A MANUAL OF ANATOMY;

CONTAINING

RULES FOR DISPLAYING

THE STRUCTURE OF THE BODY,

So as to exhibit the

ELEMENTARY VIEWS OF ANATOMY,

AND

THEIR APPLICATION

TO

PATHOLOGY AND SURGERY:

To which are added,

OBSERVATIONS

ON THE

ART OF MAKING ANATOMICAL PREPARATIONS.

BY

JOHN SHAW;

BEING AN OUTLINE OF THE DEMONSTRATIONS DELIVERED BY HIM, TO THE STUDENTS IN THE SCHOOL OF GREAT WINDMILL STREET.

VOL. I.

THIRD EDITION.

LONDON:

PRINTED FOR LONGMAN, HURST, REES, ORME, AND BROWN, PATERNOSTER ROW; T. AND G. UNDERWOOD, FLEET STREET; AND BURGESS AND HILL, GREAT WINDMILL STREET.

1822.

THE LECTURES

ON

Anatomy and Surgery,

IN THE

SCHOOL OF GREAT WINDMILL STREET,

ARE GIVEN IN

TWO DIVISIONS.

The First Course commences on the First Day of October, and the Second, on the Nineteenth of January.

TERMS.

The Fees are the same as those determined by the Anatomical Society, in 1798, and which have been since adopted by all the regular Schools of Anatomy in London.

Gentlemen who wish to become private Pupils will receive information from the Teachers.

Printed by G. HAYDEN, Little College Street, Westminster.

TO

MATTHEW BAILLIE, M. D.

Sir,

Those who are interested in the cultivation of Anatomy, and have witnessed its progress in England, will acknowledge how natural it is for me, to desire the ornament of your name, to a work of this kind.

I dedicate my labours to you, not because the School of Great Windmill-street so long flourished by your exertions as a Teacher, but because public opinion has directed me to look to you as affording the highest example of a professional life.

Studious in the early part of life, and not shrinking from the harrassing *duties of a Teacher of Anatomy, you became the most eminent Physician and Pathologist.—By your continued zeal in the Promotion of Science, and your attention to the interests of the Students, you have since shewn, that no degree of success or elevation can change the Benevolent Man and Philosopher, or make him unmindful of the honour and interest of his Profession.*

That you may long live to enjoy that universal sentiment of respect, which is the highest honour attainable in any Station, is the sincere wish of,

Sir,

Your very obedient Servant,

JOHN SHAW.

Albany, February 1, 1822.

Preface.

WHILE engaged in assisting the students, in the dissecting-room, I have been in the practice of making short notes, containing rules for the dissection of each part. Having found these of much advantage to myself, and useful to the students, I have arranged them in a systematic form.

For the manner in which the book is written, I have many apologies to make,—my principal object having been to attempt to present to the student a perspicuous view of those enquiries, to which he should devote himself, when beginning the study of Anatomy. If I have succeeded in this, I hope that the inelegancies of the language, and the carelessness of the style, will be overlooked as matters of minor importance.

I have, in the first part, attempted to show the readiest methods by which a student may acquire a general idea of the anatomy; and in the second, I have explained the manner of exhibiting the minute structure of each part—but another, and a still more important object, has been, to direct the student's attention, particularly to the points of anatomy which are most useful, and the recollection of which, will be of high importance to him, when engaged in the practice of his profession.

The student will, perhaps, discover many of the observations, to be those of Mr. Charles Bell, and possibly, more than I am aware of, for it is obvious, that one who was the pupil and assistant for many years, must, in writing a work of this kind, unconsciously adopt as his own, those, which were truly the observations of his teacher.

In giving the description of the more

minute parts, I have had recourse to the best authorities; for, although I have spent twelve years in the dissecting-room,—during ten of which, I prepared the subjects for lecture, and assisted the students, I find, that no point of anatomy can be satisfactorily determined, without referring to the labours of former Anatomists.

The favourable manner in which the first edition has been received, will be a further inducement for me, to endeavour to supply the deficiences of the present, if another opportunity should occur.

February 1, 1822.

The rapid sale of the last Edition should have been sufficient to shew that the manner in which it was printed was approved of, but I have ventured to change the form in consequence of having observed that the students found it inconvenient to refer to an *octavo*, during their dissections.—I trust that the division of the work into Two

Volumes will not be attended with any disadvantage, as the whole of the dissection of the upper part of the body is described in the first volume, and that of the lower in the second.—There is also a complete Index of the Contents of the whole work inserted in both Volumes.

London, October, 1822.

CONTENTS

OF VOL. I.

INTRODUCTION.

AS the Sciences of Medicine and Surgery are founded on Anatomy, it would be superfluous to make any remarks on the absolute necessity of the student attending to it, but it may be well, to offer some advice upon the manner, in which he ought to prosecute the study of this important science.

I would wish to impress, upon every student, but particularly upon him, who is to spend only one or two seasons in the prosecution of Anatomy, never to forget that his chief object should be, to acquire an accurate knowledge of those parts of the body, which will be of use to him, when he becomes a practitioner, and is left to his own resources.

I have often observed, when such a knowledge as enabled a student to describe the seven and twenty processes of the sphenoid bone, with accuracy, or the exact origins and insertions of the Multifidus Spinæ, was considered important, or when he was taught to believe that it is highly necessary to recollect those barbarous combinations of latinized terms, which are sometimes given to the small and irregular twigs of arteries, that he lost the opportunity of learning what is truly useful, and when he became a surgeon, he was apt to contemn the science altogether; for then, he found, that all he derived, from what he conceived to be the study of anatomy, was the being enabled to pass certain examinations.

I trust, that the contents of the following pages will prove, that I do not intend to disparage the knowledge of minute anatomy:—on the contrary, I contend, that no man can be a good surgeon, without that knowledge; but it must be a very different "minute anatomy," from that of being able to give the accurate description of the shape and facits of a dry bone; or of the points, from which some deep muscle of the back arises, although expressed even in that technical language, which appears so imposing to a beginner.

To counteract the effect of these long and hard sounding terms, these "sesquipedalia verba," which, unfortunately, have the effect of leading the young student to suppose, that the more difficult the name is to recollect, the greater necessity there is, of studying the part which it denominates,—I would advise him, while he is engaged in the dissecting-room, to read those books on medicine and surgery, which are founded on the facts of anatomy. By such a course of study, he will be directed to the proper subjects of inquiry; he will also have the best chance of becoming so acquainted with the changes produced by disease, that if, in an operation on the living body, he does not find the parts exactly in the same state, as when he saw them demonstrated in the dissecting-room, or exhibited on the table of the lecturer, he will not be in danger of being so discomposed and alarmed, as to be obliged to stop in the most critical part of the operation.

Some have objected to the student reading while he is dissecting,—but what kind of anatomy would nine-tenths of the students, who are to spend a short time in London, learn? or of what use would it be to them, if their views were not properly directed by study? The argument in favor of not reading, is, that the first notions of a student should be derived from the dissected body. With this opinion, I most cordially agree; but this argument offers no reason, why students should not, at the same time, take advantage of the hints contained in books, written by those, who have known how to attach the due degree of importance to each part. It frequently happens, that the same students who have been advised not to read, have also been told that they should not attend the dissecting-room during the first season of their studies; but, that they should acquire their first ideas of anatomy, from the appearance of the dissected body on the lecturer's table. Surely there is an inconsistency in the two advices;—the latter can never have been given by those, who have had extensive opportunities of observing the progress of students.

The student ought to attend the operations in the dissecting-room, from the first;—for though he do not use the knife himself, he will have an opportunity of correcting the notions which he must necessarily form, from the exhibition of the parts, as prepared for demonstration on the lecturer's table;—he will discover how much, must necessarily be taken away, to make the muscles, arteries, or nerves sufficiently distinct for public demonstration. But the most serious objection to a student's not dissecting until he has attended several courses of lectures on anatomy is, that he, probably, never will make much proficiency in it, nor ever go with spirit to his task. When he finds that those, who commenced the study of anatomy, at the same time with himself, and who have been, from the first, attending the operations in the dissecting-room, are much farther advanced in the actual knowledge of the parts; he is ashamed to begin, lest he should expose his awkwardness; or if he does venture to dissect, he is very apt to hurry through the dissection, that he may shew some dexterity.

It is surely needless to tell the student, that though he may be able to point out any part of the body which is exposed, he can never be a dexterous, nor even a safe operator, unless he practises dissection: indeed, since an operation is only a nice and difficult dissection, the question of the propriety of a man attempting to operate, who has never dissected, resolves itself simply into this;—is the first essay to be made on the living body?

I would recommend the student not only to dissect the important vessels, &c. with unwearied diligence; but also to practise himself in removing the cellular membrane from the larger muscles,* as this is the most likely way of giving him that peculiar command of the knife, which is so important to a surgeon, and which cannot be attained except by much practice.

Indeed, we see, that when, even a man, who is naturally dexterous, takes the knife into his

* More use should be made of the bodies of animals than is generally done. In a surgical view, the dissection of them can only be of use, in giving a degree of dexterity in the management of the knife: but they are of great service in every question regarding the minute structure of a part, or of its function,—and particularly in the investigation of the nervous system, or of the structure of the organs of sense, or of the viscera.

hand for the first time, he appears so awkward, that it is at once evident, he is not familiar with the use of the instrument.

Much of the appearance, and even the reality, of dexterity, being dependant on the manner in which an instrument is held, we ought to study what is the best and neatest mode; taking care, however, to avoid the appearance of affectation. —To perform almost any dissection, or operation, the knife should be held nearly in the same way as a pen; the motions should be executed with the fingers and wrist only,—the incisions will, in this way, be made with more freedom and precision, than they can, when the shoulder, elbow, and hand are moved at each cut; which they must, if the knife be held between the thumb and all the four fingers. Mr. Hunter, it is true, used to hold his knife in this manner; but I have been told by an old and favorite pupil, who is yet famous for his dexterity in operating, and neatness in dissecting, that this was because the joint of Mr. Hunter's thumb was stiff, in consequence of an accident.

The first dissection which the student attempts should be of a large muscle, the pectoralis major, for example. Previous to commencing, he should, by the examination of a drawing, or by reading, endeavour to acquire a general idea of the course in which the fibres of the muscle run; he should then place the body in such a position that the fibres shall be stretched in a longitudinal direction. An incision is then to be made through the skin in a direction corresponding to the length of the fibres. Several fibres are to be exposed in their whole length, from their origin, to their insertion, taking care that all the loose cellular membrane is raised, so as to make the fleshy fibre appear distinct. To do this neatly, the knife must be carried boldly down, and rather in a perpendicular direction to the fibre. Although by this manner of cutting, the knife will probably enter into the substance of the muscle, there will be no appearance of a wound, but if the knife be carried across the line of the fibres, the muscle will not only appear full of gaps and ragged, but the difficulty of removing the cellular membrane will be much increased.

To make a few of the fibres distinct, it will be necessary to use the forceps; these may afterwards be laid aside, and the skin held between the finger and thumb of the left hand. The mistake which the young dissector is most liable to commit, is to carry the scalpel too obliquely upon the fibre—by so doing, he leaves the cellular membrane on the muscle, and raises the skin only.—By proceeding in this manner, he appears to get on very rapidly with his dissection, but he will find himself grievously mistaken, for unless the skin and cellular membrane be raised together, he will not only have much difficulty in afterwards making the fibres clean and distinct, but, notwithstanding all his labour, the muscle will appear ragged.

For further hints on the best manner of dissecting muscular parts, I shall refer the reader to the description of the dissection of the abdominal muscles in Vol. II. The manner in which the arteries, nerves, &c. are to be dissected, is described in the several dissections.

The student will find, that he requires several instruments, besides those generally put into the dissecting case, to enable him to make some of the more difficult dissections.—Thus, for example, he could not dissect the nerves of the spine, nor of the head, without a small saw, two or three chisels of different sizes, a small mallet, and the strong pincers, (that are used to pull out nails); the knife (called a hacking knife), which is used by plumbers to cut lead, will also be found very convenient.* For the more minute dissections, he will require two small hooks, and a sharp steel point;—the etching tools which are used by engravers, are very useful; particularly if the points are bent a little,

* All these things may be got at a carpenter's tool shop;—the chisels, which are used for cutting iron, are the best.

as with them, the cellular membrane can easily be torn from the small nerves.*

The most effectual way of preventing the bad effects of sitting several hours in a cold dissecting-room, is, to put on an additional flannel jacket, and carpet shoes over the boots. The student should, for the comfort of himself and his friends, make a rule, never to sit in the dissecting-room, with the coat which he wears through the day; but to keep one for the purpose of using while he is there. A cap should be worn, in preference to a hat, as the latter is not only inconvenient, but also quickly acquires a bad smell.

I think I have observed, that it is necessary for students from the country, to live a little more *generously*, while attending the dissecting-room, than they have been accustomed to do, while in the country. If they do this, and, at the same time, take regular exercise, and attend to the state of their bowels, they will probably escape the bad consequences which occasionally occur from a cut on the finger.

Some years ago, it was a common occurrence, for students to suffer severely from cuts received during dissection. Of late, such a case has

* It is necessary to have one or two coarse cloths, to cover the parts which have been dissected; as they very quickly spoil, when left exposed to the air.

rarely happened in our rooms. This I attribute to the bodies being now always injected with a saturated solution of *bay salt* in water. This mixture does not change the appearance of the parts, as the solution of nitre does, nor does it crystallize in the arteries, but may be forced into the cellular membrane by the wax injection, so that it does not prevent the vessels being afterwards injected. Indeed we may preserve the arteries, if we take the precaution, to lay the limb, after the vessels have been dissected, for a day or two in a large quantity of water, as in this way, the salt will be carried off.

The objections to the use of this solution, are so trivial, and the advantages are so many, that every body should be injected with it.

The student should be particularly careful to avoid pricking his fingers, while examining the viscera of a person who has died of peritonitis, for by far the greater number of instances, which have been followed by bad symptoms, may be traced to a scratch, or prick, received during the dissection of such bodies.

Experience, both in my own case, and in that of others, leads me, decidedly to object to treating the inflammation consequent on a wound of a finger during dissection, according to the antiphlogistic system. Without entering into the theory of the plan, I shall state, that experience has now proved to me, that a poultice, made of bread or linseed meal, with warm saturnine lotion and tincture of opium, or lint steeped in the same warm mixture, are the best applications to the wound; if there be much inflammation extending up the arm, an evaporating lotion (spirits and water with a little laudanum) should be applied from the wrist to the shoulder. The bowels are to be kept freely open with calomel purges, but at the same time, the patient is to take large opiates and as much wine and porter as he can bear.

By such a plan of treatment, I have myself, derived great relief from pain and very unpleasant symptoms, and I have always been as successful in the cases of those gentlemen, who have suffered from a similar cause.

DISSECTION

OF THE

UPPER PART OF THE BODY.

AS the upper half of the body includes all the parts above the diaphragm, and also the muscles of the back, it will be too much for a young student to undertake at once; he should therefore begin with an arm, or one side of the head. But as these two parts, (according to the rules of the dissecting room,) are generally taken by the same student, I shall lay down a plan of such a series of dissections as will enable him to make the most of these parts, and will, at the same time, be practicable, while several are engaged in dissecting the body.

As the student should dissect those parts first, which become soonest putrid, he ought, on the first day, in union with his companion, to make a dissection of the principal parts of the brain.*

On the second day, he should dissect the superficial muscles of the neck; and on the third

* Neither the arteries nor the veins should be injected.

day, the muscles of the face. On the fourth day, he may examine the deep muscles of the throat and of the jaw, and the general anatomy of the mouth.

This plan may be easily followed, if the student can turn the body as he pleases; but as I have supposed that another pupil is engaged in dissecting the opposite side of the head, his operations must also be taken into consideration.

As it will be very inconvenient for both to dissect the neck at the same time, they must either dissect at different hours, or the one pursue the dissection of the arm, while the other is engaged with the neck. But if both are young dissectors, they ought to assist each other, as the dissection of the neck is very difficult.

The muscles on the fore part of the chest should be next dissected; the thorax may then be opened, so that a general view of the viscera may be given; after which, the heart and lungs, with the larynx, &c. should be removed, and put into water, for future examination.

At this stage of the dissection, the students who are dissecting the lower half, will probably be prepared, either to make a section of the body, or to turn it. The superficial muscles of the back are then to be dissected. When these are finished, the arm should be separated from the trunk, by cutting through those muscles of the back and chest, which are inserted into the scapula, and by either dislocating the clavicle from the sternum, or by cutting it through the middle. The arm should be wrapped up in a damp cloth, and laid in a cool place, until the dissection of the other parts are finished.

The deep muscles of the back and of the fore part of the neck, should now be dissected. The vertebræ are then to be divided, so that the ligaments may be examined.

If the student does not wish to preserve the skull, he should make such sections of it, as will enable him to show the general anatomy of the nose, ear, &c. But before he examines these, or dissects the ligaments, he should allow them to remain in water for some time: in the mean time he may dissect the muscles of the arm. After the muscles of the arm are dissected, he should examine the ligaments.

In the second dissection, the arteries (having been previously injected) should be traced, with some of the principal nerves and veins. During this dissection, the student should attend to the practical points of surgery; but another body, in which the vessels are uninjected, should also be devoted to this examination.

In the third dissection, the brain and nerves should be more particularly studied.

DISSECTION

OF

THE BRAIN.

I SHALL describe only the common method of dissecting the brain. Whatever changes may take place in our opinions regarding the nervous system, it will be always necessary to be familiar with the natural appearances of the different parts of the brain, as exhibited in dissecting from the upper part towards the base, since it has been the method generally pursued, in tracing the effects of disease or injury upon this organ.

The student will find the dissection of the brains of the lower animals to be very instructive; he will not only discover the meaning of certain names given to parts of the brain, but he will also find it to be the best and most interesting mode of investigating the anatomy in a physiological point of view. After he is familiar with the anatomy of the brain in several classes of animals, he will be able to make the dissection of the human brain in a variety of ways. If he dissects from the base towards the upper part, he will acquire a more correct idea of the formation of the brain, for the great mass of the cerebrum is, with reason, supposed to be a superadded part.

To prepare for the dissection of the brain, the scalp should be cut in the line of the coronal suture, from ear to ear; the anterior portion is to be raised from the scull, and pulled down upon the face: the posterior part should be carried towards the occiput. It is necessary to follow this plan in a *private* dissection; for, unless it be done so, there will be some difficulty in putting the parts together, after the dissection is finished.

In cutting through the scull, some nicety is required. On the anterior part, the cut should not be made lower than half an inch above the frontal sinuses, but it may be carried to a lower level behind. Before the saw is applied, a piece of whip-cord may be tied firmly round the scull, as a mark for the circular incision. The saw should not be carried through all the tables of the scull; but, after having cut through the external and middle tables, we should endeavour to break the tabula vitrea,* with the chissel and mallet; and by proceeding thus, the dura mater

* It is not necessary for me to remind the student, that, in the child, the tables of the scull are not developed; and that, in extreme old age, they are all consolidated. It is only in the adult, that the three tables are distinct.

will probably not be cut, which it is difficult to avoid, if all the tables be sawed through. Although the bone may be completely divided, it will still be difficult to raise the scull-cap, in consequence of the firm union between it and

Dura Mater. the DURA MATER. This forms an important point of demonstration,—for it proves, that part of the dura mater is the internal periosteum. This is well exemplified in the scull of a child, as it is almost impossible to raise the scull-cap, without, at the same time, cutting the dura mater; and even in the adult, it is necessary to use a lever between the portions of the scull, and then to pull it up, with some violence, before it will separate from the dura mater. When the adhesion is particularly strong, the separation may be facilitated by passing a whalebone spatula, or the handle of the knife, between the dura mater and the bone.

When the scull-cap is torn off, we shall see pits and furrows upon it's inner surface,—and, on the dura mater, little fungous excrescences and vessels, corresponding to the pits and furrows in the bone. The fungi are most numerous on the part opposite to the sagittal suture; they are like soft warts, or pale granulations, and

Glandulæ Pacchioni. have been called GLANDULÆ PACCHIONI. If the arteries have been injected, the branches of the MENINGEA MEDIA will be seen. The ANTERIOR and POSTERIOR MENINGEAL arteries are so small, that they will not be visible, until the brain is removed.

If we make a puncture with the scissars into the most superior and central part of the dura mater, we shall pierce the LONGITUDINAL SINUS. If we pass a probe into this puncture, it may be pushed towards the occiput, and also towards the frontal bone,—thus showing the course of the sinus. Longitudinal Sinus.

The sinus may be opened, by cutting upon the probe.—The first thing we shall observe in this cavity, is a body, generally of a white colour, but it is only a coagulum, that has taken the form of the sinus.—The internal surface of the sinus is irregular, in consequence of there being occasionally many of the glandulæ Pacchioni in it; and, from its being crossed by a number of small filaments, which, as well as a set of bands that are situated on the outside of the sinus, have been called the CORDÆ WILLISII. By putting the probe under one of these cords, we shall probably pass it into the mouth of one of the veins which enter, in a lateral direction, from the pia mater. —We cannot prosecute the course of the sinuses farther, in this stage of the dissection. Cordæ Willisii.

Our next step must be, to raise the dura mater: to do this, we should cut through it, opposite to the ear, on both sides, and, with the scissars, continue the incisions forwards, nearly to the spine of the frontal bone,—and on the back part, to the perpendicular ridge of the occipital bone.

The lateral parts of the dura mater may then be turned up towards the longitudinal sinus: this will expose the substance of the brain, covered by the TUNICA ARACHNOIDES and PIA MATER. In doing this, no adhesions will be found between the dura mater and the other membranes, except at an inch, or half an inch, from the sinus. This adhesion has a white, granulated appearance, and is often described as the effect of disease. When we tear this up, we shall see the veins of the brain entering into the sinus.

By now breaking down the connexions on both sides, we may see that prolongation of the dura mater, called the FALX, which separates the upper part of the brain into TWO HEMISPHERES; by merely pulling aside the masses of the brain, and passing down the handle of a knife between the hemispheres, we may expose this septum, in all its length. We shall see that its anterior part is very narrow, and that it is attached to the crista galli of the ethmoid bone;—as it passes back, it is seen to increase in depth, until it becomes attached to the TENTORIUM; but the tentorium cannot be seen in this view,—nor until a considerable part of the brain is removed.

Falx.

The scissars should now be passed between the anterior part of the hemispheres, so as to divide the connexion between the falx and crista galli; the falx may then be pulled towards the occiput, as a few small vessels are the only means of adhesion between it and the brain. The dura mater having been thus laid down towards the occiput, we may examine the next membrane—TUNICA ARACHNOIDES. If there be no effusion of serum on the surface of the brain, it will be difficult to see this, on account of its transparency; but when there is effusion, the membrane will be apparent, without any preparation, as it will then be a little thickened. To show it, in all cases, it is only necessary to make such a puncture on the surface, as will admit the point of the blow-pipe,—the air will raise it in the form of vesicles.

Tunica Arachnoides.

It is difficult to trace the Tunica Arachnoides to all the parts of the brain to which it is *said* to go. It may be easily traced over the surface, passing from one convolution to another, without dipping between them, as the pia mater will be found to do. But it is said to be not only reflected on the inner surface of the dura mater, so as to give it its glistening smooth appearance; but it is also, by the French, described as passing into the ventricles, so as to cover their internal surface.—When the base of the brain is exposed, the membrane will be found much thicker at that part.*

* I have, in a case of violent and chronic inflammation of the brain, seen a distinct membrane lining the inside of the ventricles.

Pia Mater. The next membrane, the PIA MATER, is so distinctly seen through the last, that they have often been confounded. We see it loaded with arteries and veins,—and when we pull upon a portion of it, we find it passing down into the substance of the brain, and between the convolutions.—In the course of our dissection, we shall discover the pia mater in many parts of the interior of the brain, it being, in fact, the cellular membrane which supports the pulp, and carries the vessels into the several parts, and which, when separated from the pulp by maceration and washing, has a floculent appearance, whence it is sometimes called TOMENTUM CEREBRI.

Tomentum Cerebri.

We should now tear this membrane from one of the hemispheres, so as to show the convolutions. The surface of these convolutions will appear grey; but if we cut a slice off, we shall then see, that the interior is of a white colour: from this circumstance, the surface has been called the CINERITIOUS, or CORTICAL PART,—and the internal, the CENTRAL, or MEDULLARY.

We should now gently separate the two hemispheres from each other; by then looking down between them, we shall see a white mass,—and if the arteries have been injected, two arteries will be perceived upon it: this white mass has been called the CORPUS CALLOSUM, or, from the term *commissure* being given to the points of union between the several parts of the brain,

Corpus Callosum, or Commissura Magna.

this being the largest, has been called COMMISSURA MAGNA.

As we have nothing particular to observe in the structure of the upper part of the hemispheres, they may be gradually sliced down,* until we reach the level of the corpus callosum. In making these cuts, the relative disposition of the cineritious and medullary matter will be seen to vary: about an inch and a half from the surface of each hemisphere, the medullary matter will have an oval form, and be surrounded by a band of cineritious matter; this is called the CENTRUM OVALE PARVUM of *Vicq-d'Azyr*, and must not be confounded with the proper CENTRUM OVALE of *Vieussens*, which will be seen when both hemispheres are cut down nearly to a level with the corpus callosum,—which we should now do. But we ought not to be too anxious to show this part exactly as an oval; for, in doing so, we may cut so deep, as to open the LATERAL VENTRICLES, particularly if they be distended with fluid. In the centre of this oval, we shall see the CORPUS CALLOSUM, in the middle of which, there is a little furrow, called RAPHE, or SUTURE, formed by two longitudinal ridges, running between the anterior and posterior parts of the brain. By examining the

Centrum Ovale.

Raphe.

* The brain will be more easily sliced if we occasionally dip the knife into water.

part closely, we may discover fibres running across, which are termed LINEÆ TRANSVERSÆ.

Lineæ Transversæ.

Our next object is, to open the LATERAL VENTRICLES.—This may be easily done, if there be water in them; for we have only to slice down the medullary matter, horizontally, on each side of the corpus callosum, until the water flows out: we should preserve about half, or three quarters of an inch in breadth of the corpus callosum, through its whole extent. It will be rather difficult to know when the ventricle is opened, if there be no water in it (and this may be previously ascertained, by patting, with the finger, on each side of the corpus callosum,) because the first part seen, when the ventricle is laid open, is a grey mass;—there being as yet no appearance of a cavity. But by insinuating a probe, or the handle of a knife, between this grey body (which is the upper part of the CORPUS STRIATUM) and the cut margin of the medullary matter, we shall be able to pass it, towards the frontal bone, into the cavity in the anterior lobe, and then, by changing the direction of the probe, into that of the posterior lobe. If the brain be firm, we may expose the cavities, by cutting upon the probe, or by taking out a piece with the scissars: but the brain, when examined in the dissecting-room, is generally so soft, that a knife, introduced like a bistoury, upon the probe, is sufficient to tear the

Lateral Ventricles.

Corpus Striatum.

medullary matter,—still we ought not to do this, if we can avoid it. When both ventricles are opened in the same manner, we can understand how the corpus callosum is said to form the *roof* of the ventricles; for it will now be seen to stretch from the anterior to the posterior part, in the form of an arch. If the brain be tolerably firm, we may be able to see the septum of the ventricles, which is formed by a thin lamina of medullary matter, passing down perpendicularly from the lower surface of the corpus callosum, towards the *floor* of the ventricle, which we shall afterwards find to be formed by the FORNIX. In consequence of this septum between the ventricles being semi-transparent, it has been called the SEPTUM LUCIDUM. Septum Lucidum
But we shall very seldom get a brain sufficiently firm, to allow of the septum being seen.

A small slip of writing paper should be cut to the shape of the corpus callosum, and laid on its upper surface; this will give the corpus callosum such a degree of firmness, that, after having cut it through on the anterior part, we shall be enabled to tear it back: in doing this, the septum is necessarily destroyed,—we may observe, that, as it is torn, it separates into two laminæ, that have a cavity between them, which has been called the FIFTH VENTRICLE.* Fifth Ventricle.

---

* This cavity is distinctly seen in the Brain of the Fœtus.

When the corpus callosum is laid back, as far as its connexion with the medullary matter of the posterior lobe, the FORNIX will be seen passing from the anterior towards the posterior lobes. On the fore part, its connexion with the medullary matter appears single, but posteriorly it diverges into two portions. I ought here, to remark, that in tearing back the corpus callosum and septum lucidum, in a soft brain, we are very liable to lift a portion of the fornix, just at the point of its division, and thus to make the appearance of a hole in it.

Fornix.

Before tracing the fornix, we should attend to the general form of the lateral ventricles. The cavities which have been already exposed, are called the ANTERIOR and POSTERIOR HORNS, or SINUSES; but there is yet another sinus, called the INFERIOR, or MIDDLE HORN. This last should be laid open; but, as it lies very deep in the middle lobe, it will be necessary to cut away a large quantity of the brain, before we can show it. The knife may be placed on the upper part of the corpus striatum, and carried, in a slanting direction, towards the angle formed by the union of the squamous and petrous portions of the temporal bone; and it may be continued in the same line, from the anterior to the posterior part of the brain. Even this large cut may not be sufficient to expose the inferior sinus; but, in cutting more, we must

Horns, or Sinuses of the Ventricles.

proceed cautiously. The POSTERIOR CRUS of the fornix will direct us to the opening of the sinus; we should pass a probe, or the handle of a knife along the crus, and then cut upon it; as the sinus takes a sweep like a ram's horn, the turn must be cautiously followed.—When the cavities of both sides are exposed in their full extent, we may make our observations on the several parts which are in the two ventricles.

Corpora Striata.

We at once recognize the CORPORA STRIATA; for the incisions which have been made for the exposure of the inferior horns, exhibit the mixture of cineritious and medullary matter, from which these bodies have got the name of corpora striata. We may now see that the FORNIX is attached to the anterior lobe of the brain, by a part, which, though it appears single, we shall afterwards discover to be formed of two cords: however, it is generally called the ANTERIOR CRUS of the FORNIX. If we trace the fornix backwards, we shall see it dividing into two parts, called its POSTERIOR CRURA, which diverge, and descend into the inferior horns. Between the fornix and the corpora striata, a reddish body will be seen; this is part of the PLEXUS CHOROIDES, which may be traced into the posterior horn, and also into the deepest part of the inferior horn; where it will be afterwards found to communicate with the pia mater which covers the base of the brain. If we now

Fornix.

Crura of Fornix.

Plexus Choroides.

look into the posterior horn, we shall see a little medullary eminence, which has been called

Hippocampi.

HIPPOCAMPUS MINOR, to distinguish it from a much larger eminence, of the same kind, in the inferior horn, called HIPPOCAMPUS MAJOR, from some resemblance to a small marine animal. If we pull up the portion of the plexus which descends into the inferior horn, we shall see, that the hippocampus takes a turn somewhat like a ram's horn, whence it has occasion-

Cornu Ammonis.

ally received the name of CORNU AMMONIS; and as its extremity has a bulbous form, like the point of a finger, it is sometimes called *Digital*

Digital Process.

Process, and from this latter name, the extremity of the sinus is often called the *Digital Cavity*. At the first view, the hippocampus appears to be the continuation of the posterior crus of the fornix; but, by following the crus, we shall find that it terminates in a thin layer of medullary matter, which lies on the hippocampus: as this layer has some resemblance to a tape worm, it has been called *Tænia*, and to distinguish it from another tænia, it is called

Tænia Hippocampi, or Tænia Fimbriata.

TÆNIA HIPPOCAMPI, or, from its edge being, when in a fresh state, apparently fringed, it has also got the name of TÆNIA FIMBRIATA.

We should now examine the communication between the two ventricles. If we trace the plexus choroides, we shall find it inclining towards the anterior crus of the fornix: if we then pass a curved probe, or small bougie, along the plexus, and under the anterior crus of the fornix, it will pass through a hole and appear in the opposite ventricle. But it may be objected to this,—that the brain is so soft, the probe would meet with no resistance, were it to be passed through the matter of the fornix. The best proof we can give of the existence of the hole, is to blow on one side of the crus of the fornix, for then the air will pass into the other ventricle; or if we open the right ventricle, in a very fresh brain, and lay the head on the same side, the water will flow from the left ventricle through the hole. In cases of hydrocephalus, we shall sometimes find the hole large enough to admit the point of the finger. This opening has been, by some, called the *Foramen* of *Monro;* but it is more generally called the FORAMEN COMMUNE ANTERIUS,—for we shall afterwards find, that it communicates with the *third ventricle* and with the *Infundibulum*.

Foramen Commune Anterius.

The fornix may now be cut at the point under which the probe has been passed, and turned back; but as the substance of the fornix is very soft, it should be strengthened by putting a piece of paper, of the same shape, upon it. When the fornix is thrown back as far as the point where it diverges, we may perceive upon its lower surface, white lines, something in the form of the strings of a lyre; from this appearance, this lower surface has got the name of LYRA.

Lyra.

We shall now have a complete view of the plexus choroides of each side, united together by a membrane generally called VELUM INTERPOSITUM, or VELUM VASCULOSUM,—or, from its similarity to the mesentery of the intestines, *mesentery* of the plexus choroides. In the fresh and sound brain, the plexus and its velum will prevent us from seeing any of the THALAMUS which is below it; however, it generally happens, that the plexus of each side falls towards the middle, so as to expose a part of both thalami.

Velum Interpositum.

If we examine the middle of the plexus, we shall see two veins passing backwards, to unite and form a larger one,—the VENA GALENI. We may trace this vessel back, by making a horizontal cut, on the level of the velum, quite to the occiput, so as to remove all the remaining parts of the fornix and corpus callosum; the vein will then be seen entering into the fourth sinus of the dura mater, from which it passes into the TORCULAR HIEROPHILI, which is formed by the meeting of the four principal sinuses at the union between the falx and tentorium.

Vena Galeni.

Torcular Hierophili.

We should now raise the plexus choroides and velum from the anterior part, and carry them back; but not farther than to expose the two white bodies called THALAMI NERVORUM

Thalami.

OPTICORUM upon the anterior parts of which we may see two little eminences, called the MONTICULI. In the angles of union between each thalamus, and corpus striatum, we shall see a streak of whitish matter, which has somewhat the form of a tape-worm, or piece of tape, whence it is called *Tænia*,—and, from its direction, *semi-circularis*,—and, from its connexion with the thalami, which are sometimes called gemini, the word geminum is added,—TÆNIA SEMICIRCULARIS GEMINÛM. Tænia Semicircularis Geminum.

On the anterior part of the thalami, we shall see the opening which has been already described as forming part of the foramen commune anterius. If we direct a probe slantingly forwards, it will pass towards the part called ITER AD INFUNDIBULUM; if pushed on, it would pass through the substance of the infundibulum, and enter the PITUITARY GLAND. If the probe be pulled out, and then passed downwards and backwards, it will pass into the THIRD VENTRICLE. This opening has sometimes received the absurd name of *Vulva;* while the depression which may be now seen at the other extremity of the thalami, has got the name of *Anus*.— This latter opening is sometimes called foramen commune posterius;—but it differs from the anterior opening, in this, that it is so covered by the velum interpositum, that there is no opening until one is formed by tearing up the velum,

Iter ad Infundibulum.

Vulva.

Anus.

and consequently it cannot be called a communication between all the ventricles.

We may now trace the plexus choroides a little farther. We shall find that it dips down behind the *anus;* but we must be careful how we raise it at this part, for here it surrounds the Pineal gland;—the membrane should not be rudely pulled away, but should be dissected off with the forceps and sissars; by which we shall expose a reddish grey body, rather larger than a pea, and attached to the posterior part of each thalamus, by a little process, or peduncle: this

Pineal Gland

is the famous PINEAL GLAND. When we take it between our fingers, we must not be surprized to find some gritty particles in it.

If we now separate the thalami gently from each other, we shall find that they are united

Commissura Mollis.

by a grey mass, called COMMISSURA MOLLIS. The name implies, that this bond of union will be often dissolved before we reach this part of the dissection.

The chink, or sulcus, seen on separating the

Third Ventricle.

thalami, is the THIRD VENTRICLE. If we separate the thalami, to some distance from each other, and look towards the anterior part of the cavity, we shall see a white cord passing across

Commissura Anterior and Posterior.

it: this is called the COMMISSURA ANTERIOR;—we may see a similar cord on the posterior part, called the COMMISSURA POSTERIOR; but to see these, and the third ventricle, more distinctly, we should now slice away a great part of the thalami and corpora striata.

Nates et Testes.

The next point of demonstration is the NATES and TESTES, or TUBERCULA QUADRAGEMINA. It is rather difficult to expose these, as they are situated in the space between the cerebrum and cerebellum.—All the remaining part of the posterior lobe, lying on the tentorium, should be removed; the tentorium should then be cut through on each side, so as to expose the upper part of the cerebellum,—the projecting part of which, (processus vermiformis superior,) is to be held down; the four little eminences will then be seen; the two superior being called the NATES,—the inferior, the TESTES.

Fourth Ventricle.

The next stage of the dissection is difficult; for we have now to expose the cavity of the FOURTH VENTRICLE, which lies between the cerebellum and medulla oblongata. If we pass a probe, slightly curved, from the third ventricle, under the posterior commissure, and give it a direction downwards, and backwards, it will pass into the fourth ventricle, the passage being called ITER A TERTIO AD QUARTUM VENTRICULUM, or, by the old name of AQUÆDUCTUS SILVII. If we hold back, or slice away, the upper part of the cerebellum, and raise the probe, we may discover it under a thin lamina of medullary matter, which is the roof of the fourth ventricle, and is sometimes called VALVULA CEREBRI, or

Aquæ Ductus Silvii.

Valvula Vieussenii. VALVULA VIEUSSENII; by cutting through this, we may look into the cavity of the fourth ventricle: and now we may observe, that this valvula cerebri is connected with, or formed of two cords, running from the nates and testes, to the cerebellum; these cords are called the PROCESSUS A CEREBELLO AD TESTES.

There are two or three different modes of exposing the cavity of the fourth ventricle more fully. One way is, to carry the knife down perpendicularly, so as to divide the cerebellum into two portions; but the best manner of examining it, is to cut out a triangular portion of the occipital bone, down to nearly as far as the foramen magnum. When the bone is removed, we shall see the cerebellum connected at the lower part, by the pia mater, to the beginning of the spinal marrow—indeed, this portion of membrane is the only boundary which the fourth ventricle has on its lower part, so that if we tear it, we shall open the cavity. By lifting the cerebellum, we shall expose the sulcus on the upper part of the spinal marrow, which has been called the CALAMUS SCRIPTORIUS;—by then dividing the cerebellum vertically into two equal portions, we shall see the whole extent of the fourth ventricle, and also the appearance in the cerebellum, called ARBOR VITÆ. But before making this section, there are two parts of the cerebellum to attend to; the names are very

Calamus Scriptorius.

