint, and Articulations of the Foot.**—The tendons passing near the knee joint are, in the first place, to be cleaned; and the anastomoses of blood vessels upon the knee are to be more particularly examined, viz., the anastomotie branch of the femoral artery, the external and internal superior articular, and external and internal inferior articular branches of the popliteal artery, and the recurrent branch of the anterior tibial artery. The three parts of the insertion of the tendon of the semimembranosus muscle and the posterior ligament are to be exhibited: the popliteus muscle is then to be dissected out, and its tendon traced to its origin; the tendon of the biceps muscle is also to be dissected to its insertion in connexion with the external lateral ligament; and at the same time the internal lateral ligament is to be displayed. In front the ligamentum patellæ is to be cleaned, and the extension upwards of the synovial sac of the knee joint carefully examined; the joint may then be opened by cutting into the synovial sac at this place, and reflecting the remains of the quadriceps extensor femoris muscle. Within will be seen the ligamentum mucosum, the alar ligaments and the fatty processes of the synovial membrane; the extent of the synovial cavity will be carefully inspected, and with a little dissection the crucial ligaments may then be brought into view. The capsule of the joint ought next to be entirely removed in order that the form and actions of the lateral and crucial ligaments and the movements of

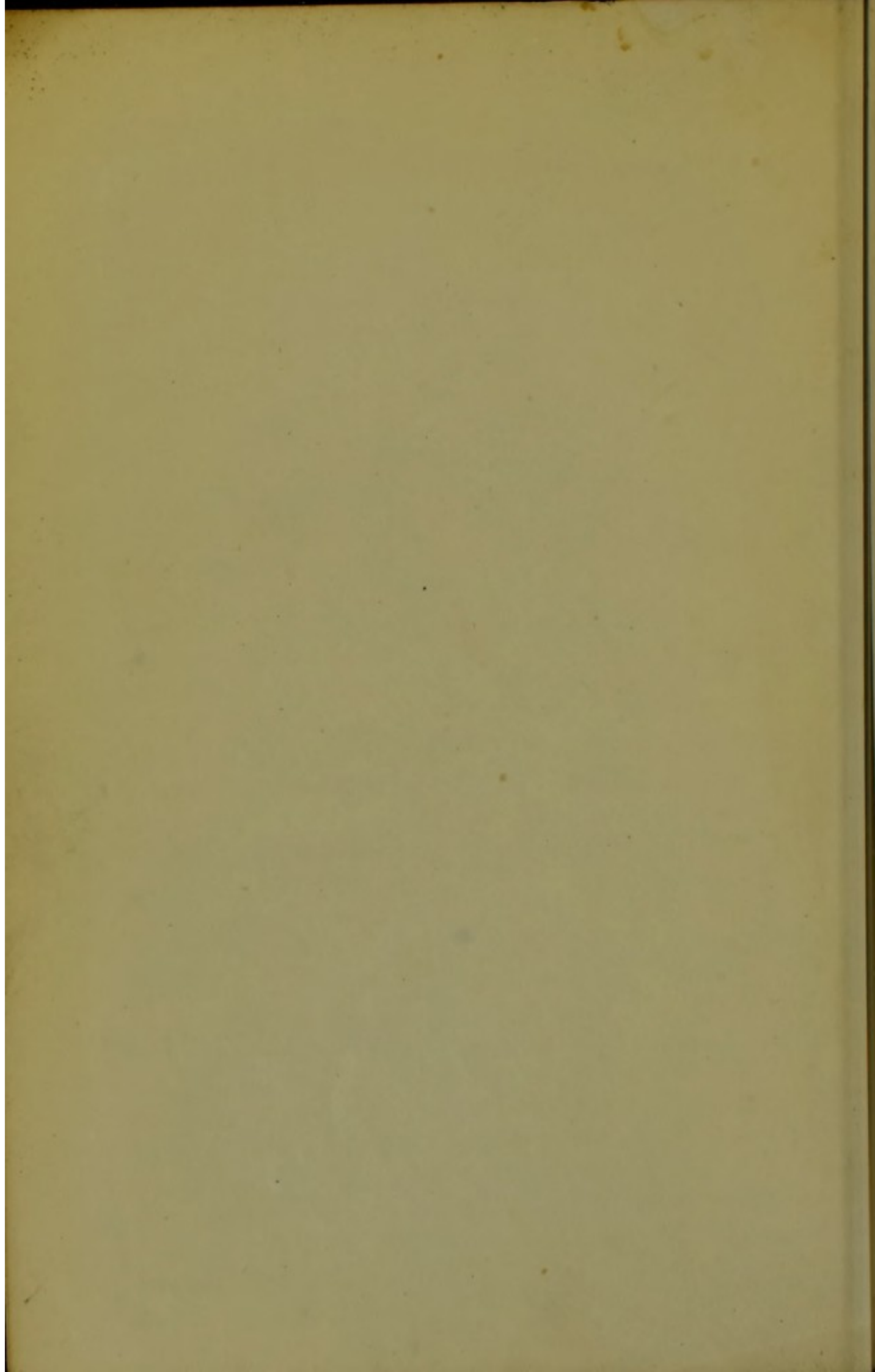
the semilunar cartilages may be better studied. The structure of the latter will be best seen after the femur has been separated from the tibia.

The structure and movements of the ankle joint ought to be studied in connexion with those of the tarsal articulations. The principal ligaments are to be cleaned, viz., the external lateral in three distinct parts, the internal lateral, and the transverse or posterior. When the internal examination of this joint has been completed, the superior and inferior tibio-fibular articulations and the interosseous membrane are to be studied. On the dorsum of the foot the numerous short dorsal ligaments of the tarsal and metatarsal bones are to be cleaned. On the sole of the foot the superficial and deep parts of the calcaneo-cuboid ligament, the inserted tendons of the tibialis posticus and peroneus longus muscles, the scapho-cuboid, scapho-cuneiform and various other shorter ligaments are to be dissected.

The examination of the remaining joints of the foot may then be completed in the following order:—the posterior articulation of the astragalus and calcaneum, bounded in front by the strong interosseous ligament; the articulation of the astragalus, calcaneum and scaphoid, in which the inferior calcaneo-scaphoid ligament is especially to be observed; the calcaneo-cuboid articulation; the articulation between the cuboid and fourth and fifth metatarsal bones; the articulation between the scaphoid and cuneiform bones, the cavity of which extends forwards between the latter; the articulation between the two outer cuneiform bones and the second and third metatarsal bones; and the articulation between the internal cuneiform and first metatarsal bone. The mode of connexion of the metatarsal bones with each other is to be observed; the interosseous, dorsal and plantar ligaments of their bases, and the transverse metatarsal ligament of their heads. Lastly, the articulations of the metatarsal bones with the first phalanges, and of the phalanges with each other are to be dissected. In connexion with the great toe the arrangement of the sesamoid bones deserves particular attention.

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