Arbor Vitæ.

absurd, but, as they are always mentioned, we must describe them.—PROCESSUS VERMIFORMIS SUPERIOR, is the name given to the little eminence on the highest portion of the cerebellum, because it has some resemblance to a worm coiled up;—this is the same part which we were obliged to hold aside, or cut away, in showing the nates and testes, and valvula cerebri. When we look at the lateral parts of the base of the cerebellum, upon the side of the sulcus which corresponds to the falx cerebelli, (and which has been removed in cutting the occipital bone,) two little convolutions will be seen, which, from some faint resemblance they also have to worms, have been called the INFERIOR VERMIFORM PROCESSES. Vermiform Process.

The method just pointed out, is the best manner of giving an accurate notion of the relation of the fourth ventricle to the other parts of the brain; but if we object to it, in consequence of the injury to the scull, by cutting out the portion of the occipital bone, we must raise the base of the brain from the scull, before we can examine the parts in the fourth ventricle. In doing this, there are several points of anatomy which should be noticed, previous to the examination of the ventricle.

The scull should be allowed to fall back a little, and then, with the handle of the knife, we should lift part of the anterior lobe from its position on the frontal bone. In doing so, in a very fresh brain, we may see the OLFACTORY

Nerves.

NERVE passing into the cribriform plate of the ethmoid bone; but this nerve is so soft, that, in general, it is destroyed before we reach this stage of the dissection. In turning the lobes farther back, the OPTIC NERVES, with the CAROTID ARTERIES rising by the side of them, will be distinctly seen. These nerves should be cut across, at their entry into the foramen opticum. The arteries, if injected, should be divided as far down as possible; but if they are not injected it is not of consequence where they are cut. On cutting through these parts, we should attend to a little red projection, which passes

Infundibulum and Pituitary Gland.

towards the Sella Turcica; this is the INFUNDIBULUM, which is attached to the PITUITARY GLAND. The next nerve, the MOTOR OCULI, will be easily discovered; but the TROCHLEARIS, is difficult to find; for it is not only very small, but lies within the fold of the dura mater which passes from the tentorium to the sphenoid bone: when discovered, it should be cut, —not torn. The next nerve, the TRIGEMINUS will be easily seen, as it is very large, and goes off in a lateral direction. The ABDUCENS OCULI will be seen to run in the same direction as the motor oculi. (It generally happens, at this stage of the dissection, that the brain has fallen so far back that it must be supported, or the weight of the anterior part may tear it through.) After observing the SEVENTH, which is by some anatomists divided into two parts, viz. the PORTIO MOLLIS and PORTIO DURA, if we look down towards the foramen magnum we shall see the scattered fibres that come up to form the EIGHTH, which is composed of three nerves, viz. the GLOSSO PHARYNGEAL, PAR VAGUM, and SPINAL ACCESSORY. In cutting them across, we must endeavour to leave the last nerve entire, as it comes up from within the spinal canal, to unite with the other two divisions. The fibres forming the LINGUALIS will be easily seen.

The brain is now held in its place, only by the spinal marrow and the vertebral arteries; the latter are to be cut across, and then the spinal marrow is to be divided, as low down as we can carry the knife.

We should now lay the brain on a wet board, and make our observations on its base. The first thing that we shall notice, is its division into lobes, which are not observable on the upper part: the ANTERIOR and MIDDLE lobes Lobes. having been separated from each other by the wing of the sphenoid bone; we may observe a corresponding sulcus, called the FISSURA SILVII. As the POSTERIOR LOBE has been already destroyed, we shall see only the cerebellum. This is divided into two portions, called its LOBES OR HEMISPHERES. We may now observe how much thicker the arachnoid membrane is here, than it was on the upper part.

Parts seen on the Base.

If the arachnoid and pia mater be dissected off, we shall see the two CRURA of the cerebrum and the TWO of the cerebellum uniting, to form the PONS VAROLII, OR TUBER ANNULARE, or (a better name still) the NODUS CEREBRI, and which is the commencement of the MEDULLA OBLONGATA, or spinal marrow. Immediately below the middle of the nodus cerebri, two pyramidal elevations, called CORPORA PYRAMIDALIA,—and upon the lateral parts, two oval eminences called CORPORA OLIVARIA, will be seen. Between the corpora pyramidalia and the nodus, there is a little sulcus, called FORAMEN CŒCUM. If we look on the brain, anterior to the nodus, we shall see too little white bodies, the CORPORA ALBICANTIA, OR CANDICANTIA: these, by further investigation, will be found to be connected with the anterior part of the fornix. Immediately anterior to these, there is a reddish grey body (the INFUNDIBULUM;) but it will not be found hollow, as its name would imply. Between this and the optic nerves, there is a small square portion of grey substance, which will be found to be the anterior part of the floor of the third ventricle; the remainder of the floor being made by the corpora albicantia and the portion of medullary matter between the crura cerebri, which, by some, is called PONS TARINI.

If we now separate the upper part of the spinal marrow from its connexion with the cerebellum, we shall see the cavity of the fourth ventricle; and by then making a vertical section of the cerebellum, we shall have a distinct view of the ARBOR VITÆ, and of the sulcus called CALAMUS SCRIPTORIUS, which, in fœtuses, and in some animals, is continued down, as a canal, through the substance of the spinal marrow. Upon the lateral and anterior part of the fourth ventricle, we shall see little striæ, which are said to be the origins of the portio mollis.

I hope that the above description of the manner of dissecting the brain will enable the student to understand the anatomy, as it is generally taught; but, I must again repeat, that by examining the brains of the lower animals, and comparing them with the brain of the human fœtus, and of the adult, particularly when dissected from below upwards, he will be enabled to unravel much of the intricacy of the structure.

We are promised a work on the comparative anatomy of the brain, by M. Serres. There is a valuable book lately published, by Professor Tiedman, on the Developement of the Parts of the Human Brain, at the different periods of Life. Some account of this may be found in the "Additions a l'Anatomie Generale de Bichat," by Professor Beclard, a gentleman who has already shewn himself to be one of the first anatomists of France.

It does not require any particular rules to enable the dissector to trace the nine nerves to the parts of the brain from which they are said to arise; the filaments require only to be followed.

The bulbous part of the OLFACTORY NERVE will still be visible, lying on the anterior lobe; upon tracing it back, it will be found to arise, by two or three filaments, near the fissura Silvii; these roots may be generally traced to the corpus striatum. In tracing each of the OPTIC NERVES back from their union, we shall see a flattened band, called TRACTUS OPTICUS, turning round the crus cerebri, to take its origin from the thalamus opticus. The MOTOR OCULI requires no dissection: it is seen to arise from between the crus cerebri and nodus cerebri. The TROCHLEARIS is so small, that we frequently destroy it, in removing the brain from the scull. When preserved, it may be traced, past the crura cerebri and cerebelli, to the lateral parts of the fourth ventricle. The TRIGEMINUS cannot be mistaken, as it is the only nerve arising at the point of union between the crus cerebri and cerebelli. The ABDUCENS is also easily understood, for it arises from the point of union between the nodus cerebri and

Origin of the Nerves.

the spinal marrow. We may here see a number of small vessels entering into the substance of the brain, which, when pulled out, show why the French anatomists have described this nerve as arising from the *pars perforée*. The seventh, according to the common description, is divided by a small vessel, into two portions; the one (PORTIO DURA) arises from the posterior and lateral parts of the nodus cerebri; the PORTIO MOLLIS, deeper,—probably from the anterior and lateral part of the fourth ventricle.

It is difficult to follow the EIGHTH, as it arises by several distinct filaments, but all of them may be traced from the posterior column of the spinal marrow. The first set, forming the filament called GLOSSO PHARYNGEAL, arises from the edge of the corpus olivare: the next, the NERVUS VAGUS, a little lower down; but the third set of fibrils, forming the SPINAL ACCESSORY of the older authors, or the Superior External Respiratory of Mr. Bell, must be looked for in the dissection of the spinal marrow, as it arises as far down as opposite to the fourth cervical vertebra. The next nerve, the LINGUALIS, which is the last of the proper cerebral nerves, is seen arising, by several filaments, from the edge of the corpus pyramidale.

If we examine the nodus cerebri minutely, we shall find that the crura cerebelli unite, and the crura cerebri pass under them; whence the

Pons Varolii. part was called, by VAROLIUS, PONS. Upon the surface of the pons we see a furrow, called the RAPHE. If we cut the pons horizontally, so as also to cut the crura cerebri, we shall show the mixture of cineritious and medullary matter, which has been called the LOCUS NIGER; and in the section of the crura cerebelli, we shall find a stain of yellowish matter, called CORPUS RHOMBOIDEUM, or *dentatum*. In this view we shall also see the medullary tracts which pass down towards the corpora pyramidalia, and the transverse fibres which run at right angles to them. By separating the two corpora pyramidalia from each other, we may see bands running from one side to the other, so that here the bodies appear to decussate. In the section of the corpus olivare, a regular oval medullary substance is seen, surrounded by cineritious matter, and called CORPUS DENTATUM EMINENTIÆ OLIVARIS; small cords also project from the back part of the corpora olivaria, which have received the name of CORPORA RESTIFORMIA.

We may now look to the sinuses. In the first stage of the dissection, the LONGITUDINAL SINUS was traced to its division into the two

Sinuses. LATERAL SINUSES. In dissecting the velum interpositum, the vein called vena Galeni was seen carrying its blood, towards the middle of the tentorium, into a sinus, which is called the FOURTH SINUS: this runs to the point of union between the longitudinal and two lateral sinuses —the union of the four, forming the TORCULAR HIEROPHILI. On the lower edge of the falx, a very small sinus may be discovered, which is generally called the INFERIOR LONGITUDINAL, or FIFTH SINUS.—By pouring a solution of corrosive sublimate in muriatic acid, diluted with a large quantity of water, upon the base of the scull, the blood in the lesser sinuses will be coagulated, so as to make them apparent. This solution will, at the same time, make the nerves appear more distinct.

The sinuses in the base of the scull are generally named according to the parts on which they are situated, with the exception of the CAVERNOUS SINUS and CIRCULAR SINUS; the first of which is on the lateral part of the sella turcica; the other surrounds it. All the rest are included under the names of SPHENOIDAL, PETROUS, and OCCIPITAL; their particular appellations being given, according to the parts of those bones, on which they are situated.

As it will be necessary to destroy the muscles of the back before we can examine the spinal marrow, it ought not to be done at present, though the description of the manner of doing it, is introduced here.

The easiest way of opening the spinal canal, is to cut through the roots of the spinous processes with a saw, or, still better, with a large knife (a plumber's hacking knife) and a mallet, and then to tear up the processes with a pair of pincers. This will expose the sheath of the spinal marrow, which is a continuation of the dura mater. On opening the sheath, we shall see the medullary cord, surrounded by its proper coats, the tunica arachnoides and pia mater: but besides these, there will be also a membranous connexion seen between the lateral part of the spinal marrow and the sheath, which is continued, by distinct and pointed slips, from the sub-occipital nerve, to the second or third lumbar nerve. This membrane, from having some resemblance to the teeth of a saw, has been called the LIGAMENTUM DENTICULATUM.

The Spinal Marrow.

Ligamentum Denticulatum.

The spinal cord, at first view appears to be uniform; but when we remove the membranes, we shall see a fissure, which, on the posterior part, is continued from the calamus scriptorius; and on the anterior, from the fissure between the corpora pyramidalia; by these, the column is divided into two lateral parts, each of which is subdivided into an anterior and posterior portion. This we can more readily perceive, by examining the origin of one of the spinal nerves; for they have each a distinct root from the anterior and posterior portion. But to follow this subject farther, see the *dissection of the Spinal Nerves*.

MANNER OF EXAMINING THE BRAIN

TO DISCOVER THE

APPEARANCES OF DISEASE.

AS I cannot go fully into the description of the morbid anatomy of the brain, I shall only make a few remarks, with the hope of inducing the student to investigate the subject.

The skull should be opened, nearly in the same manner as described at page 5.

In cutting through the scalp, we ought to calculate how far the degree of fulness of its vessels is attributable to the position of the head after death; and, in raising the scull-cap, we should recollect, that the degree of resistance produced by the adhesion of the dura mater to the bone, will depend on the age of the subject, or on a particular form of the scull; the quantity of blood which escapes in tearing up the scull, will generally correspond with the condition of the vessels in the scalp.

The appearances of disease on the external part of the dura mater, frequently depend on the state of the scull. Thus, if there has been a puffy tumour of the scalp, in consequence of a blow, and if the bone be dead, there will probably be matter on the corresponding part of the dura mater; but if there has been a venereal caries of the scull, which has made slow progress, it is more likely that several layers of lymph will be found upon the dura mater.

If a piece of bone has exfoliated, or if a portion has been removed by the trephine, the hole will be found filled up by a fungous growth of the dura mater; but if, instead of this, the dura mater has ulcerated, there will be a protrusion of the brain. As tumours are very seldom found on the dura mater, unless there has been also disease of the bone, we must be cautious in pronouncing the large clusters of glandulæ Pacchioni, which are occasionally lodged in corresponding foveæ in the scull, to be fungous tumours.

The appearances said to denote a previous slight degree of inflammation of the dura mater, are very questionable. That red appearance, which is generally described as the effect of inflammation, may be washed off. After phrenitis, or violent injuries of the head, the vessels on the external surface of the dura mater, will be as much blood-shot, as the vessels of the conjunctiva are in ophthalmia, and layers of lymph will be occasionally found on its inner surface. In such cases, the other membranes will be also inflamed.

It is not uncommon, to find deposits of bone in different parts of the dura mater, and particularly in the falx. In three cases, in which these deposits were found in contact with the olfactory nerve, the patients had suffered much for a considerable time previous to death, from the sensation of unpleasant odours.

In cases of apoplexy, or very severe injuries of the head, we shall occasionally find a quantity of blood under the dura mater. It is highly important to observe the manner in which the blood is spread over the surface of the brain; as it will show the inutility of puncturing the dura mater after trepan, with the intention of evacuating blood which may be under it.

We should particularly recollect, that there is a natural adhesion between the dura mater and the other membranes, in the line of the longitudinal sinus, and that it always has a pocky, granulated appearance, which is often erroneously considered as the effect of disease.

Tunica Arachnoides.—This will be found thickened in all cases, where inflammation of the brain has existed for some time, and then, there will also generally be effusion of serum under the membrane. It is, perhaps, improper to attach much importance to this effusion, since it is found in almost every case of protracted disease,—as in fever, or in cases where the patient has died in consequence of irritation of any viscus, and particularly after operations on the bladder, or retention of urine. When we find this effusion, we may predict that there will be water in the ventricles.

Pia Mater.—The gorged state in which the vessels of the pia mater are frequently found, in consequence of the position of the head after death, is often called inflammation; but in the true inflammation, instead of the vessels being large and gorged with blood, they will be very small and numerous, and the membrane will be thickened.

Substance of the Brain.—In the infant it is very soft; it gradually becomes firmer until extreme old age, and then it is found occasionally softened; though, at the age of ninety-seven, I have seen it as firm, as that of a middle-aged person.

It is difficult to determine whether the great fulness of the vessels, is to be taken, as denoting any particular action during the life of the patient; since we often find an unnatural degree of fulness in the vessels of the brain, of persons in whom there were no symptoms of deranged functions during life.—I am, therefore, inclined to consider the fulness of the vessels, in the greater number of cases, to be in a great measure dependent on the position of the head after death, and this, particularly after cases of fever; for, in such cases, the blood, not coagulating, flows freely up by the deep veins, in which the valves are generally so imperfect, as to permit it to pass. We may often see a proof of the deficiency of the valves, in the quantity of blood which escapes, after the brain is removed, if the head be left in a depending position.

The air which is frequently seen in the vessels, is either generated by putrefaction, or rushes in, when the scull is torn up.

The substance of the brain is generally very tough and firm, in those who have suffered from mania; and in these cases, the convolutions on the surface are also very distinct, while after bad fevers and hydrocephalus it is generally much softened.

After epilepsy, we may expect to find solid tubercles in the substance; I have generally found them, near the base of the brain. There is also frequently a thickening and firmness of the cerebellum, amounting almost to tumour.

If the scull has been diseased, the inflammation may be propagated to the substance of the brain, and an abscess formed. In such a case, the disease can be traced from the external to the internal parts; but in a case of abscess, without disease of the bone, we may suspect that we are coming upon a diseased portion, when part of the substance of the brain is found to be of a green, and mottled colour.

The fungus, or hernia cerebri, in consequence of fracture of the scull and laceration of the dura mater, will be found to be formed by a protrusion of a part of the brain, on the surface of which, there are several layers of lymph, that give it the appearance of fungus. But if the tumour arise after exfoliation of the bone and sloughing of the dura mater, there will probably be a greater proportion of lymph on the surface; this has led some to doubt the fact, of there ever being a protrusion of the substance of the brain itself. In this latter case, an abscess will generally be found, extending from the fungus to the ventricle.

When a patient dies in a fit of apoplexy, we shall sometimes find only a very small clot—but, occasionally, a mass of firm blood, weighing some ounces. Where there is a large coagulum, the substance of the brain will be firm, and its vessels empty. In the greater number of these apoplectic cases, it is difficult to discover the source of the bleeding; and it is, with much reason, supposed to come most frequently from very small vessels; but if the patient has been suddenly seized, while drunk, and struggling, there will probably be rupture of a large vessel. If a patient has survived an attack of apoplexy, we may discover the cavity in which the coagulum lay.—The sides of it will be smooth and tough; and there will be serum, in place of the coagulum, which has been absorbed.

If a man has been suddenly killed, while in a state of health, the ventricles will, on examination, appear merely lubricated with a fluid; but in all cases where patients die of protracted disease, more or less water will be found in the ventricles.* In the acute hydrocephalus, there is frequently several ounces; in the chronic hydrocephalus, the quantity of water will correspond to the size of the head,—as, in this dis-

---

* In examining the head of a man who had suffered repeated attacks of phrenitis, I found the ventricles lined with a membrane which, from its smoothness, I supposed to be the arachnoid. Though it was so thick that it could be torn from the inner surface of the ventricle, still no vessels could be observed in it; they were, however, very numerous below it.

This would probably have been called *arachnitis* by some of the modern French pathologists; upon the observations which those gentlemen have made on this new disease, I shall only remark that in the numerous dissections which I have made of cases of phrenitis, I do not recollect having observed any other appearance denoting inflammation of the arachnoid membrane, except that degree of thickening which has been noticed by all pathologists.

I should here observe that in the case alluded to above, although there was a large quantity of fluid in the ventricles, there was no effusion of serum below the arachnoid membrane on the surface of the brain.

ease, the mass of the brain merely forms a sac for the water.

The state of the plexus choroides should be compared with the appearance of the pia mater, as it generally corresponds with it.

Small cysts, like hydatids, are so frequently found attached to the plexus choroides, that we can hardly consider them to be of importance; but there are a few examples on record, of very large cysts, or hydatids, having been found in the substance of the brain. In our Museum, there are two very fine specimens; one of them contained four ounces of fluid.

The Pineal gland is sometimes very soft, at other times it appears like a vesicle. I have so frequently found it in both of these states, that I cannot attach more importance to them, than to the gritty matter which is generally found in it.

So far, the examination should be conducted nearly in the same manner as that described for investigating the natural anatomy; but to prosecute it farther, the brain should be raised from the base of the scull.

I shall endeavour to make my remarks correspond with the order in which the parts will be presented when the brain is raised from the anterior, and carried towards the posterior part. —I shall, therefore, first observe, that if there has been disease of the ethmoid bone,—as from polypus of the nose, venereal caries, &c. we may expect to find a corresponding state of the anterior lobes of the brain.

It may be laid down as a general rule, that the carotid and vertebral arteries are always more or less ossified in a person above the age of fifty.

If a person has been blind of one eye, we should examine the corresponding optic nerve, which will probably be small and transparent, and endeavour to trace it to the thalami, so as to assist in deciding whether the nerves always decussate (for it is still a question;) though I may here observe, that when the left eye was blind, I have always found the right tractus opticus much smaller and more transparent than the other; and vice versa.

If there be matter in the cerebellum, we should look to the state of the temporal bone; for scrophulous caries in this bone will often be the cause of disease in the brain.

When there is water found lodging upon the scull after the brain is removed, we must not suppose that it has existed there, during the life of the patient, but that it has escaped from the several cavities during the dissection, and has fallen down to this part.—It may even fall into the sheath of the spinal marrow; but it must be, at the same time, admitted, that when there is water in the ventricles of the brain, there will generally be some found between the spinal marrow and its membranes, and perhaps even without its being produced in consequence of disease; in the prosecution of experiments on the spinal marrow of the ass, I have several times had occasion to open the sheath, between the occiput and atlas; and in every instance, on puncturing it, about two ounces of clear limpid fluid have escaped in a stream. This I have noticed, in a proportionate degree, in other animals.

In consequence of the difficulty of opening the spinal canal, we are frequently unable to ascertain, positively, whether the parts within are diseased, or not. Of late years, it has been a common opinion, that the spinal marrow is violently inflamed in cases of tetanus; but I suspect, that in the greater number of the cases which have been related, the appearance produced by the gravitation of the blood after death, has been mistaken for inflammation: and this I have been more convinced of, since I lately, with a view to ascertain the truth of this, examined the body of a man who had died of tetanus. Immediately on the death of the patient, I got the body laid upon the belly, instead of the common position: upon opening the spine, there was no appearance of that loaded state of the vessels on the posterior column, which has been considered as a proof of the previous existence of inflammation of the spinal marrow; but the anterior portion, which, in this case, had been the most depending part while the blood was gravitating, was covered with a congeries of distended vessels. I may here also observe, that if, in opening the spine, we puncture the membranes of the spinal marrow, part of the nervous pulp will be forced out in the form of a tumour. This will perhaps account for many of the tumours which are discovered on the spinal marrow. But it is not my intention to deny either the occasional inflammation of the spinal marrow, or the existence of tumours in it; for I have several times seen tumours, of firm consistence, in it, and similar to those which are occasionally found in the brain. I have, also, in many instances, seen the membranes highly inflamed,—and even matter on their surfaces extending down to the Cauda Equina.

INVESTIGATION OF THE STATE OF THE HEAD,

IN CASES OF SUDDEN DEATH.

WHEN called upon to investigate the state of the head in cases of sudden death, or of death from injury, we must be particularly guarded in giving an opinion; for it is exceedingly difficult to ascertain, whether many of the appearances are attributable to injury, or to previous disease, or to a change which has taken place after death. Of the difficulty of coming to a decision on this subject, I am the more convinced, the greater number of bodies I examine. As I cannot enter into the question fully, I shall only make a few observations, which, I hope, will induce the student to investigate the subject further.

The first thing we should attend to, is the possibility of the common appearance of bruises on the scalp, being only the effect of pressure on a particular part of the head, when the scalp is œdematous, and loaded with blood.

The question of whether there has been a fracture previous to death, is sometimes more difficult to decide, than a person, who is not accustomed to make dissections, could imagine. If the fracture has occurred immediately before the patient's death, there will be coagulated blood found upon the bone, and in the fissures; if the patient has survived for some time, there will be marks of inflammation, and perhaps pus, in contact with the scull; but if a fracture has been produced in making the examination, (which sometimes happens even in a very careful dissector's hands,) the blood in the fracture will not be coagulated, nor will there be any effusion around the portions. If, after a blow on the upper part of the head, there have been symptoms of fracture, and if we cannot discover one opposite to the part struck, we should look to the temples, or to the base of the scull.

It has been already remarked, that a blow on the scalp may be followed by abscess in the brain; but we ought to recollect, that a blow, which, in the greater number of constitutions, would be a mere trifle, will, in certain habits, be attended by a train of symptoms which may cause death.

If effusion of blood be found between the dura mater and scull, and if a bruise on the scalp corresponds to the part,—we may conclude, that it has been caused by the blow; but if blood is found between the dura mater and the brain, though we should discover the marks of blows, or even fracture of the scull, still the question may be,—might not the patient have been attacked with apoplexy during a struggle? An interesting question of this kind occurred at the

York Assizes, in the summer of 1820.—I shall here introduce the history of a case which occurred about twelve years ago, and at the dissection of which, I assisted. This case has always made a great impression on my mind, for, as I was then very young, I might have given an erroneous opinion upon it.

It is related in Dr. Cheyne's Treatise on Apoplexy.

"An industrious man returning home from his work, found his house empty of every thing,—the bed he was to lie upon, and the tools of his trade, sold for gin by his wife, whom he found in a gin-shop, where she had been drinking and dancing. He brought her home, and, in the passage of his house, struck her, and ordered her to go up stairs. She refused to go; he carried her upon his shoulders, and the contention continuing up stairs, he struck her again. There having been no one present, we have only the husband's account of her death. He said, that whilst sitting on her chair, she fell down, upon which he threw her on the bed, conceiving she was in a fit, such as he had seen her in formerly. Some of her neighbours coming in, found her dead. Mr. C. Bell was requested to examine the body of this woman. The man was afterwards tried at the Old Bailey, for murder, and Mr. Bell's deposition was nearly to this effect:—

"In the abdomen and thorax nothing appeared remarkable, further than that the stomach contained a quantity of gin; and that there was a blush of redness on the lower orifice of the stomach and duodenum. On the head, there were several bruises; but the bone was not at all hurt, and no extravasation appeared under the bone. On exposing the membranes of the brain, the vessels of the pia mater were empty of blood, as if from pressure. There was a serous effusion under the tunica arachnoides, and in the cavities of the brain, similar to what has been found in those who have died from intoxication. On the surface of the brain, there were what appeared to be spots of extravasated blood; but upon tracing them towards the base, they proved to be streams of blood which had flowed from a vessel ruptured in the base of the brain. The base of the brain was covered with coagulated blood, in which, also, all the roots of the nerves were involved. On dissecting the cavities of the brain, the blood was found to have penetrated into the ventricle, by perforating its floor. Upon taking out the brain, and tracing the vessels in the base, the anterior artery of the cerebrum going off from the internal carotid of the left side, was found torn half way across: from this source came the extravasated blood.

"The cause of this woman's death, was the bursting of the blood from the ruptured vessel, and the pressure on the brain, or, more correctly speaking, on the vessels of the brain. As to the cause of the rupture, M. Bell's opinion coincided with the best authorities in pathology, that there is a state of the vessels, in which an external injury or shock is more apt to produce rupture,—and drunkenness may be supposed to be the artificial state of excitement, which most resembles this state of the vessels. Being asked whether the blows were the cause of the rupture? he said he conceived it very likely that a shock would rupture the vessel: and being then asked, whether he conceived that this woman was more likely to have a vessel ruptured, from having been intoxicated? he was of opinion, that intoxication, and the struggle, were likely to produce such a degree of activity of the circulation in the head, that a less violent blow might produce rupture than what in other circumstances would have proved fatal."

The man was acquitted.

A case in many respects similar to this, occurred in February, 1822, but the man was condemned upon clear evidence of his having intended to commit murder.

In concluding this subject, I feel it my duty to state, that appearances similar to those which are generally considered sufficient proof of some injury having been inflicted, are so frequently found in the bodies of persons who have been supposed to die a natural death, that in a question of murder, I would state to a jury, that if the cause of the person's death, did not appear from collateral evidence to be sufficiently distinct to them, that they ought to receive with mutch reserve the evidence or reasoning of a medical man, upon the appearances which he may have noticed in examining the body. But still we ought, as anatomists, to claim the power of being the proper judges, as to whether the appearances in question may not have been produced by a cause unconnected with the supposed injury inflicted.

The confidence with which some medical men give their opinion in court, and the dogmatical stile of the greater number of writers on medical jurisprudence, must be quite revolting to the feelings of those whose opportunities have enabled them to see the difficulties in which all questions regarding the cause of morbid appearances are involved.—For farther illustration of the importance of this subject, I shall refer my reader to what is said on the diseases of the stomach.

DISSECTION

OF

THE MUSCLES

ON THE

FORE PART OF THE NECK.

THE fibres of the PLATYSMA MYOIDES, which is the first muscle to be dissected, are frequently so thin and indistinct, that a student will find it sometimes difficult to expose them, and particularly as they have neither origin nor insertion in *bone*.

A block of wood should be put under the shoulders, and the head fixed by a chain-hook to the table, so as to make the fibres tense.* After making an incision through the skin, in the line of the clavicle, and another along the base of the jaw, a third incision is to be made through the *skin only*, from midway, between the chin and the ear, to about three fingers' breadth from the sternal end of the clavicle. This last incision will expose the fibres of the platysma, about their middle. The dissection

Platysma Myoides.

* Previous to the dissection of the muscles of the neck, the student should particularly examine the os hyoides, and the external cartilages of the larynx.

should be continued, by cutting in the same line, first towards the larynx, and then towards the back part of the neck. In dissecting towards the fore part, the fibres of the sterno hyoideus will be in part exposed; and towards the back part, the fibres of the sterno cleido mastoideus will appear under the fascia, or condensed cellular membrane, in which the fibres of the platsyma terminate.

The platysma may be cut across, about its middle. The lower half is then to be carried towards the chest, by which we shall expose the fibres of the sterno cleido mastoideus; in doing this, we should begin at the inner angle of the flap, and dissect in an oblique direction, or we shall be obliged to cut in a line across the fibres of the sterno cleido mastoideus muscle, which will increase the difficulty of raising the cellular membrane. The same thing is to be recollected in lifting the upper portion.

Sterno Cleido Mastoideus.

In raising the lower portion, it will be necessary to cut through a layer of condensed cellular membrane, which passes from the inner surface of the platysma to the inner and lower edge of the sterno cleido mastoideus.—Were it not for this membrane, the muscles on the fore part of the larynx, would be now distinct.—When the upper portion of the platysma is dissected off, the maxillary half of the biventer superior, part of the submaxillary gland, and a portion of the parotid will be seen. It is difficult to detach the platysma neatly from the spinal edge of the sterno cleido mastoideus, as it is there, intimately connected with several lymphatic glands of the set called *concatenatæ*.

Previous to dissecting the small muscles which are now partially exposed, the origins and insertions of the STERNO CLEIDO MASTOIDEUS should be shown, after which, the muscle may be cut through about the middle; one half of it is then to be carried up towards the occiput, and the other towards the clavicle.*

There will now be little difficulty in exposing the small muscles, for the course of the fibres of several of them will be seen under a thin layer of cellular membrane, upon which, there are some small branches of the Descendens Noni Nerve.

---

* In laying bare the fibres of the sterno cleido, we must cut through several nerves: the principal one, is that passing upwards to the parotid, viz. *Superficialis Colli*,—the others are branches from the cervical plexus. In raising the muscle, some small arteries, and the nerve which perforates the muscle, viz. *Nervus Accessorius*, will be necessarily divided.—I would advise the student not to attend to those parts in his first dissection. An accurate display of the origins and insertions of the muscles will be a sufficiently difficult task for him. If he is anxious to see all the parts, he must also refer to the description given of the arteries, and the nerves, and particularly to the *surgical dissection of the neck*.

The STERNO HYOIDEUS, which is the most superficial, may be shown in its whole extent.— At present, we cannot exhibit the origin of the next muscle, (the OMO HYOIDEUS,) because it arises from the scapula; but by dissecting towards the shoulder, we shall find a central tendon, which divides this muscle into two parts, whence it has been also called DIGASTRICUS; and the term *inferior* is added to it, as there is another double bellied muscle situated under the jaw.

Sterno Hyoideus.

Omo Hyoideus.

The muscle which will be partially seen between the two last, is the STERNO THYROIDEUS. To expose it fully, the sterno hyoideus should be cut through the middle, or held aside. In dissecting the sterno thyroideus, the young student is liable to raise the origin of the THYREO HYOIDEUS, which runs from the thyroid cartilage to the os hyoides, and thus to give the appearance of two sterno hyoidei muscles. When the sterno thyroid is raised, one half of the THYROID GLAND will be seen; and if it be pulled aside, the small muscle which passes from the cricoid cartilage to the thyroid (CRICO THYROIDEUS,) may be shown.

Sterno Thyroideus.

Thyreo Hyoideus.

Crico Thyroideus.

The dissection of the muscles which run from the jaw to the os hyoides, should now be made.

As the most superficial muscle, the BIVENTER, or DIGASTRICUS SUPERIOR, is composed of two parts, it will be necessary to dissect in two dif

Digastricus Superior. ferent directions, to expose its fibres. The origin of the portion which runs from the mastoid process towards the os hyoides, may be first dissected. To see its origins, we must raise the lobe of the parotid; in doing this, we must cut through some veins and arteries. To shew the connexion of its middle tendon with the os hyoides, (which is only by a ligament,) we must raise part of the submaxillary gland, but we should, at the same time take care that we do not cut through the fibres of the stylo hyoideus, which are perforated by the tendon. The maxillary half of the muscle is to be dissected, by carrying the knife in a direction from the chin to the os hyoides, having previously stretched its fibres, by pulling the os hyoides towards the sternum with the chain-hook.

Mylo Hyoideus. The next muscle to be dissected, is the MYLO HYOIDEUS. But before its middle fibres can be seen, the portion of the submaxillary gland, which lies upon it, must be removed;—nor will its attachment to the centre of the jaw, or its connexion with its fellow, be seen, until the anterior portion of the biventer is raised.

If the mylo hyoideus be carefully raised from the jaw, and from its connexion with the mylo of the opposite side, the sublingual gland will in part be seen;—so will a large portion of the

Genio Hyoideus. submaxillary. On removing the latter gland,

TABLE OF THE SUPERFICIAL MUSCLES OF THE NECK.

Latissimus Colli, or Platysma Myoides. Or. By many delicate fleshy fibres, from the cellular substance which covers the upper parts of the deltoid and pectoral muscles. They pass over the clavicle adhering to it. They ascend obliquely, to form a thin muscle, which covers all the side of the neck.

In. 1. The fascia on the base of the lower jaw; 2. the depressor anguli oris, and the fascia on the cheek.

Use. It is said to assist the depressor anguli oris in drawing the skin of the cheek downwards; and, when the mouth is shut, it draws all that part of the skin, to which it is connected, below the lower jaw, upwards. A principal use of the muscle, is to assist the respiration and circulation.

Sterno Cleido Mastoideus. Or. 1. The top of the sternum, near its junction with the clavicle; 2. the upper and anterior part of the clavicle.

In. The mastoid process of the temporal bone and mastoidean angle.

Use. To turn the head to one side, and bend it forwards.

Sterno Hyoideus. Or. The cartilaginous extremity of the first rib; 2. the upper and inner part of the sternum; 3. the clavicle, where it joins with the sternum.

In. The base of the os hyoides.

Use. To pull the os hyoides downwards.

Omo Hyoideus, or Biventer Inferior. Or. The superior costa of the scapula, and the ligament that runs across the semilunar notch. Ascending obliquely, it becomes tendinous below the sterno cleido mastoid muscle: it grows fleshy again towards its—

In. Into the base of the os hyoides.

Use. To assist in pulling down the os hyoides.

Sterno Thyroideus. Or. The edge of the triangular portion of the sternum, internally, and from the cartilage of the first rib.

In. The inferior edge of the thyroid cartilage.

Use. To draw the larynx downwards.

Thyreo Hyoideus. Or. The lower part of the thyroid cartilage.

In. Part of the base, and the cornu of the os hyoides.

Crico Thyroideus. Or. The side and fore part of the cricoid cartilage.

In. The lower part of the thyroid cartilage, and its inferior cornu.

Digastricus. Or. The groove in the mastoid process of the temporal bone; it runs downwards, and forwards. The tendon passes through the stylo hyoideus muscle, and is fixed by a ligament to the os hyoides; then the tendon is reflected forward, and upward, and becoming again muscular, it has an

In. Into a rough part of the lower jaw, behind the chin.

Use. To open the mouth, by pulling the lower jaw downwards; when the jaws are shut, to raise the larynx, and, consequently, the pharynx, in deglutition.

Mylo Hyoideus. Or. All the inside of the base of the lower jaw.

In. 1. The lower edge of the basis of the os hyoides; 2. into its fellow, of the opposite side.

Use. To pull the os hyoides upwards.

Genio Hyoideus. Or. A rough protuberance within the arch of the lower jaw, which forms the chin.

In. The basis of the os hyoides.

Use. To raise the os hyoides.

Genio Hyo Glossus. Or. The rough protuberance on the inside of the lower jaw.

In. The tip, middle, and root of the tongue, and base of the os hyoides, near its cornu.

Use. According to the direction of its fibres, to move the tongue; to draw its root, and the os hyoides, forwards; and to thrust the tongue out of the mouth.

Hyo Glossus. Or. The base, cornu, and appendix of the os hyoides.

In. The side of the tongue.

Use. To pull the tongue into the mouth, or to draw it downwards.

Linguális. Or. Base of the tongue.

In. Tip of the tongue.

Stylo Hyoideus. Or. The middle and inferior part of the styloid process.

In. The os hyoides, at the junction of the base and cornu.

USE. To pull the os hyoides upwards.

STYLO GLOSSUS. OR. The styloid process, and from a ligament that connects that process to the angle of the lower jaw.

IN. The root of the tongue, being insensibly lost on the side and tip of the tongue.

USE. To draw the tongue laterally or backwards.

STYLO PHARYNGEUS. OR. The root of the styloid process.

IN. The side of the pharynx and back part of the thyroid cartilage.

DISSECTION

OF THE

MUSCLES OF THE FACE.

IF the scull be still entire, an incision should be made, through the skin, from the middle of the parietal bone to the external part of the eye-brow,—and another, from the crown to the tip of the nose. The object of the first incision is, to expose the muscular fibres of the OCCIPITO FRONTALIS; and that of the second, to show those fibres which pass down on the nose. The next incision is to be made in a semicircular direction over the eye-brow, so as to meet the two first incisions. Another may then be made under the eye-brow, and be continued round the orbit, so that the eye-brow will be left, and the fibres of the ORBICULARIS OCULI be exposed.

Occipito Frontalis.

Orbicularis Oculi.

After completing the dissection of the occipito frontalis and the orbicularis oculi, with the CORRUGATOR SUPERCILII, which will be exposed by cutting through the nasal fibres of the occipito frontalis, we should pass to the dissection of the muscles of the mouth.

Corrugator Supercilii.

Orbicularis Oris.

An incision is to be made round the lips: this will expose the ORBICULARIS ORIS, into which the other muscles are inserted. By then carrying an incision from the zygomatic process to this circular cut, the ZYGOMATIC MUSCLES will be exposed; and if another is continued down to the angle of the jaw, from the same point, the fibres of the MASSETER will be seen;—but, in doing this, we must take care that we do not wound the *parotid duct*, which crosses the face, nearly in a line drawn from the upper part of the lobe of the ear to the ala of the nose.

Zygomatic Muscles.

Masseter.

Buccinator.

By dissecting down the flap of skin between the two last cuts, the BUCCINATOR will be exposed. A large portion of fat will be generally found running between this muscle and the edge of the masseter, but so loosely attached, that it may be pulled away with the fingers.—As, in this dissection, we do not value the skin, we should make another cut from the angle of the mouth, obliquely, towards the outer part of the jaw, so as to expose the TRIANGULARIS, or DEPRESSOR ANGULI ORIS.

Depressor Anguli Oris.

The muscles which have been named, may be fully shown by dissecting in the direction of the incisions pointed out: but the dissection of many of the muscles of the mouth will be found very difficult, and particularly those about the chin, on account of the mixture of their fibres.

with the integuments into which they are inserted.*

The muscles of the nose and upper lip, may now be dissected.

A cut should be made from the inner angle of the orbit, down to the middle of the circular cut round the mouth: this will expose the fibres of the LEVATOR LABII SUPERIORIS ALÆQUE NASI, between which, and the zygomaticus, the LEVATOR ANGULI ORIS will be found; and if we raise the levator labii superioris alæque nasi, the LEVATOR PROPRIUS will be seen. The COMPRESSOR, OR DILATOR NARIS, may be exposed, by dissecting down from the cut that was made from the tip of the nose towards the last incision. Muscles of the Nose and Upper Lip.

There are still two muscles to be shown, viz. the SUPERBUS, OR LEVATOR LABII INFERIORIS, and the DEPRESSOR LABII SUPERIORIS. To show the superbus, we should turn down the lower lip, and dissect the membrane from the root of the incisors.

The DEPRESSOR LABII SUPERIORIS will be found, by lifting the upper lip, and raising the membrane which covers the upper incisors.

---

* The dissection of these muscles will be facilitated by putting a little horse hair into the mouth.

TABLE
OF
THE MUSCLES OF THE FACE.
ARRANGED IN THE ORDER IN WHICH THEY ARE TO BE DISSECTED.

OCCIPITO FRONTALIS. OR. The superior transverse ridge of the occipital bone, and part of the temporal bone. A tendinous web covers the cranium, which terminates forward in a fleshy belly (the frontal portion): this muscular portion covers the frontal bone.

IN. 1. Into the orbicularis palpebrarum; 2. into the skin of the eye-brows. It sends down a fleshy slip upon the nose.

USE. It draws up the skin of the forehead, and raises the eye brows.

CORRUGATOR SUPERCILII. OR. The internal angular process of the os frontis.

IN. The skin under the eye-brows, near the middle of the arch.

USE. We have no power over the individual muscle. The corrugators knit the eye-brows, and are antagonists of the last muscle.

ORBICULARIS OCULI. OR. 1. By many fibres, from the edge of the orbitary process of the superior maxillary bone; 2. from a tendon near the inner angle of the eye. These run a little downwards, then outwards, over the upper part of the cheek covering the under-eye lid, and surround the external angle. Being loosely connected only to the skin and fat, they run over the superciliary ridge of the os frontis, towards the inner canthus, where they intermix with those of the occipito frontalis and corrugator supercilii; then, covering the upper eye-lid, they descend to the inner angle, opposite to the inferior origin of this muscle, adhering firmly to the internal angular process of the os frontis, and to the short round tendon which serves to fix the palpebræ and muscular fibres arising from it.

In. The nasal process of the superior maxillary bone, covering a part of the lachrymal sac.

This muscle should be divided into the external and internal muscles. There is the ciliaris covering the cartilages of the eye-lids, also, which are called cilia, or tarsi.

Orbicularis Oris. This consists of circular fibres, which surround the mouth, and constitute a great part of the thickness of the lips.

Use. To shut the mouth, and to oppose the muscles which converge to be inserted into the lips.

Part of this is sometimes described as a distinct muscle, viz.

Nasalis Labii Superioris. Or. The fibres of the orbicularis muscle.

In. The lower part of the septum nasi.

Use. To draw down the point of the nose, by operating on the elastic septum.

Zygomaticus Major. Or. The zygomatic process of the os malæ.

In. The angle of the mouth.

Use. To draw the corner of the mouth obliquely upwards.

Zygomaticus Minor.—(Often wanting.) Or. The upper prominent part of the os malæ, above the origin of the former muscle.

In. The upper lip, near the corner of the mouth, along with the levator anguli oris.

Use. To draw the corner of the mouth upwards.

Depressor Anguli Oris. Or. The base of the maxillary bone near the chin.

In. The angle of the mouth, uniting with the zygomaticus major and levator anguli oris.

Use. To pull down the corner of the mouth.

Depressor Labii Inferioris, or, Quadratus Genæ. Or. Broad and fleshy, intermixed with fat, from the inferior part of the lower jaw next the chin; runs obliquely upwards, and is

In. Into the edge of the under lip; extends along one half of the lip, and is lost in its red part.

Use. To pull the under lip and the skin of the side of the chin downwards, and a little outwards.

Buccinator. Or. 1. The alveolar part of the lower jaw; 2. the fore part of the root of the coronoid process; 3. the upper jaw; 4. the pterygoid process of the sphenoid bone.

In. The angle of the mouth, within the orbicularis oris.

Use. To draw the angle of the mouth,—to turn morsel in the mouth, and to place it under the ion of the grinding teeth.

Levator Labii Superioris Alæque Nasi. Or. he nasal process of the superior maxillary bone, here it joins the os frontis.

In. 1. The upper lip; 2. the ala nasi.

Use. To raise the upper lip and dilate the nostril.

By some, the next muscle is described as part of this.

Levator Labii Superioris Proprius. Or. The uperior jaw bone, below the foramen infra orbitale.

In. The upper lip and orbicularis muscle.

Levator Anguli Oris, or Levator Labiorum Communis. Or. The hollow on the face of the superior maxillary bone, between the root of the socket of the first dens molaris and the foramen infra orbitale.

In. The angle of the mouth.

Use. To draw the corner of the mouth upwards.

Compressor Naris. It consists of a few fibres, which run along the cartilage of the nose, in an oblique direction, towards the dorsum of the nose.

Or. The anterior extremity of the os nasi and nasal process of the superior maxillary bone, where it meets with some of the fibres descending from the occipito frontalis muscle.

In. The root of the ala nasi.

Use. This muscle is to expand the nostril; but as its name implies, it is supposed to compress the nose.

LEVATOR LABII INFERIORIS, or SUPERBUS. OR. The lower jaw, at the roots of the alveoli of the two dentes incisivi, and of the caninus.

IN. The skin of the chin.

USE. To pull up the chin, and, consequently, to raise and protrude the lip.

DEPRESSOR LABII SUPERIORIS ALÆQUE NASI. OR. The superior maxillary bone, immediately above the joining of the gums with the two dentes incisivi and the dens caninus.

IN. The upper lip and root of the ala nasi.

USE. To draw the upper lip and ala nasi downwards, and to compress the nostril.

DISSECTION

OF THE

DEEP MUSCLES OF THE NECK.

AFTER dissecting the small muscles of the face, we may remove them, and then examine the muscles of the jaw.

The TEMPORALIS and MASSETER may be easily dissected; but before we can form a correct idea of the other muscles, and of the deep muscles of the throat, we must make a section of the jaw. The most convenient method is, to cut out the portion which is between the symphysis and the insertion of the masseter; if we leave a small portion of the symphysis, we shall still have a very good view of the muscles which run from it to the os hyoides. Temporalis and Masseter

If, after examining these muscles, we pull the jaw towards the ear, we shall be enabled to dissect part of the PTERYGOIDEUS EXTERNUS, and PTERYGOIDEUS INTERNUS. (Here I may remark, that the young student is often confused in making the dissection of these two muscles, in consequence of the externus being really the most *internal* of the two.) To expose the pterygoidei completely, it will be necessary to cut away the insertion of the temporalis, and the origin of the masseter. Pterygodei.

After the origins and insertions of the two pterygoid have been seen, the portion of the jaw should be entirely removed, which will be easily done, by forcing the condyle from the glenoid cavity.* The mouth is then to be thoroughly cleaned; and to do this effectually, it will be necessary to push pieces of sponge into the larynx, pharynx, and posterior nares, as the secretions are constantly pouring from these cavities. A strong piece of twine should be put through the tongue, by which it may be pulled out and extended.

Arches of the Palate.

When we look into the throat, we shall see the SOFT PALATE, OR VELUM PENDULUM PALATI. At the posterior part of this, we see the UVULA, and on the lateral parts, the two ARCHES,—the ANTERIOR and POSTERIOR. The spaces between the two, being occupied by the TONSILS, or AMYGDALÆ.

Constrictor Faucium.

The anterior arch is formed by a fold of the mucous membrane, and a few muscular fibres: these may be now exposed: they form the muscle, called CONSTRICTOR ISTHMI FAUCIUM. The posterior arch is also formed by a muscle, (the PALATO PHARYNGEUS,) but this should not be dissected yet.

* It will be a great advantage in this view, if both sides of the jaw can be removed.

We have now two very difficult muscles to examine, viz. the CIRCUMFLEXUS, OR TENSOR PALATI, and the LEVATOR PALATI. Before these can be exposed, all the fibres of the pterygoidei must be removed; and as they arise, one from each side of the EUSTACHIAN TUBE, we should pass a probe into it, so as to mark its situation. The tube will be seen by raising the soft palate. Tensor Palati and Levator Palati.

The circumflexus, or tensor, will be found arising from the temporal bone, and covering the upper part of the Eustachian tube; its tendon passes towards the internal pterygoid process of the sphenoid bone; and, after passing over the hamular, or hook-like process, in the manner of a rope, it is spread upon the soft palate.

The levator arises from the lower edge of the tube, from which it passes directly to the middle of the palate. Levator Palati.

The palato pharyngeus, which forms the posterior arch, will be found immediately below the last muscle; it passes down, to unite with the constrictors of the pharynx. Palato Pharyngeus.

The muscular fibres which are described as forming part of the uvula, and which are called AZYGOS UVULÆ, may be seen by merely raising the mucous membrane. Azygos Uvulæ.

The next stage of the dissection should be, to display the three constrictors of the pharynx;

Pharynx. previous to commencing the dissection, the pharynx should be stuffed with baked horse-hair, so as to make the fibres tense.—By pulling the parts over to one side, the bag of the pharynx may be exposed; but the dissection will be much facilitated, if the trachea and pharynx are cut through, immediately above the sternum, for then the parts may be held up, so that we may easily remove the cellular membrane, and which is all that is necessary to be done, to show the three orders of fibres. Those Constrictors. which are close upon the occiput, form the CONSTRICTOR SUPERIOR; the next, which run obliquely down to the thyroid cartilage, is called the CONSTRICTOR MEDIUS; and the third, which are continued up from the œsophagus to the os hyoides, form the INFERIOR.

As we have now finished the dissection of all the muscles which run to the throat, we may cut out the larynx, and the pharynx, with the tongue, and, after removing the muscles which may have been left attached to them, open the bag of the pharynx.

We may now take a cursory view of the parts which are seen here. (They will be described more particularly afterwards.)

We shall see the termination of the wide part of the PHARYNX in the ŒSOPHAGUS: the opening of the LARYNX will be also distinct; and Larynx. we may now understand, that, when the tongue is pushed back, this opening will be closed by the EPIGLOTTIS.

If we raise the epiglottis, we shall see the GLOTTIS, which is the space between the two ARYTENOID CARTILAGES. The deepest part of this opening, is called the RIMA GLOTTIDIS, as it appears like a slit formed between the two cords, called CORDÆ VOCALES.—On each side of these cords, there is a little cavity, called SACCULUS LARYNGIS.

The pharynx and tongue, with the os hyoides, may now be dissected from the larynx.—If the soft mucous coat is carefully raised with the forceps and scissars, from the back of the larynx, some of the muscles which move the internal cartilages will be exposed; the first seen, will be the two which run from the back part of the cricoid cartilage to the arytenoid cartilages, whence they are called the CRICO ARYTENOIDEI POSTICI. By then pulling the thyroid cartilage a little from the cricoid, a similar set of fibres will be seen on each side, passing from the lateral part of the cricoid to the arytenoid; these are called the CRICO ARYTENOIDEI LATERALES. A considerable mass of fibres may now be observed, passing from one arytenoid cartilage to the other. This is divided into three muscles, there being a TRANSVERSALIS, and two OBLIQUI: The fibres which run directly across, form the transversalis, and may be always easily shown; Muscles of the Larynx.

but the obliqui are so small, being merely three or four delicate fibres which pass from the base of the one cartilage, to the tip of the other, that they are often cut away with the mucous membrane.

There are still three other muscles described, as running from one cartilage to the other; but it will be only in the larynx of a very powerful man, that we shall see them distinctly. The names given to them, are sufficiently descriptive of their course,—THYREO ARYTENOIDEUS, THYREO EPIGLOTTIDEUS, ARYTENO EPIGLOTTIDEUS. The only muscle on the fore part of the larynx, is the crico thyroideus,—which, in the first dissection of the neck, was seen passing from the cricoid to the thyroid cartilage.

We may now remove the small muscles, so as to show the cartilages and their ligaments, —which are named according to the cartilages which they unite together.

TABLE
OF
THE MUSCLES OF THE JAW AND OF THE DEEP MUSCLES OF THE NECK.

Temporalis. Or. 1. The semicircular ridge of the lower and lateral parts of the parietal bone; 2. the pars squamosa of the temporal bone; 3. the external angular process of the os frontis; 4. the temporal process of the sphenoid bone; 5. it is covered by an aponeurosis, from which it also takes an origin. The muscle passing under the jugum, has for its

In. The coronoid process of the lower jaw, which it grasps with a strong tendon.

Use. To raise the lower jaw.

Masseter. Or. 1. The superior maxillary bone, where it joins the os malæ; 2. the inferior part of the zygoma, in its whole length.

In. The outside of the angle of the upright part of the lower jaw.

Use. To pull up the lower jaw.

Pterygoideus Internus. Or. 1. The inner and upper part of the internal plate of the pterygoid process of the sphenoid bone; 2. the palatine bone. It fills the space between the two plates of the pterygoid process.

In. The inside of the angle of the lower jaw.

Use. To move the jaw laterally.

PTERYGOIDEUS EXTERNUS. OR. 1. The outside of the external plate of the pterygoid process of the sphenoid bone; 2. part of the adjoining upper maxillary bone.

IN. The outer and upper part of the angle of the lower jaw.

USE. To pull up the lower jaw, and for performing the grinding, or lateral motions.

CONSTRICTOR ISTHMI FAUCIUM. OR. The side of the tongue, near its root; from thence, running upwards, within the anterior arch of the fauces.

IN. The middle of the velum pendulum palati, at the root of the uvula. It is connected with its fellow.

TENSOR, or CIRCUMFLEXUS PALATI. OR. 1. The spinous process of the sphenoid bone, behind the foramen ovale; 2. the Eustachian tube. It then runs down along the pterygoideus internus muscle, passes over the hook or internal plate of the pterygoid process, and spreads into a broad membrane.

IN. The velum pendulum palati. Some of its posterior fibres join with the constrictor pharyngis superior, and palato-pharyngeus.

USE. To stretch and draw down the velum palati.

LEVATOR PALATI. OR. The extremity of the pars petrosa of the temporal bone, near the Eustachian tube, and from the membranous part of the same tube.

IN. The velum pendulum palati, and the root of the uvula. It unites with its fellow.

USE. To draw the velum upwards, so as to shut the posterior nares.

Palato-Pharyngeus. Or. The middle of the velum pendulum palati, and from the tendinous expansion of the circumflexus palati. The fibres are collected within the posterior arch behind the amygdala, and run backwards, to the top and lateral part of the pharynx, where the fibres are scattered, and mix with those of the stylo-pharyngeus.

In. The edge of the upper and back part of the thyroid cartilage, some of its fibres being lost between the membrane of the pharynx and the two inferior constrictors.

Use. Draws the uvula and velum downwards, and backwards: and at the same time, pulls the thyroid cartilage and pharynx upwards. In swallowing, it thrusts the food from the fauces into the pharynx.

N. B. A few of the fibres of this muscle have been called,

Salpingo-Pharyngeus. And are supposed to operate on the mouth of the Eustachian tube.

Azygos Uvulæ. Or. The extremity of the suture which joins the palate bones.

In. The tip of the uvula.

Use. Raises the uvula, and shortens it.

MUSCLES OF THE BACK PART OF THE PHARYNX.

CONSTRICTOR PHARYNGIS INFERIOR. OR. 1. The side of the thyroid cartilage; 2. the cricoid cartilage. This muscle is the largest of the three constrictors.

IN. It joins with its fellow, on the back of the pharynx; the superior fibres run upwards, and cover part of the middle constrictor; the inferior fibres run more transversely, and surround the œsophagus.

USE. To compress the pharynx.

CONSTRICTOR PHARYNGIS MEDIUS. OR. The appendix and cornu of the os hyoides, and the ligament which connects the os hyoides and the thyroid cartilage; the fibres of the superior part run upwards, and cover a considerable part of the superior constrictor.

IN. The middle of the cuneiform process of the occiput; it is joined to its fellow, at the back of the pharynx.

USE. To compress the pharynx, and draw it upwards.

CONSTRICTOR PHARYNGIS SUPERIOR. OR. 1. The cuneiform process of the occiput, near the condyloid foramina; 2. the pterygoid process of the sphenoid bone; 3. alveolar process of the upper jaw; 4. the lower jaw.

IN. A white line, in the middle of the pharynx, where it joins with its fellow, and is covered by the constrictor medius.

USE. To compress the upper part of the pharynx, and draw it upwards.

TABLE OF THE MUSCLES BETWEEN THE CARTILAGES OF THE LARYNX.

CRICO-ARYTÆNOIDEUS POSTICUS. OR. Fleshy, from the back part of the cricoid cartilage.

IN. The posterior part of the base of the arytænoid cartilage.

USE. To open the rima glottidis a little, and, by pulling back the arytænoid cartilage, to stretch the ligament, so as to make it tense.

CRICO-ARYTÆNOIDEUS LATERALIS. OR. From the cricoid cartilage, laterally, where it is covered by part of the thyroid.

IN. The side of the base of the arytænoid cartilage, near the former.

USE. To open the rima glottidis, by pulling the ligaments from each other.

ARYTÆNOIDEUS TRANSVERSUS. Passes from the side of one arytænoid cartilage, (its origin extending from near its articulation with the cricoid, to near its tip,) towards the other arytænoid cartilage.

USE. To shut the rima glottidis, by bringing these two cartilages, with their ligaments, nearer to one another.

ARYTÆNOIDEUS OBLIQUUS. OR. The base of one arytænoid cartilage;—crosses its fellow.

IN. Near the tip of the other arytænoid cartilage.

USE. When both act, they pull the arytænoid cartilages towards each other.

Very often, one of these is wanting.

Thyreo Arytænoideus. Or. The under and back part of the thyroid cartilage.

In. The arytænoid cartilage, higher up and farther forwards than the crico arytænoideus lateralis.

Arytæno-Epiglottideus. Consisting of a few fibres.

Or. From the side of the arytænoid cartilage.

In. The epiglottis.

Use. To pull down the epiglottis on the glottis.

Thyreo-Epiglottideus. Or. The thyroid cartilage.

In. The side of the epiglottis.

Use. To expand the epiglottis.

N. B. The crico thyroideus is described with those of the throat.

DISSECTION

OF

THE MUSCLES

ON

THE FORE PART OF THE CHEST.

THE first muscle to be dissected, is the PECTORALIS MAJOR. After the fibres have been made tense, by extending the arm and throwing it out from the body, an incision is to be carried through the skin, from opposite to the union between the bone and cartilage of the fifth rib, to the inside of the arm, at about a hand's breadth below the shoulder. The muscle may be then easily exposed, by dissecting in the line of the fibres, and by carrying the skin first towards the lower part of the chest, and then towards the clavicle; but we must recollect, that the course of the fibres changes a little, as we approach the clavicle. Pectoralis Major.

Upon the lower edge of the pectoralis, we shall see part of the SERRATUS MAJOR ANTICUS. The fibres of this muscle are more difficult to dissect than those of the pectoralis, because their course changes according to the ribs from which they arise;—in consequence of this, we shall not be able to make long incisions, as we Serratus Major.

could in dissecting the last muscle, but we must carry the knife in a sweeping direction along each portion. In tracing the fibres towards their origin, we shall see the slips of the obliquus externus, with which they indigitate; we shall not yet be able to follow the muscle to its insertion.

Before the insertion of the serratus can be shown, several muscles must be partially dissected, particularly the LATISSIMUS DORSI, the margin of which will be found running across the axilla; this portion of the latissimus should be exposed as far as its insertion into the humerus, and when this is done, we shall see, that the upper and lower boundaries of the axilla are formed by the pectoralis major and the latissimus dorsi.

Latissimus Dorsi.

Many vessels and nerves lie between the muscles, but they are obscured by fat and glands, which, though very important, may be cut through, in the present dissection.

Before tracing the latissimus dorsi, or serratus magnus, farther back, we should dissect upon the lower edge of the pectoralis major, so as to expose the margin of the PECTORALIS MINOR, OR SERRATUS MINOR ANTICUS. After a small portion of this is shown, we should raise the pectoralis major. This may be done by cutting its origins from the cartilages of the ribs, and by then carrying it towards the sternum,

Pectoralis Minor.

from which it is also to be separated, as far as to the clavicle. In doing this, we should keep all the cellular membrane attached to its lower surface.

Subscapularis & Teres Major.

The latissimus dorsi may now be followed towards the back part of the chest, and by then removing the fat, &c. from its inner surface, we shall expose the edges of the SUBSCAPULARIS and TERES MAJOR muscles.—These muscles are not yet to be followed to their insertions, but by making their *bellies* distinct, we shall expose the insertion of the serratus magnus into the base of the scapula.

Subclavius.

The whole of the pectoralis major may now be cut away, except a small portion, which should be left attached to the deltoid; this will enable us to see the SUBCLAVIUS, which runs from the first rib to the clavicle.

Intercostales

If we cut through the pectoralis minor, we shall have an opportunity of seeing the two sets of INTERCOSTAL MUSCLES; for both layers are found in the middle of the chest,—the EXTERNAL being deficient on the anterior, and the INTERNAL, on the posterior part.

Triangularis Sterni.

The muscle called TRIANGULARIS STERNI cannot be seen until the the sternum and the cartilages of the ribs are removed. The muscle will then be apparent on the inside of the sternum, without any dissection being necessary to show its fibres.

TABLE OF THE MUSCLES SITUATED ON THE FORE PART OF THE CHEST.

Pectoralis Major. Or. 1. The cartilages and bodies of the fifth, sixth, and seventh ribs; here it intermixes with the external oblique muscle of the abdomen; 2. almost the whole length of the sternum; 3. the anterior half of the clavicle.

In. Outside of the groove for lodging the tendon of the long head of the biceps. The tendon is twisted, before it is inserted.

Use. To move the arm forwards, or to draw it down, or to draw it towards the side.

Serratus Magnus, or Anticus. Or. The nine superior ribs, (missing the first), by digitations, which, resembling the teeth of a saw, have been called serrated origins.

In. The whole base of the scapula, internally, between the insertion of the rhomboid, and the origin of the subcapularis muscles; it is, in a manner, folded about the two angles of the scapula.

Use. To roll the scapula, and raise the arm.

Pectoralis Minor. Or. The upper edge of the second, third and fourth; or the third, fourth, and fifth ribs, near their cartilages,

In. The coracoid process of the scapula.

Use. To bring the scapula forwards and downwards, or to raise the ribs, when the shoulder is fixed.

SUBCLAVIUS. OR. The cartilage that joins the first rib to the sternum.

IN. Extensively into the lower part of the clavicle.

USE. To pull the clavicle downwards.

INTERCOSTALES EXTERNI. OR. The inferior edge of the rib, the whole length from the spine to near the joining of the ribs with their cartilages. (From this to the sternum, there is only a thin membrane covering the internal intercostal muscle.)

IN. The upper obtuse edge of the rib below, as far back as the spine.

INTERCOSTALES INTERNI. OR. Like the external muscle; the fibres run down, and obliquely backwards.

IN. Into the margin of the rib below. (From the sternum to the angles of the ribs.)

TRIANGULARIS STERNI. OR. From the posterior surface, and lateral edges of the sternum, and from the ensiform cartilage.

IN. Into the posterior surfaces of the cartilages of the third, fourth, fifth, and sixth ribs.

DISSECTION

OF THE

PARTS WITHIN THE THORAX.

When the muscles are removed from the fore part, the chest will appear of a conical shape, for each rib in succession from the first, forms the segment of a larger circle. We shall now see that it is the projection of the bones and muscles of the shoulder, which gives the appearance of breadth to the upper part of the thorax; and this view will also explain, how a wound which has only passed under the shoulder, may be supposed to have penetrated the chest.

Shape of the Chest.

There are several modes of opening the thorax.—The following method will be found useful, when we wish to acquire a general idea of its contents, and are not anxious to preserve the bones or the small arteries.

On opening the Thorax.

The middle of the cartilages of all the seven superior ribs, except the first, are to be cut through with the knife;* the bony parts of the same ribs are then to be sawed through at a

* We shall be generally obliged to use a saw, to cut through the cartilages of a person above the age of forty.

point near the angles, taking care not to encroach upon any of the muscles of the back, except the latissimus dorsi.

The intermediate portions of the ribs may then be removed;—the sternum will remain supported in its natural position, by its union to the first rib and clavicle above, and to the remaining ribs below.

We shall now see, that the cavity of the thorax is divided into distinct parts, which are separated from each other by the septum called MEDIASTINUM. Mediastinum The lungs will be seen lying, collapsed, in each cavity; but this is not similar to their situation in a state of health, in the living body,—for, as there is then a complete vacuum in the chest, the lungs would be distended with air, so as to fill it accurately. The heart, covered with its pericardium, will be seen protruding its apex to the left side.

If there has been no disease in the chest, the serous membrane, called PLEURA, which covers Pleura. the lungs, and lines the inside of the ribs and diaphragm, will appear of a glistening colour. It is difficult for a student who studies anatomy from books only, to comprehend the folds and duplicatures of this membrane; for he is told, that it forms the *Pleura Pulmonalis*, *Pleura Costalis*, and *Mediastinum*. But, on examination of the body, he will find, that these terms are used, only to denote the several portions of the membrane. Perhaps the following mode of tracing the pleura will be explanatory of its folds, &c.; the student must first understand, that there is a distinct pleura in each side of the chest, *i. e.* one for each lung.

This membrane may be considered as similar to the peritoneum; and we may say, here, as in the description of the relation of the viscera of the abdomen to the peritoneum, that the viscera, though they appear to be *within*, are really *external* to the membrane. Taking this, then, for granted, the pleura of each side may be traced in the following manner:—If we pass the hand through the opening which has been made by removing the ribs, we shall feel the glistening surface of the membrane, covering the remaining portions of the ribs (this part is called

Pleura Costalis.

PLEURA COSTALIS.) If we then carry the finger along the ribs towards the spine, we shall feel the continuation of the same membrane: but we shall not be able to pass the finger farther in this direction, because the membrane is here connected with the root of the lungs, (forming

Ligament of the Lungs.

the LIGAMENT of the LUNGS,) but if we pull up the lungs, we may see the membrane passing from the root to the upper part,—whence we may trace it, over the surface, down into the fissures between the lobes, and at last, to the opposite part of the lung;—this portion, from its being continued upon the lung, is called

PLEURA PULMONALIS. If we still follow the membrane, it will be found to pass up from the root of the lungs, over the pericardium, to the sternum. If we then put the other hand into the opposite side of the chest, we shall feel that the approximation of the two pleuræ forms a septum or MEDIASTINUM. From the inside of the sternum, the membrane may be traced to the part at which we commenced. By referring to the dissection of the abdomen, it will be found that this mode of tracing the membrane is nearly similar to that, by which the peritoneum is followed from one side of the abdomen to the other, and that the lungs are thus proved to be as much external to the pleura, as the viscera of the abdomen are to the peritoneum. The analogy also holds good in regard to the structure of the two membranes; for if a portion of the pleura be torn off, its external surface will be found to be *cellular*, while its internal is *serous*. Pleura Pulmonalis. Mediastinum

Though, in reality, there is nothing difficult to comprehend in the form of the mediastinum, still students are puzzled by it, in consequence of the terms *anterior* and *posterior mediastinum* being occasionally used, to denote the *anterior* and *posterior cavities* of the mediastinum.

This confusion between the terms, has arisen in consequence of some anatomists having divided the septum into two portions,—calling that part which is anterior to the heart, the *an-*

terior or *pectoral* mediastinum; and the portion posterior to the heart, the *posterior* mediastinum.

Though there is good authority for describing the septum as divisible into an anterior and posterior portion, still I think that it will be more intelligible to the young student, if only one mediastinum be described, between the layers of which, there are certain spaces, or, if we will, *cavities*.

With the present view of the parts before us, we may easily comprehend how these cavities are formed. If we pass the hand into each side of the chest, we shall find that about three inches below the sternum, our fingers will nearly meet,—but not above that point, because the two pleuræ separate from each other, immediately below the sternum (this space has been

Anterior Cavity.

called the ANTERIOR CAVITY.) If we push our fingers below the heart, they will again nearly meet; but between this point and the spine, we shall find that the pleuræ do not come into close contact; the space between them is called

Posterior Cavity.

the POSTERIOR CAVITY. But in the student's anxiety to understand these two cavities, he often omits the most important of all, viz. the

Middle Cavity.

middle space, or cavity, in which the heart, and its pericardium, are situated.

To *see* the anterior cavity, we should cut through the lower end of the sternum, and carry it towards the neck; in doing this, the pleuræ are necessarily separated from each other, so that the anterior cavity will appear larger than it naturally is. The parts within this cavity, or, in other words, between the two pleuræ, are the remains of the THYMUS GLAND, and some small vessels, particularly a lymphatic trunk, which, however, is not visible unless it be injected.

When the chest is cut perpendicularly through, or when the diaphragm is dissected away, we shall see the POSTERIOR CAVITY,—this is formed by the pleuræ separating from each other, and passing to the sides of the spine, so as to leave a triangular space,—through which, the aorta, the œsophagus, vena azygos, the thoracic duct, par vagum, and some branches of the sympathetic, will afterwards be found to pass. When the upper part of the space is examined, a small portion of the bronchii, and some lymphatic glands will be found;—in the lower part of the cavity, we may perhaps include a portion of the vena cava ascendens; though both this, and the cava descendens, are more properly in the middle space.*

Contents of Posterior Cavity.

If we now examine the external surface of the pericardium, we shall find that a considerable part of it is covered by the pleura;—but as the lower part of the pericardium always adheres

Pericardium.

* Though these parts have been now described, it will be inconvenient to follow them in the first dissection.

strongly to the tendinous part of the diaphragm, neither this portion of it, nor of the diaphragm, can be lined by the pleura.

When we open the pericardium, we shall find that its internal surface is exactly similar to that of the pleura,—indeed this membrane may be taken as an example of the great serous membranes; for its connexions with the heart, are the same as those of the peritoneum with the viscera of the abdomen, or of the pleura with the lungs. There has been a homely simile often given, as explanatory of the connexion between the pericardium and heart, viz. the double night-cap on the head; but there is no necessity for such an analogy; for, by holding the bag of the pericardium open, we may trace the loose portion down towards the base of the heart, where the great vessels arise; from this, it is reflected upon the anterior surface of the heart, to which it adheres very closely;—if we trace it to the opposite side, we shall find it again reflected from the base, to form the bag.

We may now examine the general appearance of the external parts of the heart.

General appearance of the Heart.

If the pericardium has been slit open on the fore part, the VENTRICLE which is called the RIGHT, though from its position, we should be more inclined to call it the *anterior*, will be the first part seen. The RIGHT AURICLE will probably be so distended with blood, as to project, even more than the right ventricle.—The LEFT VENTRICLE will not be *seen*; but by taking the heart in the hand, it will be at once distinguished, on the posterior part, by its firm fleshy consistence; for the right is comparatively loose in its texture, and feels as if wrapped round the left. The top of the LEFT AURICLE will be seen lapping round upon the upper part of the left ventricle; and from below it, a branch of the coronary artery, and of the coronary vein, may be traced towards the APEX of the heart. These vessels mark the division of the heart into the two ventricles, as they run nearly parallel, but a little to the left, of the SEPTUM CORDIS.

By cutting away the loose portions of the pericardium, we may show several of the great vessels of the heart, The VENA CAVA SUPERIOR will be most distinctly seen, because it is generally distended with blood.—Only a very small portion of the INFERIOR CAVA can be shown, as the lower part of the right auricle is nearly in contact with the diaphragm. The vessel which arises from the right ventricle, is the PULMONARY ARTERY: but very little more than the origin of this, can be seen, as it is covered by a portion of the ARCH of the AORTA. We cannot see the origin of the aorta at present, as it rises from the posterior part of the heart; nor are the PULMONARY VEINS visible in this view, as they are also situated on the back part.

Lungs. Before the heart and great vessels are cut out, we should take a general view of the lungs. If there be no preternatural adhesions of the lungs to the pleura, where it lines the ribs, their general figure will be easily understood. It will be seen, that the base of the lungs, or where they rest upon the diaphragm, is concave, answering to the convexity of the diaphragm; that they reach far below the anterior part of the diaphragm; and that they are pyramidal towards the upper part of the chest, answering to the pyramidal shape of the thorax.

Lobes. We shall see that the lungs of each side are subdivided into lobes. Those of the right side, generally into three,—two greater ones, and an intermediate lesser lobe; and the left, into two lobes. This, however, is sometimes reversed. The lobes are divided into groups of cells; and these again, into a series of smaller vesicles, into which air is admitted, by the minute and less rigid branches of the bronchii.

The lungs are generally of a reddish colour in children,—grey in adults, and whitish in old age.

Minute Structure. We shall find it advantageous to examine the minute structure of the lungs in the sheep or ox,—because it is essentially the same as in man. The lungs of those animals can be at any time procured in a healthy state, while, in the greater number of bodies, which we examine in the dissecting-room, the lungs are more or less diseased. The bronchii may be traced to their terminations in the air cells, upon which the branches of the pulmonary arteries and veins are distributed. In the turtle tribe, the air cells, are very large; they will be most distinctly demonstrated, by distending a portion of the lung with air, and by making various sections of it, when it is dried.

As the larynx and œsophagus have already been cut through, the heart and lungs may be now easily removed from the chest, by pulling them, with their vessels, &c. from their connexions to the spine, as far as to the diaphragm; and as the general examination of the viscera of the abdomen will probably be finished ere this time, a part of the diaphragm may be cut out along with the heart.

I shall now give only such a description of the manner of examining the heart, as will enable the student to shew the minute anatomy of it, in his second dissection.*

When the heart is laid with the apex uppermost, the lungs will so fall from it, that the ventricles and vessels will be more distinctly seen, than when the heart was in connexion with the other parts of the body.—But when the Dissection of the Heart.

* The heart and the great vessels should be completely cleared of their blood, by washing them in water.

base of the heart is turned up, the parts will appear very confused, because, not only the bronchii, or divisions of the trachea which pass into the lungs, will be presented,—but also, the aorta and œsophagus will be seen adhering to the heart. The œsophagus should be entirely removed, and also a considerable portion of the aorta; the divisions of the trachea should then be traced into the lungs; and in doing this, we shall see that the right portion, or bronchus, divides into three branches, corresponding to the three lobes,— while the left, is divided only into two. By now removing the remaining part of the pericardium, the branches of the pulmonary artery will be seen, and the pulmonary veins may be traced into the left auricle.

The lungs may then be separated from the heart, by cutting through the *four* or *five* pulmonary veins, and the branches of the pulmonary artery.

We may now examine the interiorof the heart, following, in our dissection, the course by which the blood passes through its cavities.

We should pass a probe, or the handle of a knife, from the inferior into the superior cava; and then lay open the vessels, and the cavity, in the line of the probe:—this will show the meeting of the great veins which form that part of the auricle that is called *sinus*,—to the lateral

Right Auricle. part of which, the portion properly called *auricle*, will be seen. This latter part is to be opened by the scissars, and then the muscular bands which are called MUSCULI PECTINATI, will be seen. Musculi Pectinati.

With this view before us, we cannot avoid seeing the opening into the ventricle, called OSTEUM VENOSUM;—if we push our finger into this opening, we shall feel the rough inner surface of the right ventricle. To open the ventricle, we should push the finger as far down as we can, and cut upon it; the opening may be enlarged, by cutting in a direction towards the pulmonary artery. If this does not give sufficient room for seeing the parts within the ventricle, a portion may be cut out. The first thing we shall notice is, that the interior of the ventricle is very irregular, in consequence of a number of muscular bands called COLUMNÆ CARNEÆ, running across it. We may observe that they are more numerous towards the osteum venosum, than towards the pulmonary artery;—and when we examine the osteum venosum more minutely, we shall find a set of these fleshy columns united with tendinous bands (CORDÆ TENDINEÆ) which expand into a membrane that is connected with the orifice. This structure forms a sort of valve; for when the ventricle contracts to push the blood into the pulmonary artery, these cords will be pulled so tight, as to prevent the blood from passing back into the auricle. As this apparatus is formed of three

Osteum Venosum.

Right Ventricle.

Columnæ Carneæ.

Cordæ Tendineæ.

distinct sets of *columnæ carneæ* and *cordæ tendineæ*, it is called the TRICUSPID VALVE.

Tricuspid Valve.

Pulmonary Artery.

If we now lay open the pulmonary artery, we shall find three distinct VALVES at its root, which, from their shape, are called SEMILUNAR. As these valves must be thrown down, when the vessel contracts upon the blood propelled into it by the ventricle, there can be little doubt, that their use is, to prevent the blood from regurgitating into the ventricle, when it relaxes to receive the blood, which, by the action of the musculi pectinati, is pushed into it from the auricle.

As the lungs have been cut away, we should (following the course of the *circulation*) pass to the examination of the left side of the heart.

Left Auricle.

The left auricle is to be opened by cutting upon a probe which has been passed into it, from one of the pulmonary veins. When it is fully opened, the same general appearances will be seen, as in the right; the finger is to be passed into the opening into the left ventricle, called OSTEUM ARTERIOSUM;—the cavity of the ventricle is then to be opened by following the rules which were prescribed for opening the right side.

Osteum Arteriosum.

Every part in this ventricle will be found essentially the same as in the right,—the only difference in the two ventricles being, that all the parts in the left are much stronger than in the right, since the blood is to be farther propelled by the left, than by the right. As there are only two sets of columns and cords to form the valve between the left auricle and left ventricle, and as they have some resemblance to a bishop's mitre, it has been called the MITRAL VALVE. The valves at the root of the aorta have certain little eminences in their centres, more distinct than those of the pulmonary artery. These bodies are, in both arteries, generally called CORPORA SESAMOIDEA.

Mitral Valve.

Corpora Sesamoidea.

I shall now describe the manner of showing the more minute structure of the heart. But I would not advise the young student to attend particularly to this, in his first dissection, for he may, at any time, have an opportunity of doing it, since the form of the hearts of quadrupeds, and of the greater number of warm-blooded animals, is, in all essential points, the same as that of the human body.

Minute Structure of the Heart.

We shall find, by the names given to the different parts of the heart, that the older anatomists took advantage of this; indeed, many of the terms will be much more readily understood by dissecting the heart of the sheep, or of the ox, than by examining such hearts as are found in those bodies which are generally brought into a dissecting-room.

We shall derive much assistance in comprehending the structure of the heart, as the principal agent in the circulation of the blood, by dissecting the hearts of the various classes of animals;—for then we shall understand, that the character of the heart varies according to the different systems of respiration.

The method which has been described for making the *first* dissection of the heart, may be nearly followed in making more a minute examination of it; but in opening the cavities, a little more attention should be paid to certain marks. In removing the heart from the body, we should always take a small portion of the diaphragm with the inferior cava.

To open the auricle, we should introduce a probe, or blow-pipe, into the lower cava, and convey its point to the projecting part of the auricle. If we now cut the auricle in the direction of the probe, the *Eustachian valve,* and every important part, will be avoided. Continuing to hold the heart nearly in the situation it lies, when in the body, the *septum,* which divides the right from the left auricle, will be seen,—and upon it, the remains of the FORAMEN OVALE. This *fossa ovalis* is an irregular depression, of an oval form, with its border, especially on its upper part, elevated into a ring. Its margin is white, and has somewhat the appearance of tendon. The part in the middle, which performed the office of a valve in the fœtus, is now white and firm. This membran-

Foramen Ovale.

ous portion seems, upon the lower part, to be continuous with the margin of the fossa,—while, upon the upper part, it goes behind it.

If the lower cava, where it expands into the auricle, be held open, a membrane will be seen stretching from the inner side of the margin of the foramen ovale, (this portion is sometimes called the *isthmus* of the foramen ovale,) round upon the part of the root of the vein nearest to the opening of the auricle into the ventricle: this is the EUSTACHIAN VALVE: it is like a duplicature of the inner membrane of the auricle. Eustachian Valve.

Behind the Eustachian valve, is the opening of the great coronary vein; which vein, running round the margin of the left auricle, gathers the blood from the smaller coronary veins. The little *semilunar valve*, on the mouth of this vein, was likewise first described by Eustachius.—Some small openings, of a size sufficient to admit bristles, may be found in different parts of the auricle. They were at one time, supposed to be ducts, and were called *foramina Thebesii*; but they are probably only the openings of some of the small veins of the heart, into the auricle. Foramina Thebesii.

The only other part to be observed in the auricle, which was not seen in the first general dissection is the TUBERCLE of LOWER. But this is one of those parts, the description of which, has been taken from the heart of the lower animals. It is nothing more than an emi- Tubercle of Lower.

nence, formed by a portion of firm fat, which, in a healthy heart, is found immediately at the angle, where the two venæ cavæ unite, to form the great sinus of the auricle.

Opening the Right Ventricle.

The right ventricle is now to be opened, by making an incision from the root of the pulmonary artery to the apex of the heart, and parallel with the right branch of the left coronary artery, but a little to the right of it. By an incision made in this direction, (care being taken to carry it no deeper than the thin sides of the ventricle,) none of the columnæ carneæ will be cut; for the ventricle will be opened exactly to one side of the septum of the heart. The incision may be continued round the base of the heart, by the root of the pulmonic artery and margin of the right auricle; or, the first incision may be continued round the point or apex of the heart, so as to lay the ventricle open, as if it were cleft or split.

Of the parts seen upon opening the right ventricle.—First, an irregular column of flesh is seen arising from that part of the ventricle which is laid back, and dividing into seven or eight delicate tendinous cords, which are expanded into a broad membrane that forms the anterior division of the tricuspid valve. From a little mammillary process of flesh, near the valves of the pulmonic artery, and where the surface of the ventricle is smooth, there are sent out, in three divisions, a great number of delicate cordæ tendineæ, which are all connected with the anterior division of the valve. The next division of the origins of the cordæ tendineæ, is from the septum of the two ventricles; from which they arise by separate pillars. And, again, from the back part of the ventricle, there is a strong column, having a double origin from the two opposite sides of the ventricle, and to which the great posterior division of the membranous valve is united. By the attachment of these three divisions to the tendinous circle which surrounds the opening between the auricle and ventricle, the tricuspid valve is formed. Parts seen in the Right Ventricle.

The smoothness of the ventricle towards the opening into the pulmonic artery, may be observed. When the pulmonic artery is slit up, its three semilunar valves will be seen. These valves are more frequently perforated in the edges, than those of the aorta.

Of opening the left side of the Heart. Introduce the blade of the scissars into one of the pulmonic veins, and, insinuating it into the part of the auricle, which projects by the side of the pulmonic artery, slit it up. There is little to be observed in this auricle: the musculi pectinati are not so strong, nor so evident upon its inside, as those of the right auricle. The pulmonic veins pass almost always into the cavity by four openings; those from the right lung, are closer together than the branches from the left.

Opening Left Ventricle.

To expose the left ventricle, make an incision as far towards the left side of the artery and and vein, which run down from the left auricle towards the apex, as the incision made to lay open the right ventricle was, to the right of these vessels. In opening this ventricle, there is less fear of cutting upon the columnæ carneæ, or upon the septum; for, as the right ventricle is open, the septum can be seen, and we can cut immediately on the other side of it; while the columnæ are collected in the further side of the ventricle, round the opening of the auricle, and are not much exposed to the knife. Continuing the upper part of the incision round under the projecting auricle, slit up the aorta, to show its valves: in doing which, that branch of the left coronary artery which comes out under the margin of the left auricle, must be cut through. When this ventricle is laid open, that part which is towards the septum, and more particularly, near the artery, will not appear rugged with the interlacements of the columnæ carneæ, or *lacerti*, as they are sometimes called. The columns which are connected with the mitral valve, are thick and short, and confined in a corner of the ventricle; nor do they spread their roots so extensively, as those of the right ventricle.

Turning our attention to the semilunar, or sigmoid valves, we may observe, in the child, that they are delicate and loosely floating membranes, variegated in part by a white opacity; while their edges are at some places so transparent, that there appears often to be deficiencies of the valve near the edge, when there are none. —There are, however, such deficiencies sometimes. In the adult, these valves acquire greater firmness and strength, and are opaque; and there is always on the middle of each valve, a little body, called CORPUS SESAMOIDEUM, or CORPUS ARANTII. Behind each of these valves, are seen the LESSER SINUSES OF THE AORTA, or, as they are sometimes called, SINUSES OF MORGAGNI; here the coronary arteries will be seen to arise.

Semilunar Valves.

When the heart of the fœtus is examined, we shall find that it differs very essentially from that of the adult. If we lay open the two auricles, we shall see an oval hole (FORAMEN OVALE) in the septum, which, in the adult, separates the one auricle from the other. The ventricles are nearly the same as in the adult; but from the pulmonary artery, a large vessel called DUCTUS ARTERIOSUS passes directly to the aorta. In the adult, it is found degenerated into a liga-

Fœtal Heart.

Ductus Arteriosus.

ment, which is called the *remains* of the ductus arteriosus.

The minute structure of the *walls* of the ventricles may be more easily shown, by plunging the heart into boiling water,—for then we may easily strip off the paricardium from the surface, so as to exhibit the different orders of muscular fibres which compose it.

Part of the aorta should be kept for the examination of the *coats of an artery*. About an inch of it may be distended with a piece of candle or bougie,—and another portion may be laid open: in the distended portion, we may show the coats, beginning at the *external*,—in the other portion, the *internal* may be shown first.

Coats of an Artery.

Anatomists have generally described only three coats in an artery,—but we may enumerate a fourth, by calling the cellular membrane between the muscular and internal coat, a distinct one.

The three proper coats are,—the *first*, CELLULAR, VASCULAR, OF TENDINOUS COAT; the *second* is the MUSCULAR COAT; and the *third* the INTERNAL.

The outer cellular coat of an artery may be separated into many layers; easily into three layers. These layers are, as they proceed inwards, gradually changed in their nature, from that of the general investing cellular membrane, by which the vessel is connected to the parts with which it is in contact; they are at last incorporated into a more regular coat, whence it has been called the *tendinous coat;* for it is dense, white, and elastic, and has much more toughness than the inner coats,—the inner surface of this membrane, viz. that which is contiguous to the muscular coat, is accurately defined, but its outer surface seems to degenerate imperceptibly into the nature of cellular substance,—whence it has been described as a *cellular coat;* the same part has also been called the *vascular coat,* because the small vessels, which ramify upon the larger trunks of arteries, (the VASA VASORUM,) run chiefly in it. These vessels are not Vasa Vasorum. in general, derived from the large arteries on which they lie, but come from some of the smaller branches of arteries. They are to the arteries, what the coronary arteries are to the heart. They supply and nourish the coats of the arteries; while the column of blood in their cavities, seems to have no such effect. To prepare these subordinate vessels, they must be injected minutely (before the artery is removed from the body) with size, or fine varnish injection, of a light colour, or of pure white. If a coarser, and dark-coloured injection be thrown into the trunks, after this minute injection, the light-coloured and fine injection will be pushed on-ward, while the coarse injection fills only the trunks; making thus a contrast between the large vessel and the ramifications of the vasa vasorum, upon its surface. The artery, when thus injected and prepared, may be dried and varnished, or preserved in spirits.

The MUSCULAR coat.—Having dissected these outer layers, the muscular coat appears. Its fibres run in circles round the artery;—no fibres run in the length of it, nor do the circular fibres pass completely round the artery. The canal will be found to be made up of large segments of small circles, irregularly combined, the extremities of which are intermixed, and seem lost among each other. When the arteries of a young body are examined, the muscularity of the vessel will be most observable in the arteries of the thigh. In an old body, the muscular coat may be divided into three or four laminæ.

Immediately under the muscular coat, there is a little cellular membrane, which has been sometimes called the *inner cellular coat*,—but it is hardly worthy of this term.

The internal coat is most easily demonstrated by merely laying the artery open. It is very difficult, unless the artery be diseased, to separate this from the other coats.

MANNER OF EXAMINING THE PARTS IN THE THORAX,

TO DISCOVER THE SEAT OF DISEASE.

THE common method of opening the chest, for the purpose of examining the state of the viscera, is, to make a longitudinal incision through the integuments,—to dissect them and the muscles towards the sides,—and then to cut through the cartilages of the ribs, and remove the sternum. This method has certainly the advantage of making the view of the parts within more distinct; but it is very difficult to sew the body up afterwards, so as to prevent it from appearing much disfigured. If we wish merely to take a general view of the state of the heart and lungs, the method described below will afford sufficient room, without the body being at all disfigured, particularly if a piece of adhesive strap be put along the incision, after it is sewed up; but when it is necessary to make a careful examination of the parts within the thorax, the common method must be followed. In closing the body, something should be put into the thorax to prop up the sternum.

Make an incision from opposite the cricoid cartilage to the umbilicus (if the abdomen is to be examined, the incision may be prolonged to the pubes,) and saw through the middle of the sternum. The portions of the sternum are then to be forcibly separated from each other, and a piece of wood or a proper instrument is to be placed between them.—To do this, a considerable force is necessary, for the parts must be pulled asunder until the ribs give way at their angles;—it will be most easily done by two persons taking hold of the sides of the sternum, and pulling against each other; their hands should be guarded, by putting a cloth between them and the surface of the sternum.

The first part, we should examine, is the Pleura. As it is a serous membrane, there will always be a certain quantity of fluid within it;—in the healthy state, there is only as much fluid as will moisten the surface of the membrane; but when there has been a general state of weakness, the fluid will be thrown out in greater quantity than the absorbents take up, and then the disease called *Hydrothorax*, will be formed. In such a case, we shall occasionally find more than three quarts of water within the pleuræ. When there is *anasarca* in other parts of the body, a certain quantity of fluid will be found in the chest.—It is also a very common appearance, in the greater number of those who have suffered from protracted disease of the viscera, or in children, who have died in consequence of *measles*. The cases which have occurred in the Cancer Ward of the Middlesex Hospital, have been sufficiently numerous, to prove, that this effusion is one of the most common causes of the death of those, who suffer from cancer of the breast. It is also important to know, that this, and a slight degree of inflammation, are very frequently the cause of death in those who have met with severe accidents, or who have undergone a great operation.—This is an important point in the practice of surgery. I shall refer the student to a paper upon the subject, in the Surgical Observations, by Mr. Bell.

The pleura is very subject to inflammation. In the case of common Phthysis, it will be found so thickened, and its smooth serous surface will be so altered in structure, that it will be hardly possible to recognize it. This may be considered as a chronic state of the inflammation; but if a patient dies of pneumonia, within a week after the first attack, a quantity of coagulable lymph, or inflammatory crust, will be seen upon the inner surface of the chest, and from which it may be torn, as a tremulous gelatinous layer; or, a jelly, which can be wiped away with a cloth, will be thrown out upon the surface of the lungs. These exudations approach, in their more advanced stages, to the appearance of the natural membranes, and can with difficulty be distinguished from them. When there is a vacuity in the thorax, from disease, as from the destruction of the lungs of one side, and when pus has been formed, there will generally be layers of coagulable lymph upon the inner surface of the pleura; or, we shall find a serous fluid in the bottom of the chest, with flakes of coagulable lymph, like membranes, floating in it.

When the pus is in great quantity, the disease is called *Empyema;* and this will also sometimes be found after injuries by falls. The *Vomica* is the name given to an abscess in the lung; but if this bursts into the cavity of the chest, it will form the *Empyema;* this, however, is not the species of this disease, for which we would propose the operation of *Paracentesis Thoracis.*

Of Adhesions of the Lungs.—Adhesions of the lungs to the pleura, where it lines the ribs, or where it covers the pericardium, are so frequent, that they need scarcely be considered as a disease,—at least, they are of no account, in investigating the cause of death; for it would appear, that the slightest inflammation, during any period of the person's life,—even from colds, which pass unobserved, produces adhesions, which are never afterwards removed.

In examining the state of the *lungs,* it is of much importance to distinguish between the effect of the gravitation of the blood, and the consequence of previous inflammation. From the body's lying in a horizontal posture after death, blood is often accumulated at the posterior part of the lungs,—giving them there a deeper colour, and rendering them heavier. In this case, there will be found no crowd of fine vessels, filled with blood, nor any other mark of inflammation of the pleura. Where blood is accumulated in any part of a lung, after death, from gravitation, it is always of a dark colour; but where blood is accumulated from inflammation, the part will appear florid. The lung which is loaded with blood, from gravitation, may be distinguished from that which is condensed by inflammation, by cutting into it; for then, the blood may be squeezed out, and the lung will regain its natural appearance;—but a diseased portion will feel denser and heavier, and when squeezed, the blood will not escape, nor will there be any of that crackling feel, which is felt in the healthy structure; and the interior of the substance, when cut into, will have much resemblance to the liver,—whence it has been called, by the French pathologists, *poumon hepatizé*.

The most common disease, which we are called upon to examine, is that of *Phthisis Pulmonalis*, or *Consumption*.

When we cut into the lung of a person who has died in the early stage of this disease, we shall find groupes of little white, or variegated bodies, which are called *Tubercles.*—They vary in size, from that of a pin's head to that of a bean. When the disease is farther advanced, the tubercles make the surface of the lung hard and irregular; and when cut into, they are found to have run into masses, in which there are little abscesses, or *Vomicæ*; some of the tubercles may still be distinct from the others, but when opened, they are also found to contain a thick, white pus. In those patients who have long borne out against the disease, large abscesses, or vomicæ, are found: in such cases, when the chest is opened, the lungs will be found compressed,—hard coagulable lymph will be exuded upon the surface of the pleura, and partitions will extend from the inner surface of the ribs to the collapsed and indurated lungs: sinuses of matter will be seen running among these irregular adhesions, and the lungs themselves, will contain small purulent abscesses, or large vomicæ, and will, in other parts, be full of irregular tumours, in all the various stages of inflammation and suppuration. There is occasionally, but very rarely, small tumours about the size of millet seeds found on the surface of the lung—the first example I saw was in the lungs of a sheep—I believe it to be the same species of tumor, as that lately described by the French physicians as being very common in France.

The state of the large vessels, in these great abscesses, is very extraordinary; for they will sometimes be found with open mouths, projecting into the sac,—more commonly, however, with their mouths plugged up with coagula, like the arteries of a stump, after amputation.

Tumours will sometimes be found projecting from the surface of the lungs, and widely interspersed in their substance, of quite a different texture from tubercles, being of a very vascular and porous, or cellular nature; perhaps these may be called *Sanguineous tumours*. Those upon the surface, are of a reddish colour, and are covered with a smooth membrane. They are often found in those subjects, in which there is a similarly diseased structure in the liver and lymphatic glands, and in the substance of the testicle. Indeed, when the lungs are diseased, we generally find that the lymphatic glands, and particularly, the mesenteric glands, are in the same state. There is one species of tubercle that is very rarely seen,—viz. a soft pulpy tubercle, of a light brown colour.

In a *broken-winded* horse, the air cells are sometimes found ruptured, so that several communicate with each other, and form large cysts. Something of the same kind has been seen in those, who have long suffered from asthma.

Such an appearance was found in the lungs of the famous Dr. Samuel Johnson. This has been called *Emphysema Pulmonum:* it is a very different affection from that of the *air vesicles*, which are occasionally seen adherent to the surface of the lungs.

Burst hydatids are occasionally coughed up; but as they are very seldom found in the lungs, it is supposed they are formed in the liver, and that by a process of ulceration, a communication is formed between the lung and the sac in the liver, containing the hydatids.

Earthy concretions are so frequently found at the roots of the lungs, that I am inclined to think they are very common in scrophulous constitutions; they are generally situated near the branching of the bronchii. And here, though the subject is not connected with these concretions, I may remark, that the first appearance of abscess in the lung will generally be found at the upper part,—and I think, more frequently on the left side, than on the right.

If there has been a cancer of the breast, which has extended to the bone, it will generally affect the lung also. I have found this most frequently in those patients, who have had that sort of cancer, which has been considered as a species of *Fungus Hæmatodes.* In examining the body of a person who has died of fungus hæmatodes, we should always attend to he state of the lungs, for they appear to be s frequently affected with this disease, as the ver.

If a patient dies of irritation in the larynx, he lungs will be generally found in a state of ongestion, and will not collapse; proving, that he patient has died in consequence of the gra- ual destruction of the lung, as a respiratory rgan, by the extravasation of serum into its ellular membrane.

In those children who die of Croup, the *mem- brane* may be traced into the branches of the ronchii, and the cells will be filled with puru- ent matter.

In those who die suddenly from the bursting of an aneurism of the aorta, or from *Hæmop- tysis*, the whole of the bronchii will sometimes be found quite distended with blood; in such cases, no air could have been drawn into the cells.

The first thing we should attend to, in the examination of the heart, is the state of the Pericardium. If the patient has suffered from a lingering disease, or if there be water in the pleura, we shall probably find some fluid in the pericardium; but a small quantity of water is so frequently found within this membrane, that we cannot attach much importance to it: indeed, this has been considered so natural a state of the pericardium, that the fluid has been called Liquor Pericardii;—but the quantity occasionally found, is so great that it must have impeded the action of the heart.

The pericardium is frequently found adhering to the heart. If we were to compare the number of cases which are now seen, of this, which appears to be a consequence of violent inflammation of the internal surface of the pericardium, with the importance which the older authors attached to the few cases recorded, we should be inclined to say, that the disease of pericarditis must be much more common now, than formerly. I have frequently found the lymph between the pericardium and the heart, a quarter of an inch in thickness: in such cases, the disease had been evidently chronic; as there were several distinct layers of lymph, and the most internal of which, I have been able to inject. But in those cases, in which patients die after thirty hours' illness, we shall generally find only a very delicate layer of lymph between the pericardium and the heart.

The surface of the heart which corresponds to the part of the pericardium, that adheres to the diaphragm, very often appears of a white colour, one portion, about the size of a shilling, being denser than the rest,—and sometimes a loose portion of membrane is attached to it; but this appearance is so very often found in the hearts of old people, that it cannot be considered of any importance.

Ossification of the substance of the heart will be more frequently found, than ossification of the pericardium.

The heart is sometimes monstrously enlarged; but we ought to make a distinction between the cases of enlargement. In a dropsical body, or that of a person who has evidently laboured long, under the effects of what is called a broken-down constitution, we shall find a large flabby heart, the walls of which are so soft, that, in examination, the finger will pass through them. If, in such cases, we examine the auricular valves, we shall probably find them slightly contracted; but if the heart is large, and if, at the same time, there be marks of long-continued irritation upon its surface, we shall probably find the valves of the aorta so diseased, as to have caused a certain degree of obstruction to the exit of the blood. The state of the heart, in such a case, is very analogous to that of a bladder, when there has been a stricture in the urethra.

The large flabby heart has been sometimes called *Aneurism*,—but this is a mistake; the true aneurism is very seldom found. In such a case, the heart is not generally enlarged: but, according to the best authorities, there is a projecting tumour from the side of one of the ventricles. In the only distinct case of aneurism of the heart, which I have examined, there was a cyst formed in the wall of the ventricle, which was not observable until the heart was opened: in this case, there was an opening in the cyst, which admitted a probe; and by this the blood had escaped into the pericardium.

Rupture of the heart is, certainly, a very rare occurrence, but, during the course of ten months, I met with three examples of it. One of the *right auricle*, of a young woman, from the history given by her friends, appeared to have been produced by a sudden fright. The other two examples were in the ventricles, and in old people, who, from the state of their bodies (which were brought into the dissecting room,) appeared to have been in full health previous to the moment of their death. In each of the three cases, the pericardium was stuffed with blood.

In examining the interior of the heart, we should proceed in the same manner as if we were dissecting it, to show the natural anatomy. In the right auricle, we may perhaps find the foramen ovale open; but this is so common, that we cannot attach much importance to it. I have found an opening, which would admit four fingers, in the septum auriculorum, of the heart of a strong drayman, who dropped down dead in the streets, in consequence of rupture of the aorta. It did not appear that this man had ever suffered from any affection, that could be referable to the state of the heart; and the circumstance of his having died from rupture of the aorta, affords an argument against supposing, that the action of the heart had been deteriorated by this opening.

The tricuspid valve is very frequently ossified; but, unless we find this in the heart of a young person, we should not attach much importance to it. Within the right ventricle, we shall generally find more blood than in the left; and in that state of coagulation, which has, by many, been called *Polypus*.

That these polypi are, for the most part, formed after death, there can be little doubt; but still there are circumstances which have induced many to believe, that they are formed during life. They are often found in layers; and this, it is said, argues a successive formation; or they are attached to the sides of the arteries, where their coats are diseased,—and their attachment does not appear to be accidental, or owing to the simple coagulation of the blood. In many instances, however, when these coagula are remarkably firm, and such as we might suppose were formed during life, we shall probably find that the extremity, which is loose, lies in a direction contrary to the course of the blood; a direction, in which we must be sensible, it could not have remained during life, for it must have been driven in the direction of the current of the blood, while the root was attached to the wall of the ventricle. In the centre of many of these coagula, there is an oily fluid, so similar to pus, that I have seen such cases exhibited, as examples of abscess in the interior of the heart.

Abscess in the walls of the ventricle, is a very uncommon case; I have only seen one or two examples of it: but I have dissected a heart, in the muscular substance of which, there were tubercles, which, though not in a state of suppuration, might, from their appearance, be called scrophulous.

Malformations of the Heart.—We sometimes see an opening in the septum ventriculorum: several preparations of this kind are preserved in our Museum, in Great Windmill-street,—one of these, was taken from the body of a gentleman, fifty-six years of age, who had, six hours previous to his death, gone through the exercise with the musket, without suffering any inconvenience.

In dissecting a *Puer Cæruleus*, we shall generally find, that the pulmonary artery is very small, or that it passes into the aorta. In several of these cases, there will be a hole found in the septum, so that if a probe be pushed from the aorta, it will pass as easily into the right, as into the left ventricle.

The valves of the pulmonary artery are very seldom found diseased. In the left auricle, we seldom see any marks of disease, but the ostium arteriosum is very often contracted; indeed, the whole apparatus of the mitral valve, is more frequently ossified than the tricuspid.

Within the left ventricle, we shall find the same *polypi* as in the right, but not in the same quantity, as the blood is generally propelled from this cavity, in the last struggles. The most common appearance of disease in the heart, is ossification of the valves of the aorta. I am inclined to think, that this is so far a natural consequence of old age, that it does not produce much distress in a person above the age of sixty; but in a young person, whose left ventricle is still in a vigorous state, the consequences are terrible; for, we find the heart sometimes increased to nearly the size of that of a bullock, and bearing evident marks of inflammation.

The disease of *Angina Pectoris* is generally ascribed, and, perhaps, correctly, to ossification of the coronary arteries; but I am inclined to doubt the correctness of this opinion, when I find, in almost every body, above the age of fifty, that these vessels are more or less ossified. In many old people, who, I know, never had the slightest symptom of *angina*, I have found the coronary arteries like tubes of bone, through their whole course.

When the heart is very large, we shall not find the aorta increased in size, but, on the contrary, smaller than natural.

The aorta is frequently much dilated, immediately after it rises from the heart. This state of the vessel, is generally found in old people; and when such a vessel is opened, there will be, at certain points, white spots below the inner coat,—and, at other parts, distinct *concretions* which are generally called *ossifications*. This state of the aorta is so common, that we should not attach much importance to it, in drawing up a report of the dissection of a person advanced in years.

In the dissection of those aneurisms which occur so frequently at the arch, we generally find the aorta to be dilated through almost its whole course. We may suspect, that the dilatation which I have just described, as common in old people, may be the primary state of an aneurism; for if we minutely examine an artery which is dilated, we shall generally find one point thinner than the rest, which, had the patient lived longer, would probably have given way, and then an aneurismal tumour would have been formed at the part.

When a patient dies of a large aneurism which has formed a projecting tumour, we should proceed, in making the examination of it, nearly in the following manner:—

The integuments should be dissected off from the tumour on the breast, and then, after calculating how far the bones are affected, we should endeavour to remove the sternum with the heart and the aneurism attached to it. We shall then be able to make a more careful examination of the parts. If we make a section of the sternum, and of the aneurismal sac, we shall see the *clot*, probably, in several layers: the effect of the pressure on the bony part of the sternum should also be attended to. The sac itself will appear thick and lamellated, and studded with concretions, which are imbued in a matter resembling pus. The heart will probably be small, and firm in its texture; and the valves of the aorta will be thickened, and white with concretions.

The idea that it is necessary to cut through the internal coat of an artery, with the ligature, to ensure the closing of the vessel, is so common, that I think it necessary to entreat the student to attend to this subject, as far as he can, in the dissecting-room.

In preparing to inject a limb, where the arteries are in the state in which they are generally found in a patient with aneurism, if we apply the ligature tightly upon the pipe which is in the artery, we shall cut through, not only the internal, but also the muscular coat: so that only the cellular coat shall remain; if we then throw in the injection, it will most probably escape by the side of the ligature.—If we tie the artery in the same manner, at some distance down the limb, the coats will give way, when the injection is pushed, even with a moderate force, against the part tied. Here, then, is sufficient proof that the vessel must be very much weakened, by this mode of applying a ligature. As to the idea that the union of the artery will not take place readily, where the ligature does not cut through the internal coat, —I shall only say, that I have repeated the experiment which was made by Mr. Bell (when the notion of the necessity of cutting the internal coat was first advanced by Dr. Jones,) of putting a ligature so loosely round the carotid of an ass, as not even to obstruct the passage of the blood; yet, in due time, a clot was formed, lymph was thrown out, and the sides of the artery were united. I shall not dwell longer on this subject, but refer the student to the paper on the ligature of arteries, in Mr. Bell's Surgical Observations.

METHOD OF INJECTING THE HEART AND GREAT VESSELS.

I SHALL presently describe the manner of injecting and dissecting the vessels of the chest, head, and arms, but that the description of the heart may be more complete, I shall here shew the method of injecting it, so that it may be kept as a preparation.

Old subjects should never be taken for the purpose of preparing the arteries of any of the viscera: for, in old age, the fat is accumulated about the viscera both of the abdomen and of the thorax. Nor is the fat, here deposited, derived from the extremities; for although, during life, the limbs of old people seem shrivelled and lean, —yet the oil contained in them, makes them also useless for preparing: for although dried with the utmost care, the oil will occasionally flow out, and mix with, and dissolve the varnish, so that they never are clean nor lasting preparations. If the heart, therefore, has much fat accumulated about it, there should be no hesitation in sacrificing it as a preparation, to the attainment of some other point of inquiry.

If we wish to inject the heart, while it is in its natural situation, we must sacrifice almost all the parts of the chest to it; for it is a preparation so difficult to make, and so expensive, that, when we undertake it, we must not hesitate to destroy the other parts. The chest, for this purpose, is to be opened, by cutting through the sternum in its length, and by bending back the lateral portions, in the manner already described at page 109. The abdomen must also be opened. The viscera are to be pulled down, so that a large pipe may be put into the aorta, where it lies between the crura of the diaphragm. Another pipe is to be put into the vena cava ascendens, below the liver.

We must then make a dissection on each side of the neck, so as to expose the internal jugular veins, into each of which, a pipe should be put. The carotid and vertebral arteries are to be tied; so are the subclavian: or, perhaps, it will be better to put tight ligatures on the arms, just below the insertion of the pectoralis major.

Previous to the injection of the veins, a quantity of warm water should be thrown into them, so that it may pass into the several cavities of the heart. The water is then to be pressed out along with the coagula which are generally found in the cavities of the heart.—It is principally upon this, being carefully done, that a good injection of the heart depends.

When the parts are thoroughly heated, the *red* injection should be thrown into the ascending aorta. An assistant must now be ready to *knead* the injection through the valves of the aorta; (but, if possible, a probe should have been passed from the carotid, before it was tied, to break down these valves;) when the injection once passes the valves, it will quickly distend the left ventricle, which must be supported by the assistant,—the pericardium having been previously opened. By a little pressure, the wax will pass into the left auricle, and, from it, into the pulmonary veins. It will be well to make a small puncture, with a lancet, in the apex of the ventricle, to allow of the escape of any water or blood which may be still in this side of the heart.

The right side of the heart may be filled with blue or jellow injection, from the pipes which have been put into the several veins. It will be necessary to make a puncture in the apex of the auricle, to permit the exit of a certain quantity of water which will be left in the heart, even though much care has been taken to squeeze it all out, previous to the injection.

Perhaps the vena azygos may be filled, with the other veins; but if not, we must put a pipe into it, and inject it separately.

The thoracic duct may also be injected. If sought for in the abdomen, it will be discovered at the root of the mesenteric vessels, or between the right crus of the diaphragm and the aorta, It may be traced up under the diaphragm, along

tion so difficult to
when we undertak
destroy the other p
pose, is to be op
sternum in its len
lateral portions, i
bed at page 109.
opened. The vis
that a large pip
where it lies b
phragm. Anoth
vena cava ascen

We must the
of the neck, so
veins, into eac
The carotid ar
so are the su
better to put
below the ins

Previous t
tity of warn
so that it
the heart.
along wit
in the c
upon th
jection

Wh
red

lungs at their roots, and the vena cava inferior, and all the divided arteries, except the aorta, into which a pipe must be put. If we throw red injection into the pulmonary vein, it will fill the left auricle, left ventricle, aorta, and coronary vessels: during this part of the injection, an assistant ought to hold and compress the aorta immediately after its giving off the coronary arteries, so as to press the injection on in them: but as by this, the injection will be prevented from entering the aorta, it must be filled from the pipe which was inserted into it. The injection, escaping by the intercostal arteries, may be stopped by an assistant throwing cold water on the wax, as it flows from the vessels. —The yellow injection, thrown in by the vena cava superior, will fill the right auricle, ventricle, and pulmonary artery. The dissection required, is simply the removing the soft parts from the injected vessels.

OF THE MAMMA.

THE structure of the mamma should be attended to.—Much of its bulk is made up of the fat and cellular membrane surrounding the proper part, which is formed of a congeries of lesser glands, connected by ducts and vessels. The arteries of the gland come from different sources: those from the internal mammary, may be traced from betwixt the ribs, and through the pectoral muscles. It has also branches from the external mammary, or thoracic arteries, and from the intercostal,—all of which become much more important, when the gland is secreting milk, or when it is enlarged and diseased. A very remarkable inosculation may be traced between the internal mammary and the epigastric artery, by which the sympathy between the womb and the breast, has been, by some, explained: but this connexion depends upon other laws of the economy. The veins are all very large, when the gland is in an active state. The lymphatics pass chiefly towards the glands in the axilla,—but some will be found to pass to the glands above the clavicle.

We should observe the elastic structure of the NIPPLE or PAPILLA; the glandular structure of the skin around the nipple; the opening of the LACTIFEROUS DUCTS.—When distended, these ducts take an irregular varicose-like form. The ducts are contracted before they terminate on the nipple: and the structure of their orifices is such, as to allow the milk to pass only when the nipple is drawn out by the sucking of the child. The areola, or dark coloured zone surrounding the nipple, will be found of a paler colour in girls; it changes to a darker colour during menstruation, and in women with child, or when giving suck. The glandular structure of the areola and nipple, appears to be, for preventing excoriation: but, like all glandular parts, it is subject to disease.

It must be allowed by every one, that no question in pathology is more important, than the difference between harmless tumours of the breast, and those, which it may be necessary to extirpate.

Many opportunities of determining this question are afforded in the Cancer Ward of the Middlesex Hospital. Unfortunately, the proofs of the differences cannot be kept in the form of preparations, as it is almost impossible to preserve the characteristic appearances of the internal structure of the various tumours that occur. But the opportunities have not been lost, as accurate drawings of each species of tumour have been made, and are described by Mr. Bell in the Medico Chirurgical Transactions, and in his book on the Varieties of Cancerous Diseases.

When the age of the patient is taken into consideration, the external character of a tumour of the breast often forms a better criterion for the rule of practice, than any that can be deduced from the appearance of its internal structure when preserved. For we not only find, that different tumours, when cut into, resemble each other, but that even a section of the *virgin* breast may be mistaken, by those, who are not conversant with the subject, for that of a scirrhous tumour. Indeed, I believe, that if a section of a large healthy breast, when preserved in spirits, be compared with a preparation of a section of a scirrhous breast, which has not run into ulceration, even good judges of preparations, may be led to suppose, that both specimens are examples of the same disease.

DISSECTION

OF

THE MUSCLES OF THE BACK.

I SHALL now suppose, that the student, who is making the *first* dissection of the upper part of the body, has examined the general anatomy of the viscera of the thorax, and that he is prepared to turn the body, to expose the muscles of the back.

The first muscles, to be dissected, are those connected with the arms. The body should be put into such a position, that the fibres of those muscles may be made tense: this will be done by putting blocks of wood under the chest, so as to elevate it, and by letting the head and arms hang down.

To expose the first layer of muscles, and which is formed by the LATISSIMUS DORSI and TRAPEZIUS, an incision should be made along the whole length of the spine, and another from the last dorsal vertebra, in an oblique direction, to the spine of the scapula, along which, the incision is to be continued to the acromion. Another cut is then to be made from the acromion to the tubercle of the occipital bone. These three incisions will nearly mark the boundaries

Latissimus Dorsi and Trapezius.

of the *trapezius;* but, as the middle fibres of this muscle pass directly across, from the spine to the scapula, the dissection will be much facilitated, if an incision be made through the skin, from the first dorsal vertebra, to the middle of the spine of the scapula. The dissection is to be commenced at this cut, and is to be continued, first, towards the lower oblique incision, and then towards the upper, following the course of the fibres.

Another incision should now be made from the middle of the lumbar vertebræ, to the back part of the insertion of the latissimus dorsi into the arm. The fibres of this muscle will be easily exposed, by cutting in the direction of the last incision.

The first layer of muscles may thus be easily dissected, being almost entirely formed by the trapezius and latissimus; on the upper and outer part of the trapezius and latissimus dorsi, part of the RHOMBOIDEUS MAJOR will be exposed.

The trapezius should now be raised from its connexions with the spine, and be carried towards the scapula. In doing this, we shall, on the upper part of the neck, expose a small part of the COMPLEXUS, more of the SPLENIUS, and the greater part of the LEVATOR SCAPULÆ; which last muscle passes from the transverse processes of the cervical vertebræ, to the superior angle of the scapula. When the lower part of the

Rhomboidei. trapezius is raised, the greater part of the

RHOMBOIDEUS MAJOR and RHOMBOIDEUS MINOR, both of which arise from the spine, and are attached to the scapula, will be exposed.

The muscular part of the latissimus dorsi should now be cut through, at about six or eight inches from the spine. If we divide it nearer to the spine, we shall probably destroy a small muscle—the SERRATUS POSTICUS INFERIOR, which is intimately connected with the tendon of the latissimus. Between the upper margin of this small muscle, and the lower margin of the rhomboideus major, part of the LONGISSIMUS DORSI and SACRO LUMBALIS will be seen. Serratus Inferior.

After dissecting the origins and insertions of the LEVATOR SCAPULÆ, and RHOMBOIDEUS MAJOR and MINOR, these muscles may be cut through; and then, by sawing through the clavicle, or by dislocating it from the sternum, the arm may be removed from the trunk, if the muscles on the fore part have been also dissected. The arm should be wrapped up in a wet cloth, and laid in a cool place, so that it may be preserved, until the other muscles of the back are dissected. Levator Scapulæ.

We must now dissect those muscles which more properly belong to the spine and ribs. When the rhomboidei are thrown back towards the spine, the SERRATUS POSTICUS SUPERIOR will be exposed; and on raising this, the whole of the SPLENIUS may be seen. This muscle is Serratus Superior.

Splenius. generally divided into two portions,—SPLENIUS CAPITIS and SPLENIUS COLLI: that portion which rises from the cervical vertebræ, and is inserted into the head, being the splenius capitis,—while that which rises from the dorsal vertebræ, and is attached to the transverse processes of the cervical vertebræ, is called splenius colli. The splenius should now be cut through the middle: the upper half is to be reflected towards the occiput, and the lower towards the spine. This will expose the third layer of muscles; the principal ones of which, are the SACRO LUMBALIS and the LONGISSIMUS DORSI.

Longissimus Dorsi and Sacro Lumbalis

After showing the insertions of the sacro lumbalis, according to the description given in the annexed table, we may trace a portion of muscle, which appears to be a continuation of it, upon the neck. This, however, is a distinct muscle, and is called the CERVICALIS DESCENDENS. If we we follow the longissimus dorsi in the same manner, we shall find a muscle, also connected with its upper part, but not so distinct as the last muscle,—it is the TRANSVERSALIS COLLI; immediately upon the inside of which, and closely connected with it, is a set of fibres, which run from the lateral part of the vertebræ to the mastoid process, whence these fibres are called the TRACHELO MASTOIDEUS; or, sometimes, from their intricacy, the *complexus minor*.

Cervicalis Descendens.

Transversalis Colli.

Trachelo Mastoideus.

We shall now have a distinct view of the proper COMPLEXUS, which is a very large muscle. Complexus. That part of it, which is near to the spine, has a central tendon, whence this portion has sometimes been described as a separate muscle, under the name of BIVENTER. After showing the numerous attachments of the complexus, it is to be raised from the spinous processes, and from the occiput. The SEMI-SPINALIS COLLI will now Semi-Spinalis Colli. be seen, lying close upon the vertebræ; and there will also be a set of small muscles exposed, which run between the *vertebra dentata*, the *atlas*, and the *occiput*. The one which runs from the spinous process of the dentata to the occiput, is the RECTUS CAPITIS POSTICUS MAJOR; while the one which runs from the same point, to the transverse process of the atlas, is the OBLIQUUS CAPITIS INFERIOR; and from this Recti et Obliqui. transverse process, a set of fibres may be traced to the occiput, forming the muscle called OBLIQUUS CAPITIS SUPERIOR. The last of these muscles, which is a very short one, arises from the knob on the back part of the atlas, and is inserted into the edge of the foramen magnum: it is the RECTUS CAPITIS MINOR.

It is not necessary to give any directions for the dissection of the remaining muscles on the back. It only requires that their origins and insertions should be shown, according to the description given in the annexed table.

There are still certain muscles, connected with the spine and the ribs, that have not yet been described, viz. those upon the fore and lateral parts of the neck.

Longus Colli.

Directly on the fore part of the neck, there is, on each side, a long and thin muscle, called LONGUS COLLI. This is sometimes divided into an upper and lower portion: the upper portion runs, *obliquely*, from the transverse processes of the third, fourth, and fifth cervical vertebræ, to the atlas: while the inferior portion runs *longitudinally*, from the bodies of the three upper dorsal vertebræ, to the bodies of the six lower cervical vertebræ. This lower portion is often destroyed, by the vertebræ having been broken in turning the body in the course of the dissection.

Rectus Anti-Major and Minor.

Upon the outer part of the upper portion, there is a small muscle, which runs from the transverse processes of the third, fourth, fifth, and sixth cervical vertebræ, to the basilar process of the occipital bone: it is the RECTUS ANTICUS MAJOR:—the RECTUS ANTICUS MINOR being a very small muscle, which rises from the middle of the atlas, and passes to the edge of the condyle of the occiput. This last is often confounded with another trifling muscle—the RECTUS LATERALIS, which arises from the transverse process of the atlas, and is inserted between the condyle of the occiput, and the mastoid process.

Rectus Lateralis.

The muscles which have just been described, may be dissected before those of the back; so may also the SCALENI, which run from the transverse processes of the cervical vertebræ, to the first and second rib. These muscles are distinguished from each other, by the terms, SCALENUS ANTICUS, SCALENUS MEDIUS, and SCALENUS POSTICUS. We shall have no difficulty in showing the *anticus* as a distinct muscle, but the *medius* and *posticus* are so closely connected, that they are, by many anatomists, described as one muscle. Scaleni.

In the following Table, the muscles are arranged nearly in the order in which they should be dissected.

TABLE OF THE MUSCLES OF THE BACK.

Trapezius, or Cucullaris. Or. 1. The protuberance in the middle of the os occipitis, by a thin membranous tendon, which covers part of the splenius and complexus muscles; 2. from the transverse edge of the occiput, which extends from the protuberance towards the mastoid process of the temporal bone; 3. from the ligamentum nuchæ: below this, the muscle is connected with its fellow; 4. from the spinous processes of the two inferior vertebræ of the neck, and from the spinous processes of all the vertebræ of the back.

In. 1. The outer half of the clavicle; 2. the acromion; 3. the spine of the scapula.

Use. Moves the scapula according to the three different directions of its fibres; for the upper descending fibres may draw it obliquely upwards, the middle, being transverse fibres, directly backwards, and the inferior ascending fibres, obliquely downwards and backwards.

Latissimus Dorsi. Or. 1. The posterior part of the spine of the os ilium: 2. all the spinous processes of the os sacrum and vertebræ of the loins; 3. the seven inferior spines of the vertebræ of the back; 4. the extremities of the three or four inferior ribs. The inferior fibres ascend obliquely, and the superior run transversely over the inferior angle of the scapula, towards the axilla, where they are all collected.

In. By a strong thin tendon into the inner edge of the groove for lodging the tendon of the long head of the biceps: sometimes into the tendon of the triceps.

Use. To pull the arm backwards and downwards, and to roll the os humeri.

Serratus Posticus Inferior.—(Lying under the latissimus dorsi.)—Or. In common with that of the latissimus dorsi, from the spinous processes of the two inferior vertebræ of the back, and from the three superior of the loins.

In. The lower edges of the four inferior ribs, by distinct fleshy slips.

Use. To depress the ribs.

Rhomboideus. This muscle is divided into two portions, rhomboideus major and minor.

Rhomboideus Major. Or. The spinous processes of the five superior vertebræ of the back.

In. The basis of the scapula, below its spine.

Use. To draw the scapula obliquely upwards, and backwards.

Rhomboideus Minor. Or. The spinous processes of the three inferior vertebræ of the neck, and from the *ligamentum nuchæ*.

In. The base of the scapula, opposite to its spine.

Use. To assist the former.

Levator Scapulæ. Or. The transverse processes of the five superior vertebræ of the neck: the slips unite, to form a muscle, that runs downwards.

In. Near the superior angle of the scapula.

Use. To pull the scapula upwards.

Serratus Posticus Superior. Or. The spinous process of the three last vertebræ of the neck, and the two uppermost of the back.

In. The second, third, fourth, and fifth ribs.

Use. To elevate the ribs and dilate the thorax.

Splenius. Or. 1. The four superior spinous processes of the dorsal vertebræ; 2. the five inferior of the neck,—adheres to the ligamentum nuchæ. At the third vertebræ of the neck, the splenii recede from each other, so that part of the complexus muscle is seen.

In. 1. The five superior transverse processes of the vertebræ of the neck; 2. the posterior part of the mastoid process; 3. the os occipitis.

Use. To bring the head and upper vertebræ of the neck backwards and laterally, and, when both act, to pull the head directly backwards.

That portion which *arises* from the five inferior spinous processes of the neck, and is *inserted* into the mastoid process and os occipitis, is called splenius capitis; and that portion which *arises* from the third and fourth of the back, and is *inserted* into the five superior transverse processes of the neck, is called splenius colli.

Sacro Lumbalis. Or. In common with the longissimus dorsi.

In. All the ribs, where they begin to be curved forwards, by long thin tendons.

From the upper part of the six or eight lower ribs, rise bundles of thin fleshy fibres, which soon terminate in the inner side of this muscle, and are named MUSCULI AD SACRO-LUMBALEM ACCESSORII.

USE. To pull the ribs down, and assist to erect the trunk of the body.

LONGISSIMUS DORSI. OR. Tendinous superficially, and fleshy within. 1. From the side, and spines of the os sacrum; 2. from the posterior spine of the os ilii; 3. from all the spinous processes of the loins; 4. the transverse processes of the vertebræ of the loins.

IN. 1. All the transverse processes of the vertebræ of the back, chiefly by small double tendons; 2. by a tendinous and fleshy slip, into the lower edge of all the ribs, except the two inferior, at a little distance from their tubercles.

USE. To raise, and keep the trunk of the body erect.

From the upper part of this muscle, there runs up a round fleshy portion, which joins with the cervicalis descendens.

CERVICALIS DESCENDENS. OR. From the upper edge of the four or five superior ribs, and continued from the sacro lumbalis.

IN. The fourth, fifth, and sixth transverse processes of the vertebræ of the neck, by distinct tendons.

USE. To turn the neck obliquely backwards, and to one side.

TRANSVERSALIS COLLI. OR. The transverse processes of the five uppermost vertebræ of the back, and continued from the longissimus dorsi.

In. The transverse processes of the cervical vertebræ, from the second to the sixth.

Trachelo-mastoideus. Or. The transverse processes of the three uppermost vertebræ of the back, and from the five lowermost of the neck, by thin tendons.

In. The posterior part of the mastoid process.

Use. To assist the complexus; but it pulls the head more to the side.

Complexus. Or. 1. The transverse processes of the seven superior vertebræ of the back, and four inferior of the neck; 2. by a fleshy slip from the spinous process of the first vertebra of the back: from these different origins, it runs upwards, and is every where intermixed with tendinous fibres.

In. The protuberance of the os occipitis, and transverse line.

Use. To draw the head backwards, and to one side, when acting as an individual muscle; and, when both act, to draw the head directly backwards.

N. B.—The long portion of this muscle that is situated next the spinous processes, lies more loose, and has a roundish tendon in the middle of it; for which reason Albinus calls it *biventer cervicis*,—but if this part be called biventer, the term "complexus" is quite misapplied to the other portion.

Semi-spinalis Colli. Or. The transverse processes of the six uppermost vertebræ of the back: it ascends obliquely under the complexus.

In. The spinous processes of all the vertebræ of the neck, except the first and last.

USE. To move the neck backwards.

RECTUS CAPITIS POSTICUS MAJOR. OR. The spinous process of the second vertebra of the neck.

IN. The os occipitis, near the rectus capitis lateralis, and the insertion of the obliquus capitis superior.

USE. To pull the head backwards, and to assist a little in its rotation.

RECTUS CAPITIS POSTICUS MINOR. OR. The knob in the back part of the first vertebra of the neck.

IN. The os occipitis, near its foramen magnum.

USE. To assist the rectus major in moving the head backwards.

OBLIQUUS CAPITIS SUPERIOR. OR. The transverse process of the first vertebra of the neck.

IN. The os occipitis, near the mastoid process of the temporal bone, and under the insertion of the complexus muscle.

USE. To draw the head backwards.

OBLIQUUS CAPITIS INFERIOR. OR. The spinous process of the second vertebra of the neck.

IN. The transverse process of the first vertebra of the neck.

USE. To turn the head, by moving the atlas on the dentatus.

SEMI-SPINALIS DORSI. OR. The transverse processes of the seventh, eighth, ninth, and tenth vertebræ of the back.

IN. Into the spinous processes of all the vertebræ of the back, above the eighth, and into the two lowermost of the neck.

Use. To poise the spine and support the trunk.

Spinalis Dorsi.—(Lying betwixt the spine and longissimus dorsi.)—Or. The spinous processes of the two uppermost vertebræ of the loins, and the three inferior of the back.

In. The spinous processes of the vertebræ of the back, from the second to the ninth.

Use. To connect and fix the vertebræ, and to assist in raising the spine.

Multifidus Spinæ. Or. 1. The spines of the os sacrum; 2. the part of the os ilium where it joins with the sacrum; 3. the oblique and transverse processes of all the vertebræ of the loins; 4. the transverse processes of all the vertebræ of the back and those of the neck, except the three first, by distinct tendons, which soon grow fleshy, and run in an oblique direction.

In. Into the spinous processes of all the vertebræ of the loins and back and neck, except the first.

Use. To support the spine and trunk.

Interspinales Dorsi et Lumborum, and the Intertransversales Dorsi, are rather small tendons than muscles, serving to connect the spinal and transverse processes.

Intertransversales Lumborum. Are four distinct small bundles of flesh, which fill up the spaces between the transverse processes of the vertebræ of the loins, and serve to draw them towards each other.

Levatores Costarum. Are a set of muscles, each of which arises from the extremity of the transverse process of a dorsal vertebra, and is inserted into the upper border of the rib next to it.

MUSCLES SITUATED ON THE FORE PART OF THE VERTEBRÆ OF THE NECK.

Longus Colli. Or. 1. The bodies of the three superior vertebræ of the back, and lowest of the neck; 2. from the transverse processes of the third, fourth, fifth, and sixth vertebræ of the neck.

In. The fore part of the bodies of all the vertebræ of the neck.

Use. To bend the neck forwards, or to one side.

Rectus Capitis Anticus Major. Or. The points of the transverse processes of the third, fourth, fifth, and sixth vertebræ of the neck.

In. The cuneiform process of the os occipitis, a little before the condyloid process.

Use. To bend the head forwards.

Rectus Capitis Anticus Minor. Or. The fore part of the body of the atlas.

In. The root of the condyloid process of the os occipitis.

Use. To nod the head forwards.

Rectus Capitis Lateralis. Or. The point of the transverse process of the atlas.

In. The os occipitis, opposite to the foramen stylomastoideum of the temporal bone.

Use. To move the head a little to one side.

SCALENUS ANTICUS. OR. The transverse process of the fourth, fifth, and sixth vertebræ of the neck.

IN. The upper side of the first rib, near its cartilage.

SCALENUS MEDIUS. OR, The transverse processes of all the vertebræ of the neck.

(The nerves to the superior extremity, pass between this muscle and the former.)

IN. The upper and outer part of the first rib, extending from its root to within the distance of an inch from its cartilage.

SCALENUS POSTICUS. OR. The transverse processes of the fifth and sixth vertebræ of the neck.

IN. The upper edge of the second rib near the spine.

These three muscles bend the neck to one side. When the neck is fixed, they elevate the ribs, and dilate the chest.

LIGAMENTS OF THE SPINE.

THE ligaments of the spine should be examined after the muscles are dissected.

All the vertebræ, except the two first, (viz. the atlas and dentata,) are connected together, nearly in the same manner. The first set of ligaments to be dissected, may be easily understood, though, from their shortness, it will be difficult to show them, viz. the *capsular ligaments*, which bind the articulating processes together. As each vertebra has four articulating surfaces, there must be as many capsular ligaments, viz. two superior, and two inferior; these will be sufficiently distinctly seen, when the vertebræ are divided from each other.

If we remove the muscles from the anterior part of several of the bodies of the vertebræ, we shall see a dense fascia, which may be traced down the whole length of the fore part of the spine; this is called LIGAMENTUM COMMUNE ANTERIUS, OF FASCIA LONGITUDINALIS ANTERIOR;—we may also see, between the bodies of the vertebræ, the *mutter*, called INTERVERTEBRAL SUBSTANCE, and covering this, cross slips of ligament running from the body of one vertebra to the other; these last are the CRUCIAL LIGAMENTS. By dissecting away the muscles from the back part of a few of the vertebræ, we shall see tendinous ligaments running between the tips of the spinous processes; these are principally found in the vertebræ of the back and loins, and are called the FUNICULI LIGAMENTOSI. Between the remaining parts of the spinous processes, an indistinct membranous ligament may be seen, which is sometimes called the MEMBRANA SPINOSA; and between the transverse processes, from the fifth to the tenth dorsal, we shall find ligaments, called LIGAMENTA PROCESSUUM TRANSVERSORUM; but both these, and the *membrana spinosa*, are little more than condensed cellular membrane.

All the ligaments, already described, may be found without cutting the vertebræ; but before we can show the ligaments which are situated more deeply, we must take out two or three of the lower dorsal, or lumbar vertebræ, and cut down the spinal canal, so as to separate the bodies of the vertebræ from the processes.

Upon the back part of the body, a fascia, or ligament will be found, corresponding to that which was seen on the fore part; this is the LIGAMENTUM COMMUNE POSTICUM, or FASCIA LONGITUDINALIS POSTERIOR. If we remove the spinal marrow and its sheath, from the part of the canal formed by the processes, and merely rub the parts with the handle of the knife, the ligaments which run from the root of one spinous process to the other, will be exposed;

these ligaments have, in their fresh state, a yellowish appearance, whence the name of LIGAMENTA SUBFLAVA has been given to them, and, from their course, the words *Crurum Processuum Spinosorum*, are generally added.

The ligaments which are common to almost all the vertebræ, may now be enumerated.

BEFORE THE VERTEBRÆ ARE CUT.

1. *Ligamenta Capsularia.*
2. ———— *Intervertebralia Cartilaginea.* (Intervertebral substance.)
3. ———— *Crucialia.*
4. *Ligamentum Commune Anterius,* or *Fascia Longitudinalis Anterior.*
5. *Funiculi Ligamentosi,* or *Ligamenta Apicium Processuum Spinosoruum.*
6. *Membrana Interspinalis.*
7. *Ligamenta Processuum Transversorum.*

WHEN THE SECTION OF THE VERTEBRÆ IS MADE.

1. *Ligamentum Commune Posterius,* or *Fascia Longitudinalis Posterior.*
2. *Ligamenta Subflava Crurum Proeessuum Spinosorum.*

The connexion between the occiput, atlas, and dentata, is very different from that of the other parts of the spine.

The capsular ligaments between the Atlas and Dentata, are looser than between any of the other vertebræ,—there is no intervertebral substance between them; but the fascia longitudinalis anterior is so strong, as to form almost a distinct ligament.

The Atlas is attached to the occipital bone, by distinct capsular ligaments, surrounding each condyle; there is also a ligament surrounding the foramen magnum, and connected to the upper margin of the atlas; as this has, on its internal aspect, some resemblance to a funnel, it is called by Winslow, the LIGAMENTUM INFUNDIBILIFORME. The middle of this ligament is strengthened, on the anterior part, by a continuation of the fascia longitudinalis anterior,—and on the posterior part, by a ligament something similar to the funiculi ligamentosi. All the connexions may be seen by merely dissecting away the muscular fibres from the bones; but to see the deep ligaments, the bones must be cut in a certain manner.

As it is supposed that the brain, &c. have been examined, we should cut through the spine, at the fifth cervical vertebra, and then cut through the vertebræ longitudinally, leaving only the transverse processes attached to their bodies. We should then carry the saw in the same line, so as to cut through the occipital bone, immediately posterior to the condyles: as this cut will also go through part of the temporal bones, we must take care to keep to the posterior part of the mastoid processes, that we may not destroy the joint of the jaw.

The first thing which we have to observe, is the firm attachment of the dura mater to the edge of the foramen magnum, and to the upper cervical vertebræ. When we tear off the dura mater, we shall see, below it, a set of ligamentous bands, which run from the edge of the foramen magnum,—are then connected to the upper vertebræ, and appear to terminate about the third or fourth vertebra; these bands form the APPARATUS LIGAMENTOSUS. We can now feel the processus dentatus; and by dissecting away some of the *apparatus ligamentosus*, we shall see two portions of ligament, which arise from the front and sides of the process, and proceed upwards, diverging a little, to be attached to the edge of the foramen magnum; these are generally called LIGAMENTA LATERALIA, OR *moderatoria*: that which has been described as a *Perpendicular Ligament*, is nothing more than a few slips of membrane, which may be found between these two lateral ligaments. But the principal ligament is that which runs across, between the two tubercles, on the inside of the atlas; it is called LIGAMENTUM TRANSVERSALE, and locks in the processus dentatus. The *Appendices* of this ligament are merely its edges, extending upwards and downwards. The corresponding surfaces of the processus dentatus, and of the atlas, are connected together by very fine capsular ligaments.

There is some difficulty in exposing these ligaments completely. The dissection will be facilitated by twisting the vertebræ round;—as the ligaments will then, by the resistance they offer, be easily distinguished from the cellular membrane which covers them.

LIGAMENTS BETWEEN THE ATLAS AND OCCIPUT.

1. *Ligamentum Infundibiliforme.*
2. *Ligamenta Capsularia.*
3. *Apparatus Ligamentosus.*

BETWEEN THE DENTATA AND OCCIPUT.

1. *Ligamenta Lateralia.*
2. *Ligamentum Perpendiculare.*

BETWEEN THE ATLAS AND DENTATA.

1. *Ligamenta Capsularia.*
2. *Ligamentum Transversale.*
3. *Capsulare* (of the process.)

LIGAMENTS OF THE JAW BONE.

WHEN the muscles are dissected away from below the jaw, and the fascia, which connects the styloid process to the jaw, cut through, the joint will be much weakened.

To understand the structure of this joint, we should compare it with those of the carnivorous and graminivorous animals.—In the carnivorous animal, as, for example, in the badger, the jaw bone is locked into the glenoid cavity, so that it is purely a simple hinge joint; and there are only short *lateral ligaments.* In the graminivorous animal, the cavity in the temporal bone is so shallow, that much lateral motion is allowed; and the lateral ligaments are long. The joint in the human body is of an intermediate form; for the jaw bone is not so nicely adapted to the hollows in the temporal bone,—nor are the ligaments so short, as in the carnivorous animal; but the cavity is deeper, and the condyle is rounder, than in the graminivorous animal.

In the dissection of the external part of the joint, we shall find a ligament running from the lower margin of the zygomatic process,—this may be divided into two portions, one of which runs perpendicularly to the neck, the other to the condyle of the jaw; it is called LIGAMENTUM LATERALE EXTERNUM.

When we look on the inside, we shall see a ligament rising from the edge of the glenoid fissure, and the Eustachian tube, and running to the jaw bone, midway between the angle and the condyle; this is the LIGAMENTUM LATERALE INTERNUM. Both of these ligaments are intimately connected with the LIGAMENTUM CAPSULARE, which arises from the edge of the glenoid cavity, and is attached to the neck of the bone.

When we cut through the capsular ligament, we shall find that the interior of the joint is divided into two parts, by an *interarticular cartilage*, to the edges of which, the capsular ligament is attached.

LIGAMENTS OF THE RIBS.

THE ligaments which attach the ribs to the spine, are very simple. We may cut out three of the middle vertebræ, with their corresponding ribs, and then cut through the ribs, so as to leave only about three inches attached to the spine. When the pleura is torn off, the head of each rib will be seen, to be articulated with the intervertebral substance of two vertebræ. From the head of each rib, we shall see ligamentous bands running to the body of each vertebra: these are called LIGAMENTA CAPITELLI COSTARUM (sometimes called *Ligamenta*

Antica.) If we cut through these ligaments, we shall find that the two articulating surfaces on the head of the rib, are attached, by separate CAPSULAR ligaments, to the two vertebræ: the back part of the rib is also articulated with the transverse process, by a distinct capsular ligament. From the back part of the transverse process, a ligament will be found running to the tubercle of the rib; this is called the LIGAMENTUM TRANSVERSALE EXTERNUM. If we forcibly separate the ribs from each other, we shall discover two other ligaments, which come from the transverse processes of the vertebræ, and are attached to the neck of the rib. The one which is on the inside, and which comes from the lower part of the transverse process of the vertebra, and is attached to the neck of the rib immediately below it, is the LIGAMENTUM CERVICIS COSTÆ INTERNUM. The other is on the back part: it arises from the root of the transverse process,—crosses the first, and is inserted into the upper edge of the neck of the rib; it is called the LIGAMENTUM CERVICIS COSTÆ EXTERNUM.*

* When the bones are examined, it is evident that the ligaments of the 1st, 11th, and 12th ribs must be different from the others, since they are each connected with one vertebra only. There is no articulation between the two last, and the transverse processes.

LIGAMENTS BETWEEN EACH RIB AND THE SPINE.

1. *Ligamentum Capitelli Costæ*, or *Ligamentum Anterius.*
2. *Ligamenta Capsularia Capitelli.*
3. *Ligamentum Capsulare.*
   (Of the union with the transverse process.)
4. ———— *Transversale Externum.*
5. ———— *Cervicis Internum.*
6. ———————— *Externum.*

The cartilages of the seven true ribs, are united to the sternum in a simple manner; and to show the connexion, very little dissection is necessary. The sternal extremities of the bony part of the rib, being *concave*, receive the ends of the cartilages, which are *convex;* the other extremity of each cartilage is implanted into the concavities on the lateral part of the sternum. Surrounding each of these points of union, there are capsular ligaments; and the union to the sternum is strengthened by slips of ligament, running from the rib, upon the sternum: these slips have been named according to the direction they run; those running immediately from the rib to the sternum, are called LIGAMENTA RADIATIM DISJECTA; and some slips, which cross from the cartilage of the one side to that of the other, are called LIGAMENTA TRANSVERSALIA.

Between the first rib and the sternum, the union by cartilage is very complete. The cartilages of the 6th, 7th, 8th, and 9th, are connected by loose capsular ligaments, and by ligamentous slips, which are extended between them, to keep them in their proper position.

LIGAMENTS BETWEEN THE CLAVICLES, STERNUM, AND THE FIRST RIB OF EACH SIDE.

THE sternum should be cut through the middle; the clavicles and first ribs should also be cut about the middle.

The first ligament we perceive, is that running between the heads of the two clavicles, across the sternum; it is called LIGAMENTUM INTERCLAVICULARE.

There may then be observed, slips of ligament running from the head of the clavicle, upon the sternum; those on the external part, form the LIGAMENTA ANTERIORA; and on the internal part, the LIGAMENTA POSTICA. Under these slips, there is a *capsular* ligament; but, before examining this particularly, we should attend to the connexion which there is, between the clavicle and the first rib.—Between the upper part of the rib, and the tubercle on the lower part of the clavicle, close to its connexion with the sternum, a strong ligament will be seen, which, from its shape, is called LIGAMENTUM RHOMBOIDES.

The capsular ligament between the clavicle and sternum may now be opened; and then there will be seen, an *interarticular cartilage*, which is connected to the sternum and clavicle, by portions of the capsular ligament,—so that the capsular ligament may be described here, as in the jaw, as composed of two parts.

DISSECTION

OF THE

ARTERIES AND VEINS

OF

THE CHEST, NECK, AND HEAD.

THERE is no part more important to the student, than the surgical anatomy of these vessels; but he must restrain his impatience, and be content, in the first dissection, to learn their branches only.

The injection of the vessels of the upper part of an adult, or old body, is generally made in the following manner:—

Injection of the Vessels.

An incision is to be carried, through the skin, in the length of the sternum; the bone is then to be cut through, in the same line; and the chest is to be forcibly opened, by pulling on the two portions of the sternum. A piece of wood, about four or five inches long, is then to be placed between them. The pericardium is to be opened; and a large pipe (around which a little cloth must be wrapped) is to be put into the aorta just at its origin from the ventricle. The descending aorta must be tied, about opposite to the fifth dorsal vertebra.—It will easily be found, by tearing up the adhesions of the left lung.

When an injection is made, with the arteries prepared in this manner, only the vessels of the head and arms will be filled. Though this is not a good method for shewing the origins of the vessels from the aorta; still we are generally obliged to do it, if the body be old, or if the aorta be much dilated. But when the subject is young, and when we are not anxious to preserve the muscles on the side of the chest, the thorax may be so opened, that a pipe may be put into the aorta, opposite to the sixth dorsal vertebra. The injection must, in this case, be prevented from distending the ventricle, by an assistant holding the root of the aorta; for the valves will seldom prevent the wax from passing into the ventricle. If the injection be allowed to pass into the heart, the *force* of the syringe will be so taken off, that the extreme branches of the head and arms will not be filled.

The manner of injecting the heart, &c. for a *preparation*, has been already described at page 128.

If the student wishes to make a very minute injection of the arteries of the head or arm, he must inject each part separately; for when they are both injected from the aorta, the extreme branches are seldom filled.

In describing the manner of dissecting the reat arteries, I shall suppose that the injection as been made from the aorta, opposite to the ixth rib.

Though the ventricle has not been filled, the oronary arteries will;—there is not much dis- ection required to show them, unless the heart e very fat.*

By raising the pericardium, and the cellular nembrane, from the root of the aorta, the as- ending part of the ARCH will be exposed; and by cutting a little higher, the great vessels which pass from it, would be seen: but before this is done, we may examine some of the other vessels of the heart, which, though uninjected, may still be easily dissected. First, we may show the origin of the PULMONARY ARTERY, which, as it runs under the aorta, divides into two great branches that pass into the lungs. The strong adhesion between the lower part of the aorta, and the point of the bifurcation of the pulmonary artery, is formed by the *remains* of the DUCTUS ARTERIOSUS.

Arch of the Aorta.

Pulmonary Artery.

Ductus Arte- riosus.

On the right side of the ascending aorta, the

* The dissection of the arteries of the brain should be made, previous to tracing any of the arteries of the chest, so that the student may have an opportunity of seeing the parts of the brain, which he would, in all probability lose, if he were to leave the dissectlon of the branches of the internal carotid, until he has finished those of the chest, and of the external carotid. The manner of dissecting the arteries of the brain, is described a little farther on.

DESCENDING VENA CAVA is seen; and when the pericardium is completely dissected away, the great veins that form it, will be shown, viz. the union of the LEFT JUGULAR, and LEFT SUBCLAVIAN VEINS,* which form a branch, that passes across, to unite with the RIGHT SUBCLAVIAN, and RIGHT JUGULAR VEINS. The VENA AZYGOS passes into the cava, after it has been formed by the union of the great branches.

Though the lesser veins are not of much importance, and though they will scarcely be seen, unless they are injected, or very much distended with blood, still I shall enumerate them. The VENA MAMMARIA INTERNA of the right side, joins the upper part of the superior vena cava; that of the left side, joins the subclavian vein, opposite to the cartilage of the first rib. The DIAPHRAGMATICA SUPERIOR, or PERICARDIO-DIAPHRAGMATICA, on the right side, joins the upper part of the vena cava; the left joins the subclavian, below the mammaria. The THYMICA, on the right side, sometimes joins the vena cava, and sometimes the gutturalis, or thyroid vein, or some neighbouring branch: on the left side, it empties itself into the subclavian vein. The PERICARDIAC VEIN, on the right side, enters the root of the subclavian vein: on the left side,

Veins of the Chest.

* The thoracic duct will not be seen unless it has been filled from below,—it passes into the angle between the subclavian and jugular veins of the left side.

it joins the subclavian vein: or the diaphragmatica, or the mammaria interna. The THYROID VEIN, or TRACHEALIS, or GUTTURALIS of the right side, passes into the upper part of the vena cava: of the left side, into the upper and back part of the left subclavian. The distribution of these veins is described by their names. It is for the most part very regular; but their communications with the larger veins are very inconstant.

The dissection of the arteries is now to be continued. When the whole of the pericardium is removed, the ARCH of the AORTA will be seen, and arising from it, the ARTERIA INNOMINATA,—the LEFT CAROTID, and the LEFT SUBCLAVIAN. Arteries from the arch. Before these arteries are traced, the left lung should be pulled up, so that the DESCENDING AORTA may be seen: but we should not as yet, cut away any of the ribs, to show the small vessels which arise from this part of the aorta.

After making these trunks distinct, we should dissect the origins of the sterno cleido mastoideus; and upon one side, (disregarding the relative situation of the parts,) cut off two inches of the clavicle, and an inch of the first rib, with a small portion of the sternum.* But before we

* The anatomy of the nerves of the neck is described a little farther on. The relative connexion of the arteries with the nerves, &c. is pointed out in the *Surgical Dissection of the Neck and Head.*

do this, we should look under the sternum for the *mammaria interna* and separate it, that we may preserve it as a detached vessel. After having made these cuts, which of course must be done carefully, a great many branches will be exposed. The principal ones will be found to come from the subclavian; for if we dissect between the larynx and the sterno cleido mastoideus muscle, we shall find, that the common carotid runs for a considerable distance before it gives off any branches.

Subclavian. The dissection of the branches from the subclavian, must, therefore, be first attended to.

Mammaria Interna. We cannot avoid seeing the MAMMARIA INTERNA, which passes down on the inside of the sternum; and if we look immediately opposite to it, we shall find the VERTEBRAL rising from the upper part of the artery. These two branches are very regular; but all the others are so much the reverse, that the description which I shall now give, will, in all probability, not correspond with the vessels seen in the first dissection.

Vertebral.

Close by the origin of the mammaria interna, we shall probably find a large trunk, which may be traced towards the larynx, and under the carotid; this will be the INFERIOR THYROID. From the same source, and perhaps in union with it, another branch may be seen crossing the upper part of the neck: this last vessel is

Inferior Thyroid.

o be carefully followed,—for, if it is small, t will be distributed on the muscles of the neck only, and be called the TRANSVERSALIS COLLI; but if it be large, it may be traced over the scapula, and thence be called the SUPRA SCAPULARIS.

Transversal i Colli.

Supra Scapular.

There is generally another branch found here, which passes from the same trunk, in the line of the clavicle.—It is called the TRANSVERSALIS HUMERI.

Transversalis Humeri.

As these vessels are very irregular in their order of coming off from the subclavian, we must, in describing them, give the name to the branches, and, tracing them back, apply it to the trunk from which they arise.

If we now trace the subclavian a little farther, we shall see some small branches lying upon the scalenus: these sometimes arise in a distinct trunk, called CERVICALIS SUPERFICIALIS, but this is very frequently a branch of the transversalis colli:—CERVICALIS PROFUNDA is the name given to the artery that arises from the subclavian, while it is passing under the scalenus anticus.

Cervicalis Superficialis and Profunda.

When the subclavian has passed about half an inch beyond the scalenus anticus, we shall find that, if the transversalis colli has been small, a large branch will be given off at this point, and which, as it passes to the scapula, is called the SCAPULARIS, or DORSALIS SCAPULÆ.—The stu-

Scapularis.

dent must not call this description incorrect, if he does not find it correspond with the arrangement of the vessels which he discovers in the first body he dissects,—for he will, in the course of his studies, find that the order of the branches of the subclavian is exceedingly irregular.

The description has hitherto been taken from the left side of the body. The manner in which the small vessels branch off, is not very different in the two sides; but there is a most material difference in the relative position of the great trunks, on the right and left side: this should be particularly noticed in making the surgical dissection.

As we have already loosened the attachments of the sterno cleido muscle, by cutting through the sternum and clavicle, we may now lay it a little to one side. We shall then see the great JUGULAR VEIN, lying almost over the artery, and the great nerve, the PAR VAGUM, by the side of it; at present, we need not attend particularly to these parts, but pull them to one side, and then trace the common carotid, with the forceps and scissars, from its origin, towards the angle of the jaw.

The artery will be found to pass up by the side of the larynx, for three or four inches, without giving off any branches: here, it is called the COMMON CAROTID. It at once divides into two great trunks, called the EXTERNAL and

Carotid.

INTERAL CAROTIDS. The internal will afterwards be found to pass to the foramen caroticum of the temporal bone, without giving off a branch. Hence, all the branches which we have to trace among the muscles of the throat, and on the face and temples, must be from the external carotid.

The first branch which we shall find rising from the EXTERNAL CAROTID, is the SUPERIOR THYROID: this we must trace downwards, towards the thyroid gland, in which we shall find it distributed, and uniting its branches with those of the *Inferior Thyroid,* which we have already seen coming from the subclavian. The next branch given off, is the LINGUALIS: we may trace this along the line of the os hyoides, to the muscles of the tongue, where it divides into several branches; but before we can trace these fully out, we must follow some of those of the next artery,—the FACIALIS, or *External Maxillary*. This comes off very often in the same trunk with the LINGUALIS, and if not, it rises immediately after it. It runs first towards the lower part of the jaw, and under the muscles. (But as both this and the lingualis are covered by the digastricus and stylo hyoideus, it will be necessary to make a neat dissection of the muscles, before we can trace them farther.) After the facial emerges from under the muscles, it passes into the substance of the submaxillary

Superior Thyroid.

Lingualis.

Facialis.

gland, through which, the branches must be carefully traced: from these, one branch will be seen to pass on the anterior part of the mylo hyoideus; this is the *Submentalis*. The trunk of the artery, after passing through the submaxillary gland, turns over the jaw, to be distributed upon the face;—but the branches which pass to the face, should not be dissected until some of those below the jaw have been traced.

The submaxillary gland should now be raised; —the LINGUALIS may then be traced among the muscles of the tongue, sending branches to each, which can all be easily followed if we have already made ourselves master of the muscles. After having traced the main trunk to some depth, it will be found to divide into two principal branches, viz. the *arteria dorsalis linguæ*, running towards the root, and the *ranina*, running to the tip of the tongue. I shall not here give the names of the smaller branches of the thyroid, facial, and lingual, but refer to the annexed *Table*.

To prosecute the dissection farther, we should carefully raise the skin from over the outer part of the masseter, towards the tube of the ear, and continue the dissection of it round the back of the ear, over the insertion of the mastoideus and trapezius. In removing the skin from the masseter, we must take care that we do not cut the

Transversalis Faciei. TRANSVERSALIS FACIEI, which lies immediately under the skin, and generally in a line with the middle of the tube of the ear. Some small branches of the facial, which are called *masse-tericæ*, will also be seen upon the masseter. In removing the skin from the back of the ear, we must avoid cutting the branches of the POSTERIOR AURIS, which are very superficial. The same care is also to be taken in dissecting towards the occiput, as many of the superficial branches of the OCCIPITAL pass over the mastoideus and trapezius. Occipital and Posterior Auris.

The PAROTID GLAND will now be exposed;—but before we trace the branches through it, we should examine the trunks of those, which are seen on the occiput and ear.

Three arteries generally rise from the carotid, before it enters into the substance of the gland, viz. the OCCIPITAL, the POSTERIOR AURIS, and the PHARYNGEA INFERIOR. The occipital and posterior auris very often come off in one trunk, —and if not, they come close together, and immediately at the outer edge of the digastricus, and stylo hyoideus. The posterior auris may be traced first, as it runs superficially towards the back of the ear. The occipital will be found to run so deep under the insertion of the sterno cleido mastoideus, that, to trace it fully, we shall be obliged to dissect through the substance of this muscle;—we shall then find its branches becoming superficial,—some of which pass to to the scalp, and others run to supply the superficial muscles of the back. The Pharyngea Inferior is not unfrequently the second branch that arises from the external carotid; but, as it rises from the back part of the artery, it cannot be conveniently seen until the branches which have already been described, are partially dissected,—and even then, its trunk only can be seen: the branches will be found, after those under the jaw are dissected.

Pharyngea Inferior.

The trunk of the carotid is now to be traced into the parotid gland: while here, it gives off a number of small branches, which are to be exposed, by carefully cutting away the substance of the gland. The larger branches, which are very superficial, should then be traced, viz. the TEMPORAL and the TRANSVERSALIS FACIEI. These are so immediately under the skin, that there can be no difficulty in finding them.

After exposing these branches, we may return to the dissection of the arteries of the face, —for which, there is no farther rule necessary, than merely to follow them from trunk to branch with the scissars and forceps.—The names of the small branches will be found in the *Table*.

Many of these branches must now be destroyed, that we may show the arteries which pass into the deep parts of the face,* and particularly the branches of the MAXILLARIS INTERNA.

Maxillaris Interna.

* Nearly the same rules should be followed in making a preparation of the arteries of the head. The superficial

The dissection of the branches of this artery is very difficult; for we must not only cut through a number of the muscles on the side of the face, but we must also remove the greater part of the jaw.

The first thing we should do, is to expose the trunk of the external carotid, until the internal maxillary is seen going off from it,—which it generally does, opposite to the lobe of the ear. The artery is then to be traced as far as possible under the jaw. After which, the jaw bone is to be cut through, just at the point where the facial artery passes over it (in doing this, we should, of course, take care not to injure the arteries of the neck.) We may then cut through the insertion of the pterygoideus internus; after which, the knife is to be carried close upon the inside of the bone, so as to separate the buccinator and the membrane of the mouth from it. When this is done, we can pull the jaw aside, so as to enable us to trace the trunk a little farther, and perhaps to see its first principal branch, viz. the *dental artery*, which passes into the lower jaw; —but in a first dissection, this vessel is to be sacrificed,*—for the whole of the side of the

arteries should be preserved on one side,—and, on the other, they should be removed, and the deep ones exhibited.

* In making a preparation, we may preserve the dental artery, by leaving a small portion of the jaw.

jaw should be removed; to do this safely, and at the same time to enable us to expose all the branches of the maxillaris interna, we must also remove the whole of the os malæ, and zygomatic process of the temporal bone. This may be done, by first cutting, with the saw, through the maxillary and frontal process of the os malæ, and the root of the zygomatic process;—and then, with a blow of the chisel and hammer, the parts will be so loosened, that they may be easily dissected off. The insertion of the temporalis should be cut from the coronoid process of the jaw; by then merely cutting close upon the bone, and using a little force, we may remove the whole of the remaining part of the jaw.

When the bones are removed, the parts will appear in great confusion, as the arteries are buried in the temporal muscle, and part of the two pterygoid; but, as we have no object now in preserving these muscles, we should trace the branches of the great artery through their substance, without hesitating to destroy their fibres: indeed, to make the branches distinct, we shall at last be obliged to cut the muscular fibres entirely away.

The first branch that comes off from the internal maxillary, is one of little consequence,—but the next, is of the greatest importance, the

Meningea Media. MENINGEA MEDIA,—for this is the vessel which supplies the principal part of the dura mater;

it may be traced into the foramen spinale of the sphenoid bone. The next set of branches will be found passing through the substance of the pterygoid muscles.—We shall then see the stump of the small branch which passes into the spinal hole, to supply the teeth, viz. the *dental*, or *inferior maxillary*. The next branch is, the *temporalis profunda*, or *media*, which passes into the substance of the temporal muscle, and runs close on the bone.

The main trunk of the maxillary now becomes so crooked, that we shall be in danger of cutting it through, if we are not very cautious. It will be found lying on the back part of the superior maxillary bone;—and here it gives off some small branches, called *alveolares superiores*, as they pass to the teeth of the upper jaw.

It now becomes exceedingly difficult to follow the trunk, for it passes into the spheno palatine fissure. From this part, one branch may be traced into the orbit, which we shall afterwards find, passes through the infra orbital canal, with the infra orbital nerve, to the upper part of the superior maxillary bone, where it inosculates with the branches of the facial; this artery is generally called the INFRA ORBITAL. The next branch is also very difficult to follow; for it passes at first directly downwards, through the palatine fissure, into the palatine foramen,—from which, it sends one branch back to the velum, and a larger to the anterior part of the palate: this last branch, the PALATINA, may be considered as the extremity of the internal maxillary artery. There are, however, still two branches to be enumerated; first, one which creeps by the side of the external pterygoid process, and is distributed on the upper part of the pharynx, and is called the *superior pharyngeal*: while another runs into the back part of the nostril, through the spheno palatine hole, and is called the *nasal*: this is distributed on the lower part of the nostrils; and from it, a branch may often be traced, along the lower part, to the foramen incisivum, to inosculate with the palatine.

I have been a little more minute in the description of this artery, than that of the others, for it is one particularly difficult to follow; indeed, in order to see the branches of it distinctly, we must sacrifice every other part. The student, while dissecting this artery, should have the basis of the skull constantly before him, to enable him to understand the different twists of the artery.

We should now turn our attention to the internal carotid. This artery will appear, at the bifurcation, to be more *external* than the external carotid; but it almost immediately becomes more *internal*, and passes deep under the parotid gland, and there it is covered by the

Internal Carotid,

great nerves, and lies close upon the rectus capitis anterior. We then lose it; for it passes into the foramen caroticum of the temporal bone. During its whole course, we shall find no branches rising from it, except some very small ones, to the nerves, and to the Eustachian tube.

The internal carotid must now be followed through the bone. This may be done, and the branches of the maxillaris interna be still preserved; but we must entirely change our plan of dissection.

If we wish merely to gain a knowledge of the course of the internal carotid, through the brain, we may remove the scull-cap, and proceed to the dissection of the brain.* It is presumed, that the student has already a general know-

* I have, in a note at page 165, said, that the dissection of the branches of the internal carotid should be made, before any of the others, in a *first dissection*; but if the student wishes to make a preparation of the arteries of the brain, it will be better to delay the dissection of them, until all the others are finished, for then, (the brain being putrid,) the branches of the internal carotid may be exposed, by merely washing away the pulpy matter of the brain;—in this instance, the scull should not be opened in the common manner, but a cut should be made through the frontal and parietal bones, in the line of the falx, but a little to one side of it. This incision may extend from above the orbit, to the tubercle of the occipital bone. Another cut may then be made, above the level of the ear, to meet the two extremities of the first:

ledge of the parts of the brain. On raising the scull-cap, which is to be done in the manner recommended for examining the brain, at p. 5, the vessels of the dura mater will be the first that strike the eye. Those on the part opposite to the frontal bone, may belong to the *anterior*
Arteries of Dura Mater. *meningeal*, which rises from the OPHTHALMICA; but this artery is very small; the large vessel, the MENINGEA MEDIA, which will be seen under the parietal bone, generally gives off all the branches that are seen in the first view. The meningea media may afterwards be traced back to the foramen spinale of the sphenoid bone, through which it comes from the maxillaris interna. Some small twigs from the *posterior meningeal* may be seen, but they are seldom apparent, until the tentorium is raised. The dura mater may now be cut through, along the line of the longitudinal sinus, and on one side only, at present, so that the falx may be left entire. The dura mater is then to be folded over, towards the temple. The vessels on the surface of the brain will now be seen in great numbers; they arise from several sources, which will be discovered, as the dissection is continued, towards the base.

---

the intermediate portion of bone is then to be entirely removed. By this, we shall have an opportunity, when the pulpy matter is washed away, of showing the prolongations of the dura mater.

The first arteries (which have distinct names) are those on the corpus callosum;—the artery of each side may be shown, by merely pulling the hemisphere separate from the falx.

After taking this view, we may cut the dura mater which covers the opposite hemisphere. We should then separate the falx from its connexion to the crista galli, and throw it backwards towards the tentorium; and now we can separate the hemispheres, so as to have a better view of the arteries of the corpus callosum. The whole of each hemisphere is then to be cut down to the level of the corpus callosum; for it is needless to attempt to trace the arteries which we see on the surface, down to their trunks, as they form a complete net-work in the substance of the brain, which is supported by the pia mater.—We may afterwards judge of the number of these vessels, by allowing a stream of water to play upon the mass which has been removed; for this will wash away the pulp, leaving only the membrane and vessels. By now separating the two anterior lobes, we may trace the arteries of the corpus callosum towards a trunk, which we shall afterwards find to be the ANTERIOR CEREBRI. We may then open the ventricles, and we shall see the choroid plexus loaded with the vessels, which are to supply the most internal parts of the brain. Arteries of the Brain.

We may now examine the other branches, by raising the brain from the skull. In lifting up the anterior lobes, we shall see the optic nerves; and by the side of them, the trunks of the internal carotids. These must be cut across, but we should leave enough of each artery, to shew the origin of the OPHTHALMICA, which passes into the orbit. The several nerves are to be cut through, as we carry the brain back. The tentorium is to be divided, by carrying the knife along the line of the petrous portion of the temporal bone. The two VERTEBRAL arteries will then be seen,* coming up from the vertebral canal. When these, and the upper part of the spinal marrow are cut through, the whole mass of the brain may be lifted out. The vessels may be seen on the base, without any dissection, but they will be made more distinct, by removing the tunica arachnoides.—The enumeration which is given in the *Table* will be a sufficient description of them.

Vertebrales.

* It is very difficult to trace those arteries from their origin from the subclavian, as the greater part of their course is through the canal, formed in the transverse processes of the cervical vertebræ. The spaces between the vertebræ should be cleared of the muscles, &c. to allow of the artery being seen; or the processes may be cut through. Several branches will be found passing off from the artery, in its passage upwards; these are enumerated in the *Table*. We must be careful in dissecting between the atlas and the occiput, as, from the artery bulging out between the bones, it is very liable to be cut.

TABLE OF THE ARTERIES IN THE THORAX, AND OF THE NECK AND HEAD.

AORTA.

Anterior to the arch—CORONARIA DEXTRA and CORONARIA SINISTRA.

From the arch—INNOMINATA, divided into CAROTIS DEXTRA and SUBCLAVIA DEXTRA; CAROTIS SINISTRA and SUBCLAVIA SINISTRA.

From the descending aorta—a series of small arteries, viz. PERICARDIACA POSTERIOR; PERICARDIACA INFERIOR; BRONCHIALIS DEXTRA; BRONCHIALIS SINISTRA; ŒSOPHAGEÆ; INTERCOSTALES AORTICÆ.

From the SUBCLAVIAN, the principal or primary branches are: I. MAMMARIA INTERNA; II. THYRÖIDEA INFERIOR; III. INTERCOSTALIS; IV. VERTEBRALIS; V. CERVICALIS PROFUNDA; VI. CERVICALIS SUPERFICIALIS.

I. MAMMARIA INTERNA gives these branches:—1. *Thyroideæ*; 2. *Comes Nervi Phrenici*; 3. *Pericardiaca*; 4. *Mediastinæ*; 5. *Mammariæ*; 6. *Epigastrica Anastomotica.*

II. THYROIDEA INFERIOR *generally sends off*—1. *Transversalis Humeri*; 2. *Transversalis Colli* (either this or the last branch gives off the *scapularis*, though it is often a principal branch of the subclavian; it then rises below the scalenus); 3. *Thyroidea Ascendens*; 4. *Thyroidea Propria.*

III. Intercostalis: its branches pass irregularly to the two superior intercostal spaces,—to the scalenus and œsophagus. Some branches pass to the muscles of the back.

IV. The Vertebralis principally to the back part of the brain; but it also gives—1. a *class of small branches* to the muscles attached to the cervical vertebræ; 2. to the *theca* and *spinal marrow;* 3. to the muscles under the occiput; 4. within the scull, to the dura mater, viz. *Meningeæ Posteriores;* 5. *Inferior Cerebelli;* 6. *Spinalis Posterior;* 7. *Spinalis Anterior.* The two vertebral then unite and form the basilar. From the basilar there are—1. branches to the *Medulla Oblongata, &c.;* 2. *Profunda,* or *Posterior Cerebri;* 3. *Arteriæ Communicantes* (uniting with those of the carotid, to form the circle of Willis.)

V. Cervicalis Profunda; gives branches to the *Scaleni* and *Longus Colli.*

VI. Cervicalis Superficialis; passes to the *Brachial Plexus, Scaleni, Trapezius,* &c.

COMMON CAROTID divides into EXTERNAL and INTERNAL; from the EXTERNAL, the principal branches are: I. Thyroidea Superior; II. Lingualis; III. Facialis: IV. Pharyngea Ascendens; V. Occipitalis; VI. Auricularis Posterior; VII. Temporalis; VIII. Maxillaris Interna.*

---

* The arrangement of the branches of the external carotid is very simple. We have only to recollect the parts

I. Thyroidea Superior gives off: 1. thyroidea propria; 2. laryngea, to the epiglottis, and muscles of the arytenoid cartilages. Superficiales musculares, viz. to the sternocleido mastoideus, to the sternohyoidei and thyroidei, to the thyreo-hyoideus.

II. Lingualis. 1. Sublingualis; 2. dorsalis linguæ; 3. ranina; 4. irregularly to the muscles of the tongue and pharynx.

III. Facialis. 1. Palatina ascendens; 2. to the glands and muscles of the tongue; 3. to the submaxillary gland and the tonsil; 4. submentalis; 5. to the masseter and buccinator; 6. coronaria labii inferioris; 7. coronaria labii superioris; [a] nasalis lateralis; [b] angularis.

IV. Pharyngea Ascendens. 1. Three internal pharyngeæ; 2. Three to the muscles, to the sympathetic nerve, jugular vein, and to the glands; enters the foramen lacerum posterius.

---

which it passes, and then we shall have the names of the arteries. Thus, it passes the *thyroid* gland; the *tongue;* the *face;* the *pharynx;* the *occiput;* the *ear;* the *inside of the jaw*, and the *temple*.

These vessels may be divided into three *sets*, of comparative importance in a surgical point of view. In the first set there are, the one to the thyroid gland, that to the tongue, and the artery to the face. In the second set,—the one to the inside of the jaw, and those to the temple. The next set is of little importance, as they lie deep, and are very small; viz. those to the pharynx, occiput, and ear.

V. Occipitalis. 1. To the digastricus, stylo hyoideus, and sterno cleido mastoideus; 2. meningea posterior, viz. with the jugular vein through the foramen; 3. cervicalis descendens: the internal branch inosculates with the vertebralis; 4. auricularis; 5. occipitalis ascendens. Through the foramen mastoideum posterius, a branch passes to the dura mater.

VI. Auricularis Posterior. 1. Branches to the parotid gland, biventer, and mastoid muscles; 2. to the meatus externus, and membrane of the tympanum; 3. stylomastoidea, entering the tympanum, supplying the parts there, and the mastoid cells; 4. ascending behind the ear to its muscles and cartilages; 5. ascending on the temple.

VII. Temporalis. 1. A small deep branch, and a branch to the masseter; 2. transversalis faciei, comes ductus salivæ; 3. temporalis media profunda; 4. auriculares anteriores: 5. temporalis anterior, or frontalis; 6. temporalis posterior, or occipitalis.

VIII. Maxillaris Interna, (being in the order of the branching.) 1. Auricularis, profunda and tympanica; 2. meningea media; 3. meningea parva, viz. to the pterygoid muscles, and finally piercing the foramen ovale; 4. maxillaris inferior; 5. temporales profundæ, maxillares, pterygoideæ, and buccales; 6. alveolaris; 7. infra orbitalis; 8. palatina maxillaris; 9. pharyngea superior; 10. nasalis.

INTERNAL CAROTID.

I. While in its transit through the bones, these branches: to the pterygoid canal and cavity of the tympanum; to the cavernous sinus and pituitary canal; to the fourth, fifth, and sixth pairs of nerves; to the dura mater.

Within the cranium, and having emerged from the dura mater.)

II. Ophthalmica Cerebralis. Passing into the orbit by the foramen opticum, gives these branches: 1. to the dura mater and sinus; 2. lachrymalis, which goes to the gland, after giving many branches to the periosteum, optic nerve, &c.; 3. ciliares,—three or four arteries dignified with the distinction of *inferiores, anteriores, breves, longiores;* 4. supra orbitalis; 5. centralis retinæ; 6. ethmoidales; 7. palpebrales; 8. nasalis; 9. frontalis.

III. Several lesser branches to the Pituitary Gland, Optic Nerve, Infundibulum, and Plexus Choroides.

IV. A. Communicans. Constituting part of the circle of Willis.

V. A. Cerebralis Anterior. 1. Irregular branches to the first and second pair of nerves; 2. lesser irregular branches to the anterior lobe; 3. anterior communicans (completing the circle of Willis anteriorly); 4. arteria corporis callosi.

VI. A. Cerebralis Media. Entering the fossa Silvii: it is minutely distributed to the substance of the middle lobe.

OF THE VEINS OF THE HEAD.

THE veins of the face and neck may be seen without their being injected; indeed, this should never be done, except when we wish to make a preparation of them. For this purpose, a pipe should be placed in the frontal vein, through which a quantity of warm water should be thrown, so as to clear the superficial veins of their coagula. To distend the deep veins, a pipe should be put into the longitudinal sinus, directed towards the occiput (a portion of the scull having been previously removed): or they may be filled by putting a pipe into each internal jugular vein. The success of the injection will depend very much on the veins being thoroughly cleared of the blood which is generally coagulated in them.

After they are injected, the dissection will be very easily made; for the veins are so superficial, that, in a thin body, they will be seen under the skin.

The vein which may be traced from the inner angle of the eye, towards the lower jaw, is the *anterior* FACIAL, or the ANGULARIS. This vein receives branches from various parts of the face, which are named according to the points from which they come; as,—*vena frontalis*: *vena* *ophthalmica; vena dorsalis nasi, superior et inferior; vena alaris nasi; venæ labiales, magnæ et minores; venæ buccales*, &c. At the angle of the jaw, the FACIAL vein will be found to unite with the TEMPORAL, or, as it is sometimes called, the POSTERIOR FACIAL.—By this union, the EXTERNAL JUGULAR is generally formed.

The temporal vein is formed by branches which come from the temple (generally four in number); by the veins which accompany the branches of the arteria maxillaris interna; by the transversalis faciei; the posterior auris; and sometimes by branches from those accompanying the arteria meningea media.

The EXTERNAL JUGULAR will be found to be very irregular: sometimes it divides into two branches, the one being called the *anterior*, the other *posterior*. The anterior division generally receives the branches under the chin, and from the tongue, and often joins the great internal jugular vein; while the posterior receives some from the occiput and the back part of the ear, and then passes down to the subclavian,—in its course, receiving veins from the outer part of the neck, and upper part of the shoulder.

The veins from the thyroid, correspond very much with the course of the arteries; the *superior* ones passing into the jugular, and the *in-*

ferior into the subclavian, or the transverse vein, which passes across the great arteries.

The INTERNAL JUGULAR vein is principally formed by the sinuses of the dura mater, which have already been described at p. 31; but in its passage down the neck, it generally receives branches corresponding to the deep arteries.

It will be difficult to trace the branches of the VERTEBRAL VEINS. The basilar sinus generally passes into them; they receive, also, the branches from the upper part of the spinal marrow: but they are principally formed by a net-work of veins, which surround the processes of the spine, and come from the deep arteries which supply the small muscles of the back. The trunk of the vein passes in the same canal with the artery, viz. in the transverse processes, and terminates in the subclavian vein.

DISSECTION

OF THE

NERVES OF THE NECK AND HEAD.

WE may begin either with the dissection of the nerves of the face which are from the Vth pair, and the one hitherto called portio dura of the VIIth, but more lately, *Respiratory Nerve of the face*, or with the plexus, which is formed immediately under the skin of the neck, by the superficial branches of the cervical nerves and spinal accessory, or superior external respiratory nerve.*

---

* In the following description of the manner of dissecting the nerves, I shall introduce, in the form of notes, some of those observations which Mr. Bell has for many years been in the habit of making, while delivering his lectures on the nerves :—several of these, will be found in the Edition of the *Plates of the Nerves*, published in 1816.—I shall only hint at certain experiments, which are detailed by Mr. Bell, in papers in the Transactions of the Royal Society, and in papers of mine published in the Journals of Science, and in the the Medico Chirurgical Transactions. The new names which have been given to some of the nerves, will be understood by referring to the Explanation of the Plates.

I shall suppose that we are to dissect those of the neck, first. If we cut through the skin, about opposite to the middle of the sterno cleido mastoideus, we shall find some branches, which, if patiently followed, will lead to all the others.

The superficial nerves on the side of the neck are so numerous, that it is impossible, in a work of this kind, to particularize them all; but there is one, more distinct than the others, which passes from the third cervical, along the sterno cleido mastoideus muscle, to join the branches of the portio dura. This branch is sometimes called, *Nervus Communicans*, or *Superficialis Colli*. When the skin over the parotid is raised, some branches of the PORTIO DURA, or *respiratory nerve of the face*, will be seen. These may be traced into the substance of the parotid gland, by *digging* with the scissars; this is to be done, by putting in the blades, closed, and then opening them, so that the portions of the gland may be torn, rather that cut.

Nervus Communicans.

Portio Dura, or Respiratory.

In following the branches of the respiratory, upon the face, we should not remove more of the skin than the cutis vera, as many of the principal twigs lie immediately under it; the branches, in their course from the interior of the parotid to the different parts of the face, will be found to be united together by cellular membrane, so as to have some resemblance to the webbed foot of an aquatic bird, whence the ıme of *Pes Anserinus* has been given to the exus formed by them. Pes Anserinus.

The three branches, viz. the SUPRA ORBITAL, ᴾPERIOR MAXILLARY, and INFERIOR MAXILᴬRY, of the Vth,* will be easily discovered, by collecting the three foramina through which ıey pass to the face, viz. the *Superior Orbital*, *ıfra Orbital*, and *Mental*. After the trunks re exposed, there will be no difficulty in tracing ıeir branches to their terminations,—and also ɔ show the intimate connexion which each of hem has with the branches of the respiratory ıerve in the muscles of the face. The dissecion will be most easily made, by tearing the ellular membrane from between the nerves, either with two small hooks, or with the scissars, in the manner already described.† Vth.

After having seen all the superficial nerves, we may proceed to the dissection of those which lie deeper.

The platysma may now be removed, and the external surface of the sterno cleido mastoideus

---

* See the Notes upon the *deep dissection* of these nerves.

† When we have finished the dissection for the day, we should either cover the parts with a wet cloth, or put them into water; by this, the nerves will be blanched, and afterwards more distinctly seen. If bougies, or black pins, be put under the nerves which have been dissected, the display will be still more distinct.

be dissected clean; so may the digastricus superior, and the mylo hyoideus: but we must not take off all the cellular membrane from the sterno hyoideus and thyroideus muscles, because in doing so, we should cut across some of the branches of the *descendens noni.*

The origins of the sterno cleido mastoideus may now be raised, and the muscle carried towards its insertion. In doing this, we shall see, at about two inches from the mastoid process, the SUPERIOR RESPIRATORY NERVE, or SPINAL ACCESSORY,* entering into its substance, and perforating it, in an oblique direction. After tracing the branches of this nerve, we should cut through the digastricus superior, so as to expose the stylo hyoideus; immediately below the level of which, we shall discover the IXth, or LINGUAL NERVE, running towards the os hyoides: if we pull upon it, we shall see a small branch running down the neck, towards the muscles on the larynx;—this twig is the *descendens noni*, which, if followed, will be found to pass along the sheath surrounding the carotid artery and jugular vein, and to form connexions with some of the cervical nerves. It is lost upon the sterno hyoideus and thyroideus muscles.†

Spinal Accessory or Superior Respiratory.

Lingualis.

Descendens Noni.

---

* See note upon this, in the *deep dissection*.

† In the connexions between the respiratory of the face, the ninth, the nervus superficialis cervicalis, the

The trunk of the IXth may be traced a little forward, but not far, as we shall have a better opportunity of seeing it presently.

The sheath of the vessels may now be opened. Immediately between the artery and vein, the great nerve, the PAR VAGUM, will be seen; and if we lift up the sheath altogether, we shall find the SYMPATHETIC, lying close upon the muscles of the spine. These nerves may be exposed for a short distance; but, those below the angle of the jaw, must be dissected, before we can show their connexions.

Par Vagum.

Sympathetic

The first nerves which we should dissect under the jaw, are the three that pass to the tongue. We have already seen the IXth, or MOTOR LINGUÆ, OR LINGUALIS.

Motor Linguæ.

If we now hold aside the submaxillary gland, and cut carefully through the origin of the mylo hyoideus, we shall see the GUSTATORY; and by

Gustatory.

roots of the phrenic, and that which is called the external respiratory, with the par vagum—we see the media of many combinations:—the expression and consent of parts in sneezing, coughing, vomiting; the expressive spasmodic actions during violent passion, and particularly the spasms in hydrophobia. In the connexions of the phrenic nerve with the cervical nerves, we may observe the source of that remarkable sympathy which makes the affection, or wound of the diaphragm, be attended wit pain in the shoulders, or convulsive rising and shrugging of the shoulders.

lifting up the lobe of the parotid gland, and dissecting along the line of the stylo pharyngeus and glosso pharyngeus muscles, we shall find Glosso Pharyngeal. the GLOSSO PHARYNGEAL, which is the third nerve of the tongue.*

But to facilitate this part of the dissection, and of the other deep nerves, the jaw should be cut through at the symphysis and at the angle; and after the membrane of the mouth has been separated from the bone, the intermediate portion may be removed. A piece of twine is then to be put through the tip of the tongue, by which it may be pulled out.

By holding aside the remaining parts of the jaw, the third of the (Vth, being the trunk of GUSTATORY, and of the INFERIOR MAXILLARY,) will be discovered emerging from between the two pterygoid muscles.

After the inferior maxillary has been traced

---

* The gustatory nerve connects the salivary glands and muscles of mastication.—The ninth is the motor linguæ, and connects the tongue with the muscles of the larynx and trachea.—The glosso pharyngeal nerve associates the tongue and pharynx in the action of deglutition. We may now comprehend how the tongue, being put into action through the intervention of distinct nerves, may be deprived of one faculty, and retain the others.—Thus, affections of the brain, and sometimes disorders of the bowels, deprive the patient, at one time of taste, at another of speech, or at another of swallowing.

into the hole in the jaw bone, it should be cut through, and a piece of coloured thread attached to it, by which we may again recognize it. The remaining portion of the jaw may now be removed; but we must be particularly careful in extricating the condyle, or we shall be in danger of cutting a small nerve, which runs backwards from the lower part of the gustatory, just at the point where it separates from the inferior maxillary. This small twig will afterwards be found to pass through a little hole by the side of the glenoid cavity, and then to cross the membrana tympani (whence its name of *corda tympani*); it joins the portio dura, but perhaps it will be more proper to describe it as a branch coming from the portio dura, to unite with the Vth.* Corda Tympani.

The jaw being now entirely removed, we shall have a beautiful exhibition of the nerves of the tongue; for by merely pulling it out, we may trace the GUSTATORY to the tip,—the LINGUAL to the muscles,—and the GLOSSO PHARYNGEAL to the tongue and pharynx.

We may now dissect away the parotid, and also the styloid muscles, and as many of the branches of the carotid as we can, without injuring the trunk of the portio dura: this will expose a plexus, which at first appears to be very intricate, but if we put probes under all

* See Note upon this, in the *deep dissection*

the nerves which have been already described; we shall find the intricacy to be very much unravelled. If we look towards the tongue, we shall see the LINGUAL, GUSTATORY, and GLOSSO-PHARYNGEAL; and towards the back of the ear, the PORTIO DURA and SPINAL ACCESSORY; and downwards, the PAR VAGUM and SYMPATHETIC. These now enumerated, are the only ones to be found in the neck, except those which come direct from the spinal marrow, viz. the CERVICAL NERVES.

Par Vagum. We should now trace the PAR VAGUM. It will be found to be swollen into a sort of *ganglion*, where it emerges from the scull, and to be intimately connected with all the other nerves under the angle of the jaw. The first distinct branches found rising from it, are two small nerves, which go to the pharynx;—at about an inch farther down, a large branch will be seen going off from it, obliquely downwards, and across the neck, to pass into the larynx, between the thyroid and cricoid cartilages,—this branch is called the SUPERIOR LARYNGEAL. The trunk of the nerve may then be traced down by the outside of the carotid, giving off no branches which have names, until it passes into the thorax. We should not now follow the nerve farther than the first rib; but, by looking between the œsophagus and larynx, we shall discover the first branch which it gives off while in

Pharyngeal.

Superior Laryngeal.

he thorax; for it is a RECURRENT nerve, which comes back into the neck, to pass into the larynx, between the lower part of the thyroid and cricoid cartilages;—its branches unite with the superior laryngeal;—it is often called the *inferior laryngeal nerve*.* Recurrent or Inferior Laryngeal.

The SYMPATHETIC NERVE is now to be traced. We shall first observe the enlargement of it, under the parotid; this is called its superior ganglion, from which branches are sent off to every one of the other nerves. As we trace it down the neck, we shall observe that it sends twigs to the cervical nerves, and also some very Sympathetic.

* In the distribution of the branches of the eighth nerve to the larynx and glottis, we see that connexion which so intimately unites the larynx and lungs.—We observe how the slightest irritation on the larynx, calls into activity the whole respiratory system. By the connexions of the par vagum, with the phrenic and other respiratory nerves, it governs the actions of the muscles in respiration; and being also the nerve of the stomach, by the same connexions, it governs the muscles in vomiting, combining them in a different manner, to produce that action.

In vomiting and in respiration, the same muscles are in action, but they are differently combined; for muscles, which in respiration, are opponents, become coadjutors in vomiting. The variety of combinations, of which these muscles are capable, explains the meaning of that intricacy and minuteness of subdivision, which characterize the nerves of the neck and chest.

Nervi Molles. soft delicate filaments to the artery, which, from their appearance, have been called *nervi molles*. About the middle of the neck, we generally, but not always, (and oftener on the left, than the right side, and this probably, because the heart

Ganglions. is on the same side) find another *ganglion*.—From this, some very delicate nerves will be seen to pass, in a direction more superficial than the others; these may afterwards be traced over the aorta, to assist in forming the *superficial cardiac plexus*. The main branch of the sympathetic continues to pass down, until it comes to opposite the first rib, and there it forms the *lower cervical ganglion*, from which, branches go to encircle the subclavian and lower thyroid arteries. But here, we must, for the present, give up the pursuit of this nerve. We should now turn to the dissection of the lateral part of the neck.

Phrenic. If we carefully dissect the anterior scalenus muscle, we shall see the PHRENIC, or great internal muscular nerve of respiration, lying upon it; upon tracing this nerve back, it will be seen to arise from several of the cervical nerves.*

* This nerve is generally described as rising from the third and fourth cervical; but by dissecting it carefully, we shall find that it has origins, or connexions, with the portio dura, the ninth, and spinal accessory.

It is a curious fact, that this is the only nerve which, previous to the discoveries of Mr. Bell, was considered as

By then dissecting on the lower edge of the scalenus, and by throwing out the arm, we shall see a certain number of these cervical nerves, passing to form the axillary plexus, viz. the four inferior cervical, and the first dorsal. But before we trace these nerves back towards the spinal marrow, we should cut to the depth of a quarter of an inch through the fibres of the scalenus medius; and then, about opposite to where the phrenic lies, we shall see a nerve, which rises from nearly the same roots as the phrenic, and runs under the axillary plexus, as a distinct nerve, to the external muscles of respiration: this branch, Mr. Bell has called the *External Nerve* of the muscles of *Respiration*. External Respiratory.

As we shall now have exhibited all the principal branches of the neck, we may, after making them more distinct, pass either to the dissection of the deep nerves of the scull, or to those of the thorax and abdomen. If the body is not very fresh, we should first dissect those of the thorax.—The deep nerves of the scull will be more distinctly seen, if the parts have been previously soaked in water.

---

a respiratory nerve to the muscles. He has called it the *Internal Respiratory* Nerve.

DISSECTION

OF

THE NERVES

IN

THE THORAX AND ABDOMEN.

THE viscera of the thorax and of the abdomen, should, in the first dissection of the nerves, be sacrificed to it. But after the nerves have been once fairly seen, there will be no difficulty in exposing them, in union with the arteries.

The thorax is to be opened, by removing the sternum, with the cartilages of the ribs: in doing this, we should cut close upon the inside of the upper part of the sternum, as some of the nerves lie very near the inner surface of the bone.

Phrenic. If there be no disease in the viscera of the thorax, the PHRENIC NERVE of the left side will be seen passing over the pericardium, immediately opposite to the apex of the heart;—the one on the right side, is situated rather lower down on the pericardium.—There will be no difficulty in showing the distribution of these nerves upon the diaphragm.

The dissection of the next set of nerves requires great care. If we look to the middle cervical ganglion, or to the part of the sympathetic, where this ganglion is generally found, some very delicate branches will be seen going off from it, and which, if carefully traced, will be found to form the SUPERFICIAL CARDIAC PLEXUS. Superficial Cardiac Plexus.

The PAR VAGUM should be traced into the thorax, before the deeper branches of the SYMPATHETIC. Par Vagum.

On the left side, the par vagum will be seen, passing over the aorta, towards the lower part of the heart and the lungs. While it lies on the aorta, it gives off that branch which has already been seen running to the lower part of the larynx, viz. the INFERIOR LARYNGEAL, OF RECURRENT; on the right side, the recurrent passes round the subclavian artery. Recurrent.

The par vagum* will now be found to form

* The par vagum connects the larynx, pharynx, lungs, heart, and stomach; and the sympathies it produces in health and disease, are very many. Disorder of the stomach deranges the secretion of the larynx; a vomit, or nauseating medicine will loosen the viscid secretions of the larynx and pharynx; disorders of the stomach, acting through the pulmonic plexus, will occasion cough; and medicines acting on the stomach will alleviate asthma. Through the plexus of this nerve, the heart and lungs are united, ever corresponding in action. When life seems extinguished by suffocation, (in experiments on animals)

intricate plexuses of branches with the sympathetic, for the supply of the back part of the heart, and of the anterior and posterior part of the lungs. These branches form the DEEP CARDIAC PLEXUS, and the anterior and posterior PULMONIC PLEXUSES; but to see them distinctly, we shall be obliged to cut off the ribs at the an-

Cardiac and Pulmonic Plexus.

---

pricking the heart will be followed by an attempt to respire; and in the apparently drowned, the play of the lungs, by artificial breathing, will bring after it, the action of the heart. It is well known how disease of the lungs affects the heart; but it is not so generally observed, how much, disease of the heart resembles pulmonary disease.

Looking to the distribution of the par vagum on the stomach, and the plexus of the nerve, in its course upon the œsophagus, it will not appear surprising, that disorder of the uterine system, affecting the stomach, and also primary disorders of the stomach itself, should produce the *globus hystericus*, or paralysis, or spasms of the pharynx and œsophagus. Although the heart and stomach be separated by the diaphragm, yet through this nervous cord, they are united; and this explains why disorder of the stomach should produce such changes on the heart's action. The pause, or intermission of the pulse, which, in many diseases, is a fatal symptom, is often produced in a manner less alarming, merely by irritation of the stomach. Seeing the many connexions of the stomach with the vital parts, through this nerve, we cannot be surprised that a blow on the stomach should sometimes prove instantly fatal.

Some gentlemen have attempted to prove, that the secreting power of the stomach depends on the par vagum. In contradiction to this opinion, the well known fact may gles, on one, or both sides. If we then pull up the lung, we shall be able to see not only the plexuses, but also those branches of the par vagum, which encircle, or run in a net-work, on the œsophagus, and form the ŒSOPHAGEAL PLEXUS.* After these are exposed, if we merely tear up the pleura, we shall see the continuation

Œsophageal Plexus.

---

be adduced, that there are many animals which have stomachs of powerful digestion, but no par vagum.

The use of the par vagum, and the cause of the phenomena which take place after it is cut, will, perhaps, be discovered by the investigation of comparative anatomy: for by it we find, that the existence of this nerve depends upon the manner an animal respires, and upon the connexion there is between the stomach and the organs of respiration. As, in complicated animals, the par vagum passes to the throat, the larynx, the heart, the lungs, and the stomach,—we may conclude, that the nerve is for connecting and combining into one great system, these several organs,—each of which, has the power of performing, to a certain extent, its own peculiar function; but if the nerve be cut through, the connexion between all the organs, and also betwixt them and the external muscular apparatus, upon which the perfection of the economy of each depends, will be destroyed.

* In the dissection of a Camel, we discovered a very beautiful plexus of nerves upon the œsophagus: these were in connexion with a set of branches on the upper part of the pharynx. As these are also in the Calf, and not in the Ass,—it is reasonable to suppose, that they are peculiar to the ruminating animals, and are probably for combining the actions of the pharynx and stomach.

of the sympathetic upon the inside of the ribs, forming, at the intercostal spaces, a union with each dorsal or intercostal nerve, through the medium of a small ganglion. If we then trace the sympathetic backwards, we shall find that it encircles the subclavian artery with a plexus of branches, from the anterior part of which, those going to the viscera of the thorax pass off.*

Corda Ventriculi.

By now tracing the œsophagus through the diaphragm, we shall see the united branches of the par vagum passing upon the cardiac part of the stomach, to form the plexus which has been called the *Corda Ventriculi.* We should then look to the side of the chest, and we shall see three or four branches passing off from the sympathetic, towards the bodies of the vertebræ: there they unite, and form a division, called the

Splanchnic.

SPLANCHNIC, and which will be found to perforate the diaphragm. If we look on the abdominal side of the diaphragm, and at the same time pull upon the nerve within the chest, we shall discover that a large ganglion is formed immediately at the root of the cœliac artery: this, being of a crescentric shape, is called the

* In dissecting the deep nerves of the thorax, we should place the body so, that the viscera of the abdomen shall drag down the diaphragm. It will be still better to open the abdomen, and to remove all the small intestines, before the dissection of the nerves of the thorax is completed.

SEMILUNAR GANGLION; it has more the appearance of a lymphatic gland, than of a part belonging to the nervous system. Semilunar Ganglion.

From the ganglion of each side, branches pass off, to unite together, and with those of the par vagum, to form a great plexus, which has been called the CŒLIAC PLEXUS, or, more commonly, the SOLAR PLEXUS; from which we may trace branches to each division of the viscera. If we lift up the liver, we shall see a set of nerves passing along the hepatic artery, to form the HEPATIC PLEXUS. If we dissect in the course of the splenic artery, we shall see the SPLENIC PLEXUS;—and, in the same manner, the RENAL PLEXUS to the kidney; and the SUPERIOR and INFERIOR MESENTERIC PLEXUSES to the small intestines: and also the SPERMATIC PLEXUS to the testicle, and the HYPOGASTRIC PLEXUS to the bladder. In dissecting these plexuses, we should put probes under those which have been exposed, that they may not be lost, while we are in search of the others. Cæliac or Solar Plexus. Lesser Plexuses.

If, after these nerves of the viscera have been shown, the peritoneum be lifted up from the spine, the sympathetic will be seen passing from the thorax, along the lumbar vertebræ,* Sympathetic

* A small division of the nerve which sometimes comes off from the sympathetic, about opposite to the 11th or 12th rib, and passes to the ganglion, or to the renal plexus, is called the LESSER SPLANCHNIC, OF ACCESSORY.

and forming connexions with each of the lumbar nerves, by a series of small ganglions: and if we follow it into the pelvis, we shall find that it is connected with the nerves which pass to the leg. The sympathetic, from each side will at last be found united together on the extremity of the sacrum, forming a small ganglion, which is called the COCCYGEAL GANGLION, or GANGLION SINE PARI.

Coccygeal Ganglion.

This description, though superficial, will perhaps be sufficient to enable the dissector to make out what is commonly considered the anatomy of these nerves. But I would advise the student, who is anxious to understand their physiology, to examine the nervous system of the lower animals.—By so doing, he will not only make the study of the nerves (which has heretofore been considered a fagging task) an easy and pleasing subject of inquiry, but he will also be led, to form very different ideas of the use of certain nerves, than have been deduced from some experiments which have been made of late years. I allude particularly to the experiments on the par vagum.

DISSECTION

OF

THE DEEP NERVES OF THE HEAD.

BEFORE the student commences this dissection, he should furnish himself with a mallet and chisels, small saws, pincers, delicate hooks, and a magnifying glass. He should also have the base of a scull always lying before him.

The manner in which the nerves arise from the brain, has been pointed out at pages 24 and 28.

The 1st, or OLFACTORY, passes into the cribriform plate of the ethmoid bone,—but its structure is generally so soft, that we cannot trace its filaments. Olfactory.

The 2d, or OPTIC, we see entering into the foramen opticum. We shall afterwards, in the dissection of the eye, find that it passes forward, without giving off any branches;—but to be expanded, as the RETINA, in the interior of the eye. We should now take hold of the dura mater, which lies upon the frontal bone, with Optic. the pincers, or strong hook, and pull it off, towards the temporal and sphenoid bones. This requires some force,—but it must, at the same time, be carefully done, particularly near the edges of the foramen lacerum, or we shall tear off some of the small nerves, which pass into the orbit. Indeed, the third, and the fourth (which lies in the sphenoid fold) should be partly exposed before the dura mater is torn down.*

Casserian Ganglion. When the membrane is torn from the sphenoid and temporal bones, the CASSERIAN GANGLION of the Vth, will be seen,—from which there pass off the three grand divisions, viz. the OPHTHALMIC, passing through the foramen lacerum, into the orbit,—the SUPERIOR MAXILLARY, through the foramen rotundum, to the upper part of the face,—and the INFERIOR MAXILLARY, (which is divided into the *dental* and *gustatory*,) through the foramen ovale.

The first nerves to be followed, are those which pass through the foramen lacerum into the orbit, viz. the *third*—the *fourth*,—the *first division* of the *fifth*—and the *sixth*.

Before we can trace these nerves, the orbit must be opened, by carrying the saw through the orbitary plate, in a line drawn from the middle of the foramen opticum, to the inner angle of the superciliary ridge, keeping about half an

---

* Before exposing the course of the nerves which pass through the several foramina, we should attach coloured threads to them, by which we shall easily find them, during the dissection.

inch to the temporal side of the crista galli.* The os malæ is to be cut to the depth of three-quarters of an inch, on a level with the zygomatic process. The saw is then to be carried through the temporal process of the sphenoid bone, and the squamous part of the temporal, nearly to a level with the sella turcica. By a smart blow with the mallet, the roof of the orbit will now be so loosened, that by cutting close upon the bone, it may be entirely detached from the soft parts.

We shall now have so exposed the orbit, that we may make the dissection of the nerves in it.

The first nerve seen, is a branch of the ophthalmic division of the Vth. It is the same which, in the dissection of the face, was found coming through the superciliary hole, to be distributed on the forehead. A black hair pin should be put under it, to mark its situation. In tracing it, we shall find that it gives off two principal branches,—one to the *lachrymal gland*, and the other to the *nose*. This last one, should be marked by a bristle, or pin, as it must afterwards be minutely traced. Opthalmic of the Vth.

As the FOURTH is very small, we should first look for the trochlearis muscle, upon which it is Fourth, or Trochlearis.

* It is presumed, that the dissection of all the superficial nerves has already been made; and that, therefore, there can be no hesitation in cutting through some of the superficial branches of the Vth, and of the VIIth.

distributed, and then we shall see some of its fibres. By tracing them back, we shall discover the trunk of the nerve, which is not larger than a thread. The THIRD, at its entry into the orbit, lies very close on the optic nerve. It almost immediately divides into several branches, one of which, in its course towards the obliquus,—and at about three-quarters of an inch from the foramen opticum,—and on the temporal side of the optic nerve, forms an union with the *nasal* branch of the Vth, (already described,) through the medium of a small ganglion, called the LENTICULAR. From this ganglion, a number of small nerves, called *ciliary nerves*, pass into the coats of the eye.

Third, or Motor Occuli.

Lenticular Ganglion and Ciliary Nerves.

The SIXTH is the last nerve of the orbit, to be dissected. It enters upon a lower level than any of the others. As it passes through that spongy structure of the dura mater, which is called the cavernous sinus, there is an intimate connexion between it and the sympathetic,—but this union will be more particularly described presently. The trunk of the nerve will be found to be almost entirely distributed upon the rectus externus muscle.*

Sixth, or Abducens.

* In dissecting the nerves of the orbit, we should disturb the natural situation of the parts as little as possible; and after the dissection of each twig, we should mark it, by putting a black pin, or bristle, under it.

We should now follow the other branches of the Vth pair. This we shall find to be a most difficult dissection,—and one, in which we are often, after much labour, foiled, by an unlucky blow of the mallet and chisel.*

The eye, with its muscles, nerves, &c. may be removed, or drawn aside.

---

* Mr. Bell has shown, that all the spinal nerves, the suboccipital and the Vth, have several essential circumstances, in common:—that they have, each, two distinct roots,—that they have, each, a ganglion on one of their roots,—that they are all exquisitely sensible,—that they are all distributed to the muscular frame, for locomotion and action,—that each nerve is distributed to its corresponding division of the bodily frame, without ever taking a longitudinal course on the body,—and finally, that these nerves are common to all animals which have a symmetrical body and a regular nervous system. This view will be more easily understood, by referring to the Plan in plate 1.

When we examine the origin of the nerves minutely, we shall find, that the Vth is the only nerve of the scull, which comes off in such critical circumstances, as to have a root from the crus cerebri, and another from the crus cerebelli,—which parts may, by comparative anatomy, be proved to be the continuations of the anterior and posterior divisions of the spinal marrow. The Vth will also be found to be the only nerve within the scull, which has a ganglion at its roots. Those who have dissected the deep nerves of the head, or who have attempted to demonstrate the branches of the Vth pair to students, will be able to estimate the value of this view.

I have examined the nerve repeatedly, in its whole course, in man, in the horse, the ass, the calf, and the

2nd of the Fifth.

The zygomatic process of the temporal bone is to be cut through at its root,—so is the malar process of the superior maxillary. When the intermediate portion of bone is removed, we may easily trace the *superior maxillary* of the Vth, across the spheno palatine fissure, to the orbital canal of the superior maxillary bone,—from

---

dog. By these dissections it is shewn, that the Vth pair resembles the spinal nerves in every respect, even in the peculiar form of its ganglion and plexus. In the horse, there is as distinct a plexus formed by the branches which go to the different parts of the head, as there is formed by those which go from the axilla, or loins, to supply the limbs. The form of the part from which this nerve arises, appears also analogous to that of the spinal marrow, where the axillary nerves take their origin. If this be correct, it will be another proof of the similarity of the Vth nerve to the spinal nerves.

In this investigation, I have been able to correct the very common mistake, that the sympathetic nerve has its principal connexion with the nerves of the head, through the VIth nerve.

Many of the branches of the sympathetic which appear to go to the VIth, go to the ganglionic portion of the Vth.

By the establishment of this fact, it is proved, that even the connexion between the sympathetic and the Vth, is similar to the union of the sympathetic with the ganglionic roots of the spinal nerves.

For an account of the experiments by which the similarity of the Vth and spinal nerves is further proved, I must refer to papers in the Philosophical Transactions, and in the scientific journals.

which it emerges, at the infra orbital foramen, upon the face.

In its passage across the spheno palatine fissure, it gives off some important twigs:—but before we can show these, we must remove a great deal of the pterygoid muscles.—By then looking close upon the bone, we shall see a confused plexus; which, however, will be found to be principally made by the branches of the internal maxillary artery; therefore, as many as possible of these vessels, are to be removed: we shall then discover two twigs, passing down to the narrowest part of the fissure, to be united with a small ganglion, which, from the name of the German Professor who first described it, is called the ganglion of *Meckel:* or, from its situation, the *spheno palatine* ganglion. Ganglion of Meckel.

When this ganglion is carefully examined, some branches will be seen passing off from it, towards the palate and nose; and, from its back part, a nerve may—but with some trouble, be seen passing into the pterygoid, or Vidian hole of the sphenoid bone. This nerve (the *Vidian*) Vidian Nerve passes to unite with branches of the sympathetic, and with the portio dura;* but it cannot be traced, until those of the other division of the Vth are examined.

The third division of the Vth, is so large, that 3rd of the Fifth.

---

* See what is said on the portio dura, p. 217.

we shall see it at once, by looking to the foramen ovale. To make it distinct, after it has passed through the hole, it is only necessary to dissect carefully in the remaining part of the pterygoid muscles. The branches which pass to the supply of these muscles, and to the temporal muscles, will then be seen.—It is presumed that the jaw-bone has been removed in the first dissection, and that the dental branch is marked, by a thread being attached to it.—The only particular branch of this nerve that remains to be shown, is that which passes back from the gustatory, towards the glenoid fissure (the *corda tympani**). This nerve may, with some care, be traced through a small hole, into the cavity of the tympanum; but, in breaking up the bone, which it is necessary to do, to expose its course,—it is often torn. Its track, across the membrane of the tympanum, may be easily shown, by breaking up the cavity, in the manner recommended in the dissection of the ear.

Corda Tympani.

The foregoing is but a slight sketch of the manner of dissecting the branches of the Vth pair; but I hope the hints will be sufficient to enable an ingenious dissector to follow the branches to their termination.

Seventh.

The VIIth pair will be seen passing into the

* See the note upon the portio dura.

foramen auditorium internum,—where, according to the opinions hitherto entertained, it almost immediately divides into two divisions, called PORTIO MOLLIS, and PORTIO DURA,—but the views drawn from comparative anatomy, and the experiments upon the functions of the portio dura, entitle us to say, that the two portions ought to be considered as distinct nerves. The one, for the organ of hearing, the other as a nerve of respiration and expression.

Portio Dura.

It is exceedingly difficult to follow the portio dura through the dense part of the petrous portion of the temporal bone, but, with some care, it may be done, and, in tracing it, we shall find the union between it and the Vidian, and also with that which is called the corda tympani.* The nerve will be found to emerge from the

* In the investigation of the minute anatomy of the portio dura, or the *respiratory nerve of the face*, as it is called by Mr. Bell, we have been induced to consider the *Vidian* as that branch of the portio dura, which passes to the respiratory muscles in the back part of the palate, and the *corda tympani*, as the twig which supplies the muscles of the internal ear and levator and tensor palati :—I think we may be permitted to say, that these two nerves have hitherto been traced back from the Vth, only in consequence of their forming a union with the deep branches of the VIIth, similar to that which is formed by the superficial branches of the same nerves on the face.

The dissection of the nerves in the horse, would lead us to believe, that branches from the sympathetic pass stylo mastoid foramen, to be distributed on the face, as has already been described.

Eighth pair. The upper part of the spinal marrow should now be exposed, so that we may distinctly see all the branches of the VIIIth pair. This may be done by carrying the saw down behind the mastoid processes of the temporal bone,—and then by cutting through the transverse processes of the cervical vertebræ, with a mallet and a plumber's hacking knife:—the broken pro-

---

into the ear, along the Vidian; and that branches from the Vth, enter along with the corda tympani.

The portio dura will be found to be one of the most interesting in the nervous system; for, by comparative anatomy, we are able to prove, that it exists, only where there is a particular respiratory apparatus; and, by experiments, it has been most distinctly shown, that when this nerve is cut, the muscles to which it goes, are paralyzed, as muscles of respiration. If the late discoveries by Mr. Bell, had done nothing more, than to show the use of this nerve,—they would still have constituted the greatest advance, which physiology has made in the present day.

The very curious experiments which were instituted by him to investigate the use of this nerve, will be found in the Philosophical Transactions, and in the Scientific Journals.

The comparative anatomy of the portio dura is very interesting; but I cannot enter into it here. I have given a short account of the distribution of this nerve in the Elephant and other animals, in the Journal of Science for January, 1822.

cesses are to be torn off with a strong pair of nippers.

The sheath of the spinal marrow will then be exposed. When it is opened, we shall see the origins of the SPINAL ACCESSORY;* and its trunk, Spinal Accessory.

* This is a very remarkable nerve. In all animals in which it is found, it is intimately connected with the respiratory nerves.

If an animal does not perform part of the act of repiration by muscles which run from the scull to the chest, no spinal accessory, or *superior external respiratory*, as it is called by Mr. Bell, will be found. A common example of this may be seen, in any of the larger birds, as the swan, &c. By experiments on the ass, we have proved, that, by cutting this nerve, we can paralyze the muscles to which it goes, as muscles of respiration,—though the same muscles, being still supplied by other nerves, will retain their powers of raising the head, &c.

During the month of April last, there was an excellent opportunity afforded, of corroborating the opinions which Mr. Bell had formed on the use of this nerve, by the dissection of the Courier Camel, or Maherry, which was brought from the interior of Africa by Captain Lyon, as a present to his Majesty. In the dissection of this animal, we noticed many interesting facts, which have been overlooked by comparative anatomists,—and particularly the distribution of the nerves of the neck and stomach. The arrangement of the nerves which combine the muscles of the throat and stomach, in the act of rumination, is very beautiful. I have given a short account of the nerves of the neck of the camel in the Journal of Science for January, 1822. Here I shall only remark, that there was no spinal accessory nerve in this animal.

passing up, to unite with the fibres of the par vagum and glosso pharyngeal, which have their origins from the corpus olivare. The three united nerves may be traced through the foramen lacerum, with the internal jugular vein.—As soon as they emerge from the scull, they separate. The par vagum will be found to form a sort of ganglion, just at its exit from the scull.

Par Vagum Glosso Pharyngeal.

Ninth.

The IXth pair will be found to come, by a single set of filaments, from the corpus pyramidale,—and to pass through the foramen condyloideum, direct to the muscles of the tongue.

Spinal Nerves

We may now examine the manner in which each cervical nerve arises from the spinal marrow. We shall find that each nerve has a double root, *i. e.* one from the anterior, and the other from the posterior column of the spinal marrow; that the one from the *posterior*, has, immediately before it joins with the *anterior*, a ganglion formed upon it;* and if we carefully examine this, we shall find that, from each ganglion, a small nerve is sent off, to unite with the sympathetic.†

* Some curious experiments have been made in Windmill Street, on the comparative degree of sensibility of the two origins of these nerves. In these experiments there was sufficient observed, to induce us to believe, that there is much difference between the two sets of fibrils.

† This union, or origin, of the sympathetic, appears to have been entirely overlooked by Bichat. He has des-

To trace the sympathetic through the foramen caroticum,—and to show its connexions with the nerves within the scull, it will be necessary to sacrifice the greater number of the other branches. When the foramen caroticum is opened, a plexus of nerves will be found surrounding the carotid artery, which appear to be united with the VIth, but which, when carefully traced, will be found to pass over the VIth, to

Sympathetic.

---

cribed the ganglion, but not the nerve of communication. Had he lived, he would, in all probability, have investigated the anatomy farther,—and then, perhaps, he might have given up the idea of considering the sympathetic as a part entirely distinct from the system of the spinal nerves. It is a striking and curious fact, that, in the edition of his *Anatomie Descriptife*, published in 1802, the editor says, "Nous reprenions ensemble le systême nerveux des ganglions et c'étoit le soir même ou nous avions commencé le ganglion cervical superieur, que Bichat fit cette funeste chute qui determina sa derniere maladie."

The greater number of experiments which have been lately made in this country on the nerves, appear to have been founded on the views of the ganglionic system, given by Bichat, and not on those of the great anatomists, who preceded him, as Haller, Zinn, Scarpa and others. Since Bichat was incorrect in his description of the anatomy of the sympathetic nerve, it follows, that not only his own ideas on the ganglionic system are untenable, but, that all the conclusions from experiments, which have been instituted in the belief that his observations were correct, are also liable to objections.

unite with the Casserian ganglion of the Vth.* There will also be branches seen passing along the Vidian nerve to form in union with it the ganglion of Meckel.

---

* Professor Böch, of Leipsic, and M. Cloquet, of Paris, have, in prosecuting the minute anatomy of the sympathetic nerve, discovered a small ganglion in the cavernous sinus. This I have often seen; but I think I have also shown, by the dissection of these nerves in the larger animals, that the principal connexion between the sympathetic, and the nerves of the head, is not through the VIth pair; for, as I have already said, the branches of the sympathetic, which *appear* to unite with the VIth, pass along it, and over it to join with the ganglionic portion of the Vth, while the branches of the sympathetic, which actually unite with the VIth, are very small.

DISSECTION

OF

THE NOSE AND OF THE EAR.

AFTER having finished the dissection of the nerves, the scull should be divided, so that we may have an opportunity of examining the nose, and some parts of the ear.

The section of the scull may be made, by carrying the saw through the remaining part of the bones of the head and face, in a perpendicular line,—but a little to one side of the septum narium.—The soft palate, &c. is to be cut in the same direction. Each of the sections will afford us some very useful views,—particularly if the pharynx and larynx be left attached to one of them. Indeed the anatomy of the posterior nares, &c. is so important, that the student should always examine it, even though he should destroy many of the small muscles.

The cavities of the nose will be made more distinct, by cutting (in one of the sections) through the superior maxillary bone, immediately below the orbital plate, and by continuing the cut, in the same line, through the ethmoid and sphenoid bones.

We may then see the mucous membrane which lines all the interior parts of the nose, viz. the *Schneiderian membrane;* the *inferior spongy* bone; the *labyrinth* formed by the ethmoid bone; the *communication* between the *cells* of the frontal, ethmoid, and sphenoid bones: immediately above the inferior spongy bone, we shall see the opening into the *antrum* of *Highmore;* and below the bone, the *passage* to the *lachrymal sac.* On the other section, the *septum narium* will be seen to be formed by the union of the perpendicular plate of the ethmoid with the vomer, through the medium of a cartilage. By looking to the posterior part, we can understand the relation of the passage between the back part of the nostrils and the throat—the *posterior nares;* and, with a little care, we may discover the *Eustachian tube,* which leads into the cavity of the TYMPANUM.

We may now examine the general anatomy of the ear.

The following description of the manner of dissecting the ear, will perhaps enable a young student to acquire a general idea of the relative position of the parts composing the organ.—To comprehend the minute anatomy, requires more opportunities, than a dissecting room commonly affords.

The muscles of the cartilages of the external ear, are so small, that, unless the dissection be made in a very fleshy ear, as in that of a negro, it will be difficult to find them; but those running from the head to the ear, may be always easily found.*

---

* The following table of these muscles is added:—

MUSCLES LYING ON THE CARTILAGES OF THE EXTERNAL EAR.

Helicis Major. Or. The upper and acute part of the helix, anteriorly.

In. Into its cartilage, a little above the tragus.

Helicis Minor. Or. The inferior and anterior part of the helix.

In. The crus of the helix, near the fissure in the cartilage, opposite to the concha.

Tragicus. Or. The middle and outer parts of the concha, at the root of the tragus.

In. The point of the tragus.

Antitragicus. Or. The internal part of the cartilage that supports the antitragus.

In. The tip of the antitragus, as far as the inferior part of the antihelix, where there is a fissure in the cartilage.

Transversus Auris. Or. The prominent part of the concha on the dorsum of the ear.

In. Opposite to the outer side of the antihelix.

These muscles are for giving rigidity to the ear, the better to enable it to collect the sound.

The several *cartilages* may be exposed by merely removing the skin, &c. which covers them. The *cartilaginous tube* should be followed down to the bone.—The squamous part of the temporal bone should then be cut, down to the level of the pars petrosa; and we should proceed to lay open the different cavities of the internal ear.

MUSCLES OF THE EXTERNAL EAR.

Attolens Auris.—A thin and almost tendinous sheet. Or. The tendon of the occipito-frontalis, where it covers the aponeurosis of the temporal muscle.

In. The upper part of the ear opposite to the antihelix.

Anterior Auris.—A membranous muscle also. Or. Back part of the zygomatic process of the temporal bone.

In. The back of the helix, near the concha.

Retrahentes Auris.—Two delicate membranous muscles. Or. The mastoid process, above the insertion of the sterno cleido mastoideus.

In. That part of the back of the ear which is opposite to the septum that divides the scapha and concha.

These muscles, in a state of nature, are designed to give tension to the ear; to make it more capable of receiving sounds, and especially to bring us acquainted with the direction of sounds; but their use is, in general, almost entirely lost.

The bone immediately behind the squamous portion, and in a line with the posterior part of the tube, is so very thin, that the slightest blow with a small chisel will break it: if the fracture be made posterior to the line of the *meatus externus*, the *mastoid cells* will be opened. After having done this, it is easy to expose the whole cavity of the *tympanum*, by breaking up the thin bone, in a direction towards the foramen spinale of the sphenoid bone.

The *membrane* of the *tympanum*, with the *chain* of *bones*, will now be seen, and also the *communication* of the *tympanum* with the *mastoid cells;* and if a fine probe be pushed towards the fore part of the cavity, it will pass into the *Eustachian tube*: but it will not be possible to push the probe into the throat, without injuring the little bones in the tympanum,—the tube, therefore, should be examined in the throat.

* If we have determined to sacrifice the bones, for the purpose of examining the eye, nose, and ear, the following cuts should be made:—The lower jaw having been removed, the saw should

---

* The following directions for cutting the bone, were written under the idea, that the dissection of the ear was to be the principal object:—it will be easy to vary the cuts a little, if the posterior nares, &c. have already been examined.

be carried in a line parallel with the cavity of the tympanum, cutting through the glenoid cavity, and terminating in the foramen ovale of the sphenoid bone;—another cut (if the orbit has not yet been opened) should pass through the os malæ, at its union with the superior maxillary bone, and be carried in a line through the frontal and sphenoid bones, so as to meet the first cut into the foramen ovale: when the triangular piece of bone, which is included between these cuts, is removed, it will be easy to show the whole extent of the Eustachian tube; and if one half of the soft palate be cut away, the trumpet mouth of the tube will be exposed; and now a small probe (for, at one point, the tube is very narrow) may be passed into the tympanum;—the tube may then be laid open, through its whole length, with a pair of strong scissars. We shall now be convinced of the impracticability of passing a probe into the ear from the mouth.—The mere possibility of doing it from the nostril will be seen.

It is now easy to understand, that if the Eustachian tube be closed, after an ulcerated sore throat, deafness may be the consequence; or how temporary deafness is frequently occasioned by catarrh. In proof of this, we shall find, that in children who die of cynanche, the tube is generally full of purulent matter. It must also be evident, that, in those people who can throw smoke from the mouth, out by the ear, the membrana tympani must be in part destroyed.

Besides the *bones* (the MALLEUS, INCUS, ORBICULARE, and STAPES,) there are certain small muscles within the cavity of the tympanum; but these are very difficult to show. On the upper part of the Eustachian tube, a muscle lies, partly in a cavity, which, in the dry bone, being something like a marrow spoon, has been called the *Spoonlike Cavity;* upon the extremity of which, the tendon of the muscle is reflected, and then runs to the long process of the malleus. This muscle is called the TENSOR TYMPANI. From the opposite side of the Eustachian tube and glenoid fissure, another muscle passes, to be inserted into the malleus: it is the LAXATOR TYMPANI. From the upper part of the tympanum, there is a third muscle, which runs to the short process, and is called the SUPERIOR, or EXTERNAL muscle;—but this last, is denied by many to be of the nature of muscle. There is still a very small muscle attached to the stapes,—it is called STAPEDIUS, and takes an origin from the interior of a little eminence, absurdly called *pyramid.* The *corda tympani nerve*, which has already been described at page 217, will be seen running across the membrane of the tympanum, and over the long process of the malleus.

Bones of the Ear.

Muscles.

Although these muscles are now mentioned, it is not possible to see them all, in this stage of the dissection, as the tympanum has not yet been sufficiently opened; but to expose it more, at present, for the purpose of exhibiting these muscles, would endanger the parts composing the LABYRINTH.

It is almost impossible for any one, but an experienced dissector, to exhibit all the parts of the labyrinth in one view. To do this, he must have a knowledge of each part; and to expose them, he requires a variety of little instruments, as small chisels, files, and saws; but it is possible for any one to make such a dissection, as will give a general idea of the relative situation of the parts. About a quarter of an inch posterior to the meatus internus, a *ridge* will be seen crossing the petrous portion: if this surface be filed down, a cavity will be opened; viz. the SUPERIOR SEMICIRCULAR CANAL. This canal may be easily followed, by putting an awl into its cavity, and then, as with a lever, breaking up the bone: by tracing it towards the cavity of the tympanum, we shall show its communication with the HORIZONTAL CANAL; by tracing its other end, we shall open the INTERNAL CANAL: but it is very difficult to follow these two last canals through their whole extent. The VESTIBULE may be opened by breaking the bone with a small chisel, imme-

Semicircular Canals.

Vestibule.

diately anterior to the union of the superior and external semicircular canals,—or a better mark, is the base of the stapes;—but in making the cut, we are very liable to break up the FORAMEN OVALE. To show the COCHLEA, a slanting cut Cochlea. should be made across the meatus internus, towards the Eustachian tube. If this be done with a very fine saw, it will probably pass through the MODIOLUS, so as to give a view of all the parts of the cochlea; but in making the cut, the saw-dust will so fill the SCALÆ COCHLEÆ, that it will be impossible to see them until they are cleaned; but we must not put any instrument into the cochlea to clean it: it should be done by dipping the preparation into water, and blowing forcibly into the scalæ with a blow-pipe. We may, then perhaps, make the MODIOLUS and LAMINA SPIRALIS, with the INFUNDIBULUM, distinct. I shall not enter into a more minute description of the parts, but shall refer the student to good books of Anatomy: he will find great assistance in the published engraving which is copied from the Plan used in Windmill Street, for the demonstration of the internal structure of the ear.

DISSECTION
OF
THE EYE.

AS the parts of the human eye are not only on a very small scale, but as it is seldom possible to procure one sufficiently fresh for the examination of the minute structure, we should have much difficulty in acquiring a knowledge of the formation of the eye, as an organ of vision, were it not, that we have it always in our power to get the eyes of sheep, pigs, or oxen, in a perfectly fresh state. Indeed, we shall find it advantageous to dissect the eyes of some of those animals, before we examine the human eye; because, in them, the important parts of the organ are not only of the same structure, but are much larger, and consequently can be dissected more easily. But to understand the eye, as a part upon which surgical operations are to be performed, we must carefully examine the human eye, and accurately mark the proportionate size and relative position of each part.

It need hardly be said, that the eye-lids, and the lachrymatory apparatus, muscles, &c. must all be studied on the human body.

The eye of a sheep is a very good subject for dissection; but the eye of a pig, in some respects, more nearly resembles the human eye. The dissection of the eye of the horse or ox will be found very useful, when we wish to examine some of the more minute parts.

Before endeavouring to discover the minute structure of each part of the eye, we should make several sections, to acquire a general knowledge of its formation. We may commence, by dissecting away the muscles, &c. which are attached to the ball of the eye. When this is done, the SCLEROTIC will be seen, with the transparent CORNEA attached to its anterior, and the OPTIC NERVE perforating its posterior part.

If we puncture the cornea, the AQUEOUS HUMOUR will escape: if we cut out a portion of the cornea, we shall see the IRIS, with its central hole, called the PUPIL. By now pressing on the ball of the eye, the LENS will be pushed forward into the pupil; by scratching with the point of the knife, we shall open the *capsule* of the lens; by increasing the pressure on the ball, the lens will start through the pupil, and then the VITREOUS HUMOUR will appear pushed forward into the pupil. But as the capsule of the vitreous humour *(tunica hyaloidea)* is very different from that of the lens, the mere scratching of its anterior part will not be sufficient to evacuate the humour; the instrument must be

First View of Humours.

plunged deep into it, and be moved in several directions: by then squeezing the ball, an *aqueous humour* will exude from it.

Another eye may now be cut through, at half an inch posterior to the edge of the cornea. On the anterior section, we shall see the back part of the iris, of a deep black colour: the transparent lens will be seen lying upon it. On the posterior half, we shall see the transparent vitreous humour; and looking through it, we shall probably see the inner surface of the CHOROID, because, in a very fresh eye, the RETINA, which is interposed between the vitreous humour and the choroid, is generally transparent; but perhaps some of the vessels of the *tunica vasculosa retinæ*, may be seen, *apparently* on the back part of the vitreous humour. When we hold up this portion of the globe, and invert it, the vitreous humour will fall out; and then the *nervous matter* of the retina, being exposed to the air, will become opaque, and consequently, visible: but it will not keep its proper position; —it will fall back towards the bottom of the eye, so as to expose the whole of the inner part of the choroid, which, in the sheep, is black and green. The choroid may now be easily separated, with the handle of the knife, from the sclerotic.

First View of the Coats.

Before we commence the examination of the minute structure, we ought to fix the eye; and this should be done in such a manner, that we may, in the course of the dissection, be enabled to put the eye occasionally into water,—for there are some parts too delicate to be dissected, unless they are, at the same time, supported in a fluid. Any thing in the form of a small egg-cup, or pill-box, will hold the eye sufficiently steady, to enable us to examine the principal parts; but we should at once so fix it, that we may continue the dissection through the whole organ. The most convenient mode of doing this, is to attach the ball of the eye, with a few pins, to a piece of cork, about an inch in diameter, and half an inch in depth, which has been previously hollowed out, and fixed to a saucer with sealing-wax. The pins may be pushed through the coats; or it will be better to put the pins into the cork, and then to pass three or four threads, at different points, through the sclerotic, about half an inch from the nerve; the threads are then to be fixed to the pins. If it be too much trouble to make this apparatus, two small nails, slightly bent, may be laid across each other, and fixed to a saucer with sealing-wax; the eye may then be easily attached to them. In addition to the saucer, we should have a glass globe, one third of which has been cut off; for after the parts have been dissected, they will be seen to great advantage by filling this globe with water, and then inverting it over the saucer;

Manner of Fixing the Eye.

the manner of doing this, does not require much ingenuity to discover.

We may now proceed to make a very minute examination of all the parts already mentioned.

Cornea and Sclerotic.

The transparent cornea, and the sclerotic, are so intimately connected, that, on the first examination, they will appear to be parts of the same coat; indeed, we cannot separate them; yet, by maceration, the connexion between them, will become so completely loosened, that the cornea will fall from the sclerotic, like a glass from its frame.—Even in the fresh state, we can show that they are of different textures. To do this, the cornea must be cut from the sclerotic, by a pair of sharp scissars, (in doing which, the aqueous humour will escape,) and then, by taking the cornea betwixt the finger and thumb, we shall feel that it is composed of several laminæ, between which, there is a cellular structure, filled with a pellucid fluid.

If we squeeze the ball of the eye, before the cornea is cut off, it will appear opaque,—probably in consequence of the relative position of the cells being changed. When the pressure is taken off, the eye will again appear clear; this explains the immediate good effect of puncturing the cornea, when there is effusion into the anterior chamber.—This operation is frequently performed on horses. The cornea may be separated into distinct laminæ; but this will be more easily done, after it has been macerated some time;—we shall then be able to discover, besides the proper laminæ, a coat, upon the external surface of the cornea, which appears to be the continuation of the *tunica conjunctiva*,—and another, on the inner surface, which has sometimes been described as a *capsule* of the *aqueous humour*. This last is sometimes called, from its discoverer, *Tunica Wrisbergii*. Tunica Wrisbergii.

It would be inconvenient to examine the structure of the sclerotic, at present: we may defer it until we finish the other parts, or examine it, in another eye. We shall find that it is not *lamellated*, but *fibrous*.

The cornea being removed, the iris will be seen.—It is almost needless to remark, that the shape of the iris in the sheep, is very different from that of man.

The cut edge of the sclerotic should now be seized with the forceps. The point of the scissars is then to be gently insinuated under it,—or it will be better to pass an ivory or silver probe under the edge of the sclerotic, to the extent of a quarter of an inch, and then to gently move it round the circle; this will separate the connexions between the sclerotic and LIGAMENTUM CILIARE, which is the name given to the part which connects the choroid and iris.

The sclerotic may then be cut, so as to expose the outer part of the choroid: this is to be done, by first passing one blade of the scissars cautiously between the two coats, and then inclining the eye to one side, that the weight of the humours may so drag on the choroid, as to facilitate the separation. After having removed a small portion of the sclerotic, it will be well to put the saucer into a flat basin, or dish, with as much water in it, as will cover the eye. The whole of the sclerotic need not be removed, but only as much as will exhibit the external appearance of the choroid. A number of small nerves and vessels will be found running between the sclerotic and choroid, which ought to be cut,—not torn. The choroid will now appear to be of a jet black colour, which is owing to a black secretion on its inner surface; if we scrape the membrane with the finger, very little colouring matter will come off. Although this secretion is on its inner surface, still a little exudes through the coat; for even in a very fresh eye, the surface of the sclerotic, in contact with the choroid, will be found to be slightly discoloured.

Choroid.

The iris will now be more distinctly seen, and, between it and the choroid, the white ring, which has received many names, viz. *ligamentum ciliare; corpus ciliare; annulus ligamentosus; annulus gangliformis tunicæ choroideæ:* but the name most commonly given to it, is LIGAMENTUM CILIARE.

Ligamentum Ciliare.

The choroid consists of two laminæ:—by cutting very carefully, with a small scalpel, through one half of the membrane, about the middle of the eye, and by pulling upon the divided portion with the forceps, we may show both of the laminæ; but it is difficult to do this nicely; we shall, however, easily understand the difference between the two laminæ, when the choroid is separated from the retina; for then, the internal surface will appear of a bright colour, and *villous*,—while the external, will be dull, and *cellular*. Two Laminæ of the Choroid.

The external part is called the *true choroid*, from its resemblance to the chorion of the fœtus,—the inner part has, in honour of the discoverer, been called *Tunica Ruyschiana*. The variegated colour of the internal surface, in some animals, having some resemblance to the colour of fine tapestry, induced the Parisian dissectors to give it the name of *tapetum*.* Tunica Ruyschiana. Tapetum.

Though we cannot make the following dissection on the same eye on which the internal

* The pigment, upon the surface of the tapetum, is generally black in man, but the secretion is of various colours, in different animals; sometimes it is deficient, and this gives the appearance of the red eye, as in the white rabbit, cream coloured horse, or albino; for in them, the blood, circulating in the choroid, is seen through the pupil, while in the common eye, the vessels are obscured by the *pigmentum nigrum*.

part of the choroid has been examined, yet the description may now be given. The cornea, and half an inch of the anterior part of the sclerotic, is to be carefully removed from the choroid:—this will show the iris in union with the choroid, through the medium of the white body, called ligamentum ciliare.

Iris. It must be evident, at first view, that the iris is of a very different structure from the choroid. On the latter, we see a number of small veins, disposed in whirls or vortices, whence the name *vasa vorticosa;* while on the iris, we cannot see any thing resembling them. There is not any appearance in the choroid, of fibres; but in the iris, we see both *radiated* and *circular*, which have been, by the best authorities, supposed to be muscular.

The colour of the two parts, is also very different; for the name of *iris* has been given, from the variety of colours seen upon it. When its anterior surface is examined with the microscope, a number of *villi* will be seen, which are said to secrete the different coloured matters; when the back of the iris is examined, it will be found to be covered with the pigmentum nigrum, whence, from its black appearance, it has sometimes been called *uvea*.

Uvea. So far, it is sufficiently clear, that the choroid and iris are very different from each other; but many authors have said, that the anterior part f the choroid is divided into two portions, viz. nto the *Iris* and *Ciliary Processes.* I think hose authors must have come to this conclu- ion, in consequence of having made the dissec- ion in rather a superficial manner. To under- tand the true anatomy of the part, we must irst examine the ligament by which the iris is connected to the choroid.—In the fresh eye, he union is so firm, that it is difficult to detach the iris; but after the eye has been macerated for some time, the iris may easily be separated from the choroid, and then the ciliary processes will be seen. This dissection may be made in two ways; the first may be done in an eye nearly quite fresh.—After the iris and part of the choroid have been exposed, we should introduce one blade of the scissars into the pupil, and cut across the iris, (but not quite to its root,) at two points of the circle. If we then tear one half of the iris back towards the choroid, we shall expose the black circle of ciliary processes, lying loose on the margin of the capsule of the lens: by tearing away this portion of the iris, altogether from the ligament, we shall see that these processes are the termination of the choroid.—To expose them in another manner, the dissection must be made upon an eye that has been kept for two days. We should not now cut the cornea, but through the circle of the sclerotic, about a quarter of an

Ciliary Processes.

inch from the margin of the cornea.—We must not injure the choroid, but separate the sclerotic from it. In separating these two coats, the iris will probably adhere to the sclerotic and cornea, so that when it is torn up, the ciliary ligament will be divided into two portions: the ciliary processes will be seen projecting from that part of the ligament which remains attached to the choroid. At the first view, the apices of the processes will appear to adhere to the capsule of the lens,—and so they have been described by many; but that they do not, may be proved, by blowing a little air between them and the lens: this will also show, that, at their bases, they appear to adhere to the capsule,—but they do not actually touch it, for there is interposed between them and the capsule, a membrane, presently to be described *(Tunica Vasculosa Retinæ.)* This part of the dissection is very difficult, and ought to be done while the eye is under water. There is still another method of giving a view of the ciliary processes.—This is, to make a section of the anterior part of the eye, at the distance of half an inch posterior to the margin of the cornea. The lens will be seen lying on the iris, and beneath its transparent margin is the black circle, which is formed by the ciliary processes.

To examine the processes still farther in this section, the lens may be removed, by cutting the posterior part of its capsule. If the parts be now put in water, and the processes be scraped with the handle of the knife, the pigment which covers them will be washed away, and then they will have the form of a circle of white striæ, projecting from the choroid, and passing behind the iris.

As the retina is a very delicate part, considerable care is requisite in preparing it for demonstration. The eye should be properly fixed in a saucer, and the choroid prepared in the way already described; then, while the eye is under water, a part of the choroid should be torn off,—the white opaque retina will then be seen. But there is another coat between this and the choroid, which, however, is so delicate, that it is almost impossible to see it with the naked eye; but when the glass globe is inverted over the dissection, we shall then see it, floating between the choroid and nervous pulp of the retina; this is the membrane described by Dr. Jacob, of Dublin.* Retina.

Membrana Jacobi.

Having seen this membrane, the choroid may be stripped farther off, and then the termination of the nervous matter of the retina will be seen,

* This membrane was shown to me by Dr. Jacob, while I was on a visit in Dublin, in 1818.—Since that time, I have always demonstrated it by the name of *Tunica Jacobi*, in honour of my friend, who discovered it.

marked by a vessel, running about the eighth of an inch from the margin of the lens.* Some vessels will be seen under the nervous matter; they are on the TUNICA VASCULOSA RETINÆ. It may now be understood, that the nervous pulp of the retina, is contained between the *membrane of Jacob* and the *tunica vasculosa*.

Tunica Vasculosa Retinæ.

The transparent coats which contain the humours, may now be examined.

Petitian Canal.

If we make a puncture in the angle between the margin of the lens and the vitreous humour, and then blow into the puncture, we shall distend the cavity that is called the PETITIAN CANAL, and surrounds the lens. When it is distended with air, or size injection, it has a plaited appearance, whence it was called by the French anatomists, *Canal Godronné*. Different modes of showing this part, will be described presently. On the plaits, we shall see black striæ, which have erroneously been called the ciliary processes of the retinæ; they are nothing more than marks left by the ciliary processes;—this appearance, however, gives a good idea of the shape and situation of these processes.†

* By dropping a little weak acid on the retina, the nervous matter will become more distinct; but if we wash the surface with an alkaline solution, the nervous matter will be destroyed, and then the tunica vasculosa will be seen.

† By Winslow, these marks are called *Sulci Cilia-*

If we make a puncture on the anterior part of the lens, and blow into it, its capsule will be raised; in doing this, a small quantity of fluid, called the *Liquor Morgagni*, will escape. Capsule of Lens. Liquor Morgagni.

By pushing the blow-pipe into the vitreous humour, we may distend the *tunica hyaloidea*, or capsule of the vitreous humour; this is not a regular sac, similar to the capsule of the lens, but has more of a cellular structure, and contains the humour in the cells. This capsule is supposed, by many, to split at the anterior part; one portion is said to go anterior to the lens,—the other, posterior to it; and that, in this manner, the Petitian canal is formed. Mr. Charles Bell, however, has said, in his Description of the Eye, that the canal is formed by the splitting of the tunica vasculosa retinæ; and this he deduces from the examination of the fœtal eye, for in it, may be proved, that the vessels of the tunica vasculosa retinæ, are continued on the back part of the capsule of the lens. But as all these membranes are exceedingly delicate and transparent, in the adult, the manner in which they are connected together, will always be a matter of dispute. Tunica Hyaloidea.

If an eye be now so cut, as to allow the lens and vitreous humour to fall out, in connexion

ris; by Zinn, *Corona Ciliaris*; by C. Bell, *Halo Signatus*.

with each other, we may again have a good opportunity of showing the Petitian canal; for, if we make a puncture in the angle between the two humours, we may distend the canal with any coloured fluid, as red ink: if it be done with size and vermilion, it may be kept as a preparation. The easiest way of doing this, is to suck up a little of the fluid with a glass tube, which has been *drawn* to a point sufficiently fine to enter the puncture,—by blowing a very little, the injection will fill the canal.

Petitian Canal.

This part may also be easily demonstrated, when the eye is slightly putrid, by cutting off the cornea, and about a *line* of the sclerotic;—we should then tear up the iris, which will separate easily from the ciliary processes; by then pushing the processes back with the probe, we shall be enabled to make a puncture by the side of the lens, into which the blow-pipe is to be introduced;—if we have not made the puncture into the canal, either the capsule of the lens, or the capsule of the vitreous humour, will be distended.

Capsule of Aqueous Humour.

There is still another transparent membrane, viz. that of the aqueous humour; in some animals, as in the hare, and rabbit, it is very easy to demonstrate it; but the human eye, and that of the sheep, must be macerated, almost to putrefaction, before this delicate membrane will separate from the inside of the cornea.

We have now to examine the humours. The AQUEOUS HUMOUR is seen, on puncturing the cornea; it is described as having two chambers; one, anterior to the iris,—the other, posterior to it; but when we cut off the cornea, we shall see that the lens lies almost close upon the iris,—so that the space behind the iris, (the *Posterior Chamber*,) is almost ideal.*

Chambers of Aqueous Humour.

When we take the LENS between our fingers, we shall find, that it is much denser in its centre, than in its circumference;—if we boil it, or put it into acid, we shall see this, still more distinctly. When it is boiled, it will have a laminated form,—and when pressed upon, in the centre, it will generally break into three portions, which are distinct from each other in the fœtus, there being a little aqueous fluid interposed between them.

Lens.

The VITREOUS HUMOUR will be found to be a viscid, watery humour, contained in a transparent cellular membrane, which gives it the appearance of solid jelly. If we put this humour on a piece of card, and then make two or three holes in the bottom of the card, and, through them, puncture the membrane, the water will escape: then, with a little manage-

Vitreous Humour.

* The size of the two chambers may be shown, by freezing the eye,—a thin pellicle only, of ice, will be found between the lens and the iris.

ment, we may blow into the capsule, so as to distend and dry it.

The parts already described, are the principal points of the anatomy to be attended to; but if we can procure a very fresh *human eye*,—by making a simple section of it, at half an inch posterior to the cornea, we may discover, near the optic nerve, on the temporal side, the spot

Foramen of Sommering.

described by *Sommering*,—it has the appearance of a hole, with a yellow border surrounding it. But I believe this should rather be considered as a part of the retina, upon which the nervous matter is deficient, than a foramen. If we take the posterior half of the sclerotic, and look upon its inner surface, we shall see the entry of the optic nerve: if we rub the nervous matter off, we shall see a black hole, this is

Porus Opticus.

called the *porus opticus*,—however, it is only the part at which the arteria centralis retinæ enters. By squeezing the nerve from behind, we shall see the pulpy matter oozing at many points,—proving, that the nervous matter comes through several foramina, which form what is called the cribriform part of the sclerotic, *Lamina Cribrosa*.

Lamina Cribrosa.

In the fœtal eye, there are some peculiarities, which may be shown by injecting a fœtal calf; the *arteria centralis retinæ* will be seen passing through the centre of the nerve, and through the vitreous humour, to the back part of the

ıpsule of the lens,—upon which, the vessels
ın in the form of a spider's web, whence the
ıpsule is sometimes called *Tunica Aranea.* Tunica Aranea.
/hen the capsule is injected, the vessels of the
is will also be filled. Four distinct arteries
ıss to the iris; from the branches of which,
ssels may be seen shooting across the pupil,
that membrane which is most perfect in the
etus of seven months, and is called MEM- Membrana Pupillaris.
RANA PUPILLARIS.

DISSECTION

OF

THE MUSCLES

AND

LACHRYMAL APPARATUS OF THE EYE.

THE parts external to the ball of the eye, may be examined on the body in which the muscles of the face have been dissected.

Eye-lids. By cutting off the orbicularis muscle, and a little cellular membrane which is under it, the cartilages of the eye-lids (TARSI) will be exposed. In doing this, we must not lay the upper cartilage quite bare, or we shall be in danger of cutting the tendon of the muscle which raises it,—LEVATOR PALPEBRÆ. By pulling the eye-lids towards the temple, the ligament which connects them to the superior maxillary bone, will be seen. In dissecting this ligament, we must keep close upon it, or we shall open the lachrymal sac. The external ligament, by which the eye-lids are attached to the os malæ, may be shown, by pulling the lids towards the nose.—The names of EXTERNAL and INTERNAL CANTHUS, are given to these angles of union.

Between the union of the eye-lids on the nasal side, there is a little projection, called CARUNCULA LACHRYMALIS.—It is a prolongation of a fold of this kind, which forms the *membrana nictitans* in some animals.

The eye-lids are lined by a vascular membrane, which, when the eye-lids are everted, will be seen to be continued over the anterior part of the eye, whence it is named CONJUNCTIVA, OR ADNATA.

We may now examine the apparatus for the secretion of the tears, and for their passage into the nose.

If we pull down the upper eye-lid, and cut the cellular connexion between it and the frontal bone, we shall discover the lachrymal gland. By a careful examination we may discover eight or ten ducts passing from the gland, and opening upon the inner surface of the upper eye-lid. It is very difficult to inject these ducts. When the eye-lids are closed, a little gutter is formed, which conveys the tears to the PUNCTA, which are small openings in each eye-lid, on little eminences, at the nasal extremities of the cartilages. It is easy to pass bristles into these openings; and, by a little management, they may be so directed, as to pass into the sac, which lies in the groove, in the os unguis.

Lachrymal Gland.

Puncta Lachrymalia.

If this groove be cut upon, the LACHRYMAL SAC (in which the bristles should be seen) will

Lachrymal Sac.

be opened. It will be found lined with a mucous membrane, and so large, that it will admit a common probe, which, when slightly curved, may be passed from the sac, into the

Duct. *duct* which carries the tears into the nose.

There is still another secreting apparatus upon the cartilages: it is composed of a series of small glands, which are named, in compliment to the anatomist who first described them,

Meibomean Glands. *Meibomean*. When the eye-lids are everted, the glands will be seen in parallel rows, like a number of small ascarides, on the surface of the cartilages, and under the conjunctiva.—Each of them opens on the margin of the eye-lid, by a separate duct. It is the inflammation of one of these small glands, which causes the common disease called *Stye*.

In making the dissection of the eye-lids, we can easily understand the two common diseases, ectropion and entropion. In the worst case of ectropion, it is necessary to cut out a portion, and unite the edges of the incision, so as to make the lid shorter. In the entropion, an operation must be performed that will make the lid longer;—a simple snip through the lid, which will be filled up by granulation, will sometimes be sufficient for this. The necessity of great care, in removing small tumours from the eye-lid, must be evident, when we examine the cartilages. I have seen a patient, on whom the operation for ectropion had been performed, by extracting the cartilage; the consequence was, that the eye was nearly destroyed by the constant pressure of the orbicularis muscle.

The muscles of the eye should now be dissected. We should cut through the eye-lids at their two points of union, and then separate the lower eye-lid from the ball of the eye, by dissecting the conjunctiva from its union to the ball;—we may then cut off this eye-lid. We should separate the upper eye-lid in the same manner; but we must not cut it away, as the levator palpebræ must yet be dissected. Muscles of the Eye.

It is difficult to dissect all the muscles without cutting part of the frontal and malar bones; but if we are desirous of preserving the scull, we must do as well as we can in the narrow space. To make a fine display of the muscles (if the scull has not been opened,) we should cut through the ascending orbital process of the os malæ, to the depth of an inch, in a line with the floor of the orbit, and then cut the external angular process of the frontal bone, commencing in the superciliary ridge, and carrying the cut down, so as to meet that on the os malæ.

If the scull-cap has been removed, the dissection may be made still more easy, by cutting away the roof of the orbit: but in doing this, we must not come upon the foramen,—nor nearer to the internal angular process, than the superciliary hole; for if we break up the optic foramen, we shall destroy the origin of the muscles; and if we cut down the internal angular process, we shall cut through the pully of the trochlearis.

The first muscle to be dissected is the only one which does not arise from the foramen opticum,—the OBLIQUUS INFERIOR, or EXTERNUS. To stretch its fibres, we should pull the ball of the eye towards the temple,—for this muscle arises from the bone, above the inferior orbital foramen, and is inserted into the outer part of the ball of the eye.

Obliquus Inferior.

Before dissecting the muscles which pass from the foramen opticum to the ball of the eye, we should pull down the remaining part of the upper eye-lid, and dissect the muscle which lies immediately under the roof of the orbit, viz. the LEVATOR PALPEBRÆ. Having dissected this, the eye-lid and muscle should be removed.

Levator Palpebræ.

The whole of the dissection now consists, in removing the loose fat which is between the muscles. We shall find the SUPERIOR OBLIQUE, or TROCHLEARIS, lying upon the os planum: its tendon, after running through a small ligamentous and cartilaginous band, (which is attached to the lower part of the internal angular process,) passes backwards, below the rectus superior, and is inserted into the ball of the eye, about its middle and upper part.

Trochlearis.

There are no particular directions necessary, to enable the student to dissect the four recti muscles; for they run direct, from around the foramen opticum, to the ball of the eye,—their combined tendons forming, on the anterior part of the ball, an expansion of tendinous membrane, which is described as a coat, common to the ball of the eye and to the muscles;—it is called the TUNICA ALBUGINEA.

Tunica Albuginea.

The muscles of the eye may be easily recollected, for there are only seven in all; of which, six belong to the ball of the eye, and one to the upper eye-lid. The muscle of the eye-lid is called LEVATOR PALPEBRÆ SUPERIORIS. —It arises from the upper edge of the foramen opticum, and is inserted into the cartilage of the eye-lid. The six muscles are divided into the FOUR RECTI and the TWO OBLIQUE. The four recti are distinguished from each other, by the terms LEVATOR, DEPRESSOR, ABDUCTOR, and ADDUCTOR: while the two oblique are named,—the one, EXTERNAL, or INFERIOR; the other, INTERNAL, or SUPERIOR; or, from its passing through the pully, TROCHLEARIS.

Four Recti Muscles.

All the four recti arise from around the foramen opticum, and are inserted into the sclerotic, at nearly equal distances from the cornea. The internal oblique also arises from the edge of the foramen opticum;—its course and its insertion have been already described.

The external oblique cannot be forgotten, as it is the only muscle, which arises from the outer edge of the orbit.

The dissection of the nerves of the orbit, has already been described at page 210.

The dissection of the arteries may be made at the same time that those of the brain are examined; and as the dissection consists in merely following them from trunk to branch, I shall give only a *Table* of them.—

Ophthalmica Cerebralis. Passing into the orbit, by the foramen opticum, gives these branches: —1. To the dura mater and sinus; 2. lachrymalis, which goes to the gland, after giving many branches to the periosteum, optic nerve, &c. 3. ciliares; three or four arteries dignified with the distinction of *inferiores, anteriores, breves, longiores*; 4. supra orbitalis; 5. centralis retinæ; 6. æthmoidales; 7. palpebrales; 8. nasalis; 9. frontalis.

METHOD OF MAKING CERTAIN PREPARATIONS OF THE EYE.

IT will be useful to preserve some human eyes, to show the relative situation of the parts: for this purpose, the eyes must be very fresh.

A student will find it difficult to imitate some of the preparations which are preserved in anatomical museums; but any one may make such dissections, as will give a general idea of the anatomy of the parts, and be of use in planning operations on the eye. If we remove all the muscles, &c. from the eye-ball, and cut off about one-third of the cornea, and then insinuate the blade of the scissars between the ciliary ligament and the sclerotic, so as to cut off about a third of the sclerotic,—the choroid, and its connexion with the iris, will be shown: this forms a very good preparation. Another eye may be prepared, so far in the same manner;—it is to be completed, by cutting away the portion of the choroid corresponding to the sclerotic, so as to expose the retina; but, in attempting to do this, we shall often be foiled. A third preparation may be made, nearly in the same manner; in it, we should remove the retina.

This last preparation will be very useful; for not only will *one half of the cornea*,—the *size* *of the anterior chamber,—the ligamentum ciliare,*—the *iris,*—and the *pupil,* be shown, but also the *lens* and *ciliary processes,* and the *vitreous humour,* will be distinctly seen. As soon as such a dissection is made, the eye should be put into proof spirit. By this, however, both the lens and the capsule of the vitreous humour will be made opaque.

The view of the parts in this section will prove that oculists, who say they have put the cataract into the posterior chamber, must be ignorant of anatomy.—The proper place for the introduction of the needle, in couching, so as to avoid the ciliary processes, will be evident. In considering the subject of couching, there is a point of great importance, and which may be understood in the dissection of even a sheep's eye; viz. the possibility of the lens and vitreous humour being both turned round in the attempt to couch. When this happens, total blindness may be the consequence, as the nervous matter of the retina may be destroyed, by the displacement of the vitreous humour.

SURGICAL DISSECTION

OF

THE NECK AND HEAD.

THERE are so many important questions connected with the Surgical Anatomy of the Neck and Head, that it would be impossible for me to enter fully into any one;—all that the limits of a book of this kind will permit, is to make such remarks, as will rouse the student's attention to the importance of the subject.

I shall suppose that he has made himself master of all the muscles, arteries, nerves, &c. and that he is now about to make a dissection of the neck, as a part upon which he may be called on to operate, or to give an opinion, as to the nature and connexions of a tumour.—The vessels should not be injected.*

Previous to beginning the dissection, the student should mark all the prominent points with ink;—he should then vary the position of the

---

* Perhaps it may be advantageous to inject the arteries with a strong solution of glue, coloured with vermilion: only a small quantity should be thrown in, as the injection passes easily into the veins.

head and neck, and compare the changes which take place in the points he has marked. In examining the neck, he should not only note the appearance, but also the *feel* of the parts.—It is a good exercise, to examine one's own neck in this manner, before a looking-glass.

It is not now necessary to give any rules for the dissection of each part. As soon as we raise the skin, we shall observe, that there is no fascia under it, as in the limbs, but a thin muscle (the platysma) we shall naturally pause, and consider, whether we can assign any reason for this difference. But the important question will be, of what consequence is this muscle, in operations on the neck?—If it be forgotten, even in the simple operation of opening the external jugular vein, the surgeon may be foiled; for as the vein is under the muscle, if the incision be not made obliquely, the fibres will close, and prevent the flow of blood. Those who have once dissected a tumour from under this muscle, will never forget the strength of these fibres in the living body, though they appear so trifling on the dead subject. We can now understand, why tumours of the neck, when they are enlarged, are pushed inwards; and that they may be larger, than a superficial examination would lead us to suppose.

Platysma in Operations.

If the body be thin and anasarcous,—instead of the fibres of the platysma being distinct and connected, they will appear scattered; and the cellular membrane between, and under them, will have the form of a fascia.—It is this appearance, which has led some surgeons to attach more importance, to what they call the fascia of the neck, than to the platysma. Yet I must admit, that though the cellular membrane will not resemble *fascia*, in a body where the muscles, &c. are plump,—still, in a patient who has a tumour here, the membrane will be so thickened, in consequence of the pressure, that it will, sometimes, be almost as strong as a distinct fascia: it is important to recollect this, in performing operations on the neck. Fascia of the Neck.

The branches of nerves seen, when the integuments only, are taken off, are not of much importance in a surgical view.

The dissection of the skin should now be carried up to a line, drawn from the tube of the ear to the nose. We shall then see, that there are no muscular fibres on the parotid, but that it is covered by a dense layer of fascia. This fascia will, in some degree, account for the violent pain which attends cynanche parotidea; for not only will the nerves be compressed by the fascia, but it will also form a natural obstacle to the free exit of matter.—I have seen a patient quite delirious from the pain he suffered during an inflammation of the parotid. Under this fascia, several branches of the portio dura On cutting the Portio Dura.

will be seen: these must not be forgotten; because, in the simple operation of taking out a small tumour from this part of the face, we may, by cutting these nerves, cause a degree of distortion in the lips of the patient. The risk of producing a certain degree of paralysis, ought to be explained to the patient, before we commence any operation on this part.

We should now raise the platysma, by cutting it through in the middle, and then dissecting one portion towards the clavicle, and the other to the base of the jaw. We shall now have exposed the sterno cleido mastoideus, and the superficial muscles which are connected with the larynx. There is much to study in this view. The first question that will strike us, is, where ought the operation of laryngotomy to be performed?—The nature of the case will have much influence on our decision: but, looking to the parts as they now appear, we should decidedly fix upon the space between the thyroid and cricoid cartilages, because it is the most superficial, and there are very few vessels upon it; but we ought to know, that a portion of the thyroid gland very often crosses this part, to pass up to the os hyoides, this however might be pulled to one side. If the case be such, that we cannot operate at this point, (but, luckily, this does not occur once in ten times,) then the operation must be performed lower down. This

Laryngotomy.

will be very difficult; for we must not only go below the thyroid gland, but to a great depth between the muscles, to reach the trachea. This however, is not all the difficulty: if we put our finger upon our own larynx, and then breathe, as a patient does, who is suffocating, we shall be able to form some idea of the tension of the muscles, of the distended state of the small veins, and of the frequent change in the position of the larynx.—We must not, at the same time, forget that the patient must be sitting almost upright. These considerations will give us some notion of the difficulty of performing the operation of tracheotomy.

The histories of the operations on the larynx, are most important; because, by them only, can we judge of the difficulties. Some excellent cases and remarks will be found in Mr. Charles Bell's Surgical Observations, and in the Medico Chirurgical Transactions. There is also a case related by Dr. Johnson in the Medico Chirurgical Journal, which is highly descriptive, of what really takes place during the operation of laryngotomy.—This case is also remarkable, as the patient was still, at the end of three years, obliged, and *able*, to wear a tube in the larynx.

If we should be called upon to perform an operation, to relieve a child which has sucked a pebble or pea into the larynx,—the space between the two cartilages will probably be the most proper part to open the larynx. I have dissected a child, whose death was occasioned by a pebble sticking exactly opposite to this part :—had assistance been brought sufficiently early, the child might have been saved by a cut with the lancet.

The success attending a case related by Mr. Chevalier, would induce us to open the larynx at this part, when a child is dying of croup.

We may now consider the Surgery of the Arteries.

We now know, that if we were to turn up the edge of the sterno cleido-mastoideus, we should come upon the sheath of the carotid artery ; but, before we expose it, we should think of all the diseases and accidents to which the artery is liable.

The cases already recorded of aneurism of the carotid artery, prove, that it generally takes place at the bifurcation. Seeing the proximity of this, to the sensible part of the larynx, we can understand how the aneurismal tumour may be pressed in upon it, by the platysma, and thus produce irritable cough, and symptoms referable to pressure on the nerves of the larynx. This irritation has been the cause of the death of some patients, upon whom, even the operation of tying the carotid was performed ; but this is no reason against the operation ; on the con-

Carotid Aneurism.

trary, it is a motive for its early performance, and before the tumour is much enlarged.

Before an operation is decided on, we should carefully weigh all the circumstances of the case. It is important to recollect, that a small tumour situated over the artery, so as to be moved at each pulsation, has been occasionally mistaken for aneurism. I have not only heard of such instances, but I have been consulted in a case of enlargement of one lobe of the thyroid gland, for which the patient was sent a journey of forty miles, that the carotid artery might be tied, to cure the supposed aneurism.

The question will force itself upon us, Where is the artery to be tied? If the aneurismal tumour be lower down than the bifurcation of the carotid, then it will be very difficult to decide, and probably the operation will be unsuccessful, as we must either come too close on the tumour, or too near the origin of the carotid; however, if we may judge from the cases already recorded, the tumour will generally be formed at the bifurcation,—and then the most advisable point to tie the carotid, is, where it is crossed by the omo hyoideus.

When the edge of the sterno cleido mastoideus is raised in a strong man, neither the artery, vein, nerve, nor even the sheath of the vessels will be seen, but only the omo hyoideus, covered with a broad and smooth membrane.—If we

The Operation. mark the lower edge of this muscle, and cut the membranous expansion, and then draw the muscle towards the ear, we shall expose the sterno thyroideus, and the general sheath of the vessels and nerve.* If we open the sheath, by scratching upon it, close to the edge of the sterno thyroideus, we shall then open only that division of it, which contains the artery; so that neither the jugular vein nor the par vagum will be exposed, nor will the recurrent nerve be endangered; but if we were to draw the omo hyoideus towards the trachea, we should then be obliged to cut upon the middle of the sheath, by which we would come on the great vein and nerve, and, perhaps, on branches of the superior thyroid artery, which will make it more difficult to tie the carotid neatly. It will now be evident, that the great vein will be less endangered, if the ligature be introduced between the vein and artery.—It need hardly be mentioned, that the sympathetic nerve lies close on the spine, and quite separated from the general sheath of the vessels. In making this dissection, we must not forget that the head is lying in a very different position, from that of a patient, on whom an operation is to be performed. As the patient will probably be sitting, with his

* Some branches of the descendens noni, will be seen upon the sheath and the muscle.

head reclining on a pillow, we ought to elevate the neck of the subject into that position.

The manner in which the artery is here advised to be tied, is nearly the same as that which is given, in the illustrations of the Grand Operations of Surgery, by Mr. Bell. It differs considerably from the manner of operating recommended by Sir A. Cooper, and by several other Surgeons. But before such a serious operation is performed, I would recommend the operator to read every thing that has been written on the question, and to compare the several modes proposed. Many interesting cases will be found in the Medico-Chirurgical Transactions, related by Sir A. Cooper, Mr. Dalrymple, Mr. Vincent, and Mr. Coates; and also many excellent remarks on the principle of the operation, in the Illustrations of Surgery, by Mr. Bell.

At the place just pointed out, the artery may be cut down upon, so as to be compressed between the finger and thumb, or tied, when a serious operation is to be performed below the angle of the jaw.

It is hardly necessary to consider how the carotid should be tied, when cut by the suicide; for when it is opened by a large incision, the patient will probably be dead, before the surgeon is brought to him; but still, such a question may offer. Mr. John Bell tied it in one case, with success; but the circumstances were peculiar, for the unfortunate person was so cool, and so determined to commit suicide, that, after having read the description of the artery, in Mr. Bell's Work on Anatomy, he stood before a mirror, and calculated the situation of the carotid so nicely, as to pierce it with a pen-knife; but, in consequence of the small size of the external orifice, the hæmorrhage was not very great—the external wound closed, and an aneurism formed, for which Mr. Bell performed the common operation.

The tying of the carotid was, until a few years ago, considered to be a very difficult and hazardous operation. The opinions upon this question are now so much altered, that some surgeons have gone into the other extreme, for they have even performed this operation, to try the effect, not only on tumours, but even on head-ache. We ought to recollect, that there is little or no merit in being able to tie the common carotid, for it is so easily found, that a surgeon, with very little knowledge of anatomy, may put a ligature safely round it. In a case of hæmorrhage, to which I was called some time ago, I was strongly urged, by my assistant, to tie this artery—but, though there was more necessity for attempting the operation, than there appears to have been in some cases, where it has been performed, I was deterred from doing it, by the conviction, that the patient might do well without such an operation, and, therefore, if I had performed it, I should have justly incurred the censure of being too desirous of shewing that I knew where the carotid lay.

We may now prosecute the dissection towards the angle of the jaw, and consider the manner of securing the vessels, when cut at the root of the tongue, by the suicide. Vessels cut by the Suicide.

We see that the larynx and the sterno cleido mastoideus protect the carotid, and that the branches most exposed, are those of the lingual and facial arteries. The cornu of the os hyoides should be carefully marked; for this is the part which we should feel for, as a guide, by which we shall easily find the lingual and facial arteries. The vessels will generally be easily secured in the wound made by the suicide; for, there will be a large open incision, and before we are brought to him, the quantity of blood lost, will have diminished the arterial force. In some cases, it may be difficult to tie the arteries neatly.—I have been obliged, in secondary hæmorrhage under the tongue, to pass a needle and thread coarsely round a bleeding surface. This was against all rule; but I was forced to do it, because the state of the parts was such, that I could not discover the bleeding vessel,—and as the source of the hæmorrhage was exactly in the middle of the throat, I was afraid, that if I tied one carotid, I should be obliged to tie the other also; and that, even if I tied the carotid from which the vessel arose, there would still, from the anastomosing vessels, be bleeding sufficient to destroy a patient who had already, for the second time in six days, lost two pounds of arterial blood. The patient did well.

We have now brought the dissection up to the angle of the jaw; and here comes the very important question of extirpation of tumours.

Extirpation of Glands.

In dissecting up the platysma, we exposed part of the submaxillary, and parotid glands; under the margin of the submaxillary, and sometimes within its substance, we shall find a small lymphatic gland,—when this becomes diseased, and grows large and hard, it presses up the submaxillary gland, so as to give it the appearance of being affected; and hence we have naratives of the extirpation of the submaxillary, when, most probably, the disease has been only in the lymphatic gland; for the salivary glands are seldom scirrhous. The dissection will show, that an encysted tumour may sometimes be taken out, without much hæmorrhage.—In such a case, we should first mark the situation of the facial artery and vein, and, avoiding them, make an incision on the edge of the submaxillary gland, so that we may lift up its edge, and scoop out the tumour. If it be very hard, and adhering to the gland, we may have considerable bleeding, but not necessarily dangerous; for it will probably be from the facial, or lingual artery,—and either of these arteries may be tied, the cornu of the os hyoides being the principal guide; the lingual artery lies above it, and the facial a little higher. We must not forget that the lingual nerve is situated between these vessels.

The remarks upon the liability of a scirrhous lymphatic being mistaken for disease of the salivary gland, apply more forcibly to the tumours which are connected with the parotid. Every student who examines the anatomy of the parotid gland, and, particularly when it is injected with quicksilver, will suspect that the histories of operations, in which a diseased parotid is said to have been wholly extirpated, are erroneous. The external carotid artery passes through the substance of the gland,—but this is no objection to the accuracy of the report; for it may be tied both above and below; but is there no danger of cutting the internal carotid, or the internal jugular, or the par vagum, in the attempt to extirpate those parts of the gland which are situated so deep as the space between the occiput and atlas? These considerations induce me to believe, that we cannot *extirpate* the parotid gland.

Extirpation of the Parotid.

It is frequently necessary to cut off a portion of the parotid, when a scirrhous tumour is imbedded in it: in these operations, the blood issues as from a sponge, so that it is difficult to find all the vessels; but in the greater number of cases, the graduated compress will restrain the bleeding from the smaller arteries. When we tie the external carotid, previous to such an operation, we may proceed thus:—If we cut through the skin, from the lobe of the ear, towards the cornu of the os hyoides, and then dissect through the platysma myoides, we shall come upon the digastric; and if we then dissect along the upper edge of this muscle, we shall expose the stylo hyoideus,—by forcing this last muscle downwards, we shall find the continued trunk of the external carotid.

Tying the External Carotid.

In extirpating tumours from this part, we must cut across many branches of the portio dura,* which will cause partial paralysis of the face.

The dissection of the duct of the parotid should now be made, and its situation accurately marked, that we may avoid it during operations

---

* Since the use of the portio dura has been illustrated by the facts of comparative anatomy, and by various experiments, instituted by Mr. Bell, we have been able to explain many symptoms of disease, which have hitherto been very obscure. For several examples of paralytic affections, in consequence of injury of this nerve, I shall refer the student to papers by me in the Journals of Science for January, 1822, and April, 1822, and the Medico Chirurgical Transactions.

on the face. We shall generally find that a line, drawn from the middle of the tube of the ear, to the opening of the nostril, will be immediately over the duct; but, though we may mark its situation pretty accurately, we shall proceed with less dread in removing a tumour that is situated near it, if, instead of trusting to our recollection of the situation of the duct, we pass a fistula lachrymalis probe into it:—this may be easily done by everting the cheek; the opening of the duct will be found opposite to the second molaris. Parotid Duct

The bleeding, in most operations on the face, will be commanded by the assistant pressing on the facial artery, where it passes over the jaw. After the removal of a tumour, the vessel may be secured by the twisted suture, which will, at the same time, hold the lips of the wound together. In this view, we shall see the danger of opening the temporal artery very low on the head.

We should now return to the examination of the lower part of the neck.

It is hardly possible for surgeons, now, to propose to cut the branches of the Vth, or the VIIth, indiscriminately, for the disease called *Tic Douloureux*.—There is reason to believe, that the disease is seldom or never in the portio dura,—and the question of the propriety of cutting the Vth, is very doubtful.

Before we divide the sterno cleido mastoideus, we should calculate the place that it may be necessary to cut this muscle, for the disease of wry neck. But this disease is generally either in the sternal or clavicular portion only.

By now laying the lower half of this muscle on the chest, and by detaching the sterno hyoideus and thyroideus muscles, we shall expose the thyroid gland.* If we make a slight cut into the gland, we shall form an idea of its vascularity, and consequently of the troublesome hæmorrhage which may ensue from its being wounded. I have, by injecting the carotids of a suicide, after death, proved that the wounding of the gland, even without opening the trunks of the arteries which pass to it, is sufficient to cause a fatal hæmorrhage. This should make us question the propriety of passing a seton through the middle of the gland, for the cure of bronchocele, especially as the trunk of the carotid has been found in it.

Thyroid Gland.

---

* In this dissection, the anatomy of the salivary glands should be attended to. The duct of the submaxillary gland of each side, will be found by the side of the frenum linguæ.—Those of the sublingual glands, open in rows on each side of the tongue. The situation of the duct of the parotid, has been already pointed out from each of the glands, which are called *buccales,—labiales*, &c. These are distinct ducts which open on the inside of the cheeks and lips.

When the four arteries of the thyroid are dissected, and their connexions with the sympathetic and par vagum are displayed, we shall be convinced, that the surgeon, who attempts to extirpate this gland, must be a bold one. But the greatest objection to attempting such an operaion, is, that the gland is seldom in such a state as to require removal, without the larynx being also involved in the disease.

The deep dissection may be continued up to the space behind the jaw, and then we shall discover a portion of fascia which runs from the angle of the jaw towards the styloid process and the os hyoides. This may encumber us much, in extirpating tumours from this part. We should now particularly mark the situation and appearance of the stylo hyoideus muscle, as it is a boundary, beyond which, we should carry a scalpel with great hesitation. When we extirpate tumours that are under this muscle, the operation should be rather, by scooping and tearing with the handle of the knife, than by cutting with a sharp blade. Deep Fascia.

We may now cut across the masseter muscle, and saw through the jaw, near the mental foramen, and remove one side of it. We shall then see the nerve enter into the jaw; which will explain the reason of the violent pain that is sometimes felt after fracture of the jaw, or where we attempt to pull away a piece of carious bone. We shall also see the artery entering into the foramen; this is sometimes torn in pulling the last tooth, and it then bleeds violently.*

After the mouth has been thoroughly cleansed, the ranina artery, by the side of the frenum, may be exposed.—This is the vessel which has been cut in those children who have died of bleeding, in consequence of dividing the frenum linguæ. We are sometimes obliged, even against our judgment, to perform this operation.

Frenum Linguæ.

—It may always be done safely, while the child is crying; for then the mouth is wide open, and the tongue is turned up: it is only necessary to make such a scratch as will draw blood, —that will satisfy the mother.

By the side of the frenum, we shall find the ducts of the submaxillary gland: to these we should look, when there is a swelling of the gland; for they are sometimes obstructed by a small calculus.

If we could trace the lymphatics which pass from the parts within the mouth, we might be

* Patients have even died in consequence of this. An anecdote was related to me by an Irish surgeon, which may afford a useful hint:—During a consultation on the propriety of tying the carotid, for hæmorrhage from this artery, one of the students asked the patient for the tooth which had been extracted; this he pushed into its place again,—there was no more hæmorrhage.

able to detect the source of many of the swellings in the neck, as easily as we do those of a bubo in the groin: in the one case, a sore on the penis is generally the cause of the tumour, —and in the other, an ulcer on the gum, or a spoiled tooth.

We should now examine the natural state of the tonsil.—We shall very often find that its appearance resembles ulceration. It is important to recollect, that, in consequence of a little irritation, such as that produced by taking mercury, the ducts of this salivary gland will have so much resemblance to an ulcerated surface, that they may be mistaken for venereal ulcers. I have known several patients put upon a second, and severer course of mercury, in consequence of the surgeon not having been aware of this fact. Tonsil.

As we may sometimes be called upon to scarify the enlarged tonsil, we should recollect that a small artery passes into it: the wounding of this, however, would probably do good; but such a case has happened, as the wounding of the internal carotid, in this operation.—The artery will be found very close to the gland.

We should now examine the pharynx and larynx.

Before making a lateral view of the pharynx, we should introduce a probang into the œsophagus. In doing this, we shall see how much Pharynx.

danger there will be of passing it into the larynx, if, in its introduction, we pull out the tongue.

We should now cut through one side of the pharynx.—An accurate knowledge of the natural form of the pharynx, and of the beginning of the œsophagus, is even more important than a knowledge of the anatomy of the urethra; because, persons of a particular constitution, have very frequently symptoms, which might lead us to suspect that they arose from stricture in the œsophagus.

If a surgeon, who has not an accurate knowledge of the structure of the part, be induced to introduce a bougie, in such a case, the sudden narrowing of the tube opposite to the cricoid cartilage, will probably lead him to believe, that there is stricture, and particularly if there should, at the same time, be that spasmodic affection of the parts, which is so often excited by the attempt to pass a bougie.

Stricture of the Œsophagus.

If he perseveres in the use of instruments, to cure the supposed stricture, he may produce such a state of the parts, as will be followed by a contraction of the tube, which is generally the cause of a horrible and lingering death. This subject should be studied by reading all the best authors who have written on it.

The question of œsophagotomy may now be considered. The appearance of the natural parts will prove, that this is one of those operations, in which there will be more difficulty to decide upon the propriety, than on the manner of performing it. Œsophagotomy.

I have once assisted in opening the œsophagus, to relieve a stricture, by which the patient would have been destroyed in two or three days:—though the case terminated fatally, I saw no reason for being afraid to repeat the operation, should a patient offer, in whom the stricture of the œsophagus has become so narrow, as to make death, from starvation, inevitable.

If we make a section of the scull, such as is described at page 223, we may understand how a tube may be passed from the nose into the larynx; how a polypus, hanging down from the posterior nostril, may produce suffocation;—how it may be possible to restrain a violent hæmorrhage from the nose, by plugging up the posterior nostrils.

We may now understand how much the ethmoid bone, and even the brain, may be endangered by the forcible extraction of polypi.—The principles upon which the different operations of fistula lachrymalis are to be performed, may be seen. We shall also be able to determine upon the most favourable position of the head, in cases where there is a collection of matter in the antrum;—and by pulling the second molaris, we shall see that a free exit might be given to matter collected in that cavity.

We may perform the operation of trephine upon the subject, with much advantage; for we may make examples of the various fractures which require operation, and at the same time see the greater number of difficulties which may occur during the operation on a patient.

Operation of Trephining.

If we allow the head to fall on the ground, we shall probably produce *simple fracture*, with extensive fissure; if we strike it a smart blow with a hammer, we shall perhaps produce a *stellated fracture;* in such a case as this, we may, with small levers and forceps, pick away the pieces of bone, without using the trephine. When the scull is struck with a sharp point, though there will be only a depression or hole in the external tables, yet there will probably be an extensive fracture of the tabula vitrea;—this, it is evident, will require a large trephine. If the head be allowed to fall on the vertex,—or if it be struck with a heavy body, as when a brick-bat falls from a building on the top of the head,—we may find that the fracture has taken place at one, or both, of the temples.

In performing the operation, we should pay particular attention to the various degrees of thickness in the different parts of the scull. In a rickety person, we may expect that, at certain points, the scull will be very thick.—But as we shall find that, in the greater number of sculls, there are no marks by which we can be guided in judging of the thickness,—we shall be satisfied of the justness of the rule, that the operation of trephine should always be very cautiously performed.

There are certain points, which a dissector, who had not seen much practice in surgery, would be afraid to set his trephine upon,—as, for example, in the course of the longitudinal sinus: but experience shows, that there is no danger in opening the scull here. The manner in which the meningea media frequently runs in the substance of the bone, will prove to us, that, in the greater number of cases, where the trephine is applied over its course, it must be cut; but this should not alarm us,—for when this artery is cut, the bleeding can be easily stopped.

The practical surgeon will agree with the dissector, in considering it very difficult to apply the trepine over the frontal sinuses, or in the line of the spine of the os frontis.—When the external table of the frontal sinus is removed, we can understand how the membrane lining it, has, in some operations, been mistaken for the dura mater.

By striking the scull smartly with a mallet, the dura mater will be detached from the bone, at the part struck: if the head be afterwards injected with size, a coagulun will be found at this part. This experiment would lead us to doubt the accuracy of Mr. Abernethy's explanation of the cause of effusion of blood between the dura mater and the bone.

While the student has these parts before him, he should read the Works of Pott, John Bell, and Abernethy, and of Charles Bell;—in the Fourth Number of the Surgical Observations, by Charles Bell, he will find many remarks applicable to the question of the varieties of fracture.

DISSECTION

OF

THE ARM,

AFTER IT IS SEPARATED FROM THE BODY.

THE dissection of the muscles by which the arm is attached to the body, is described at pages 81 and 135.

The first muscles to be dissected, are those surrounding the shoulder joint.* A *block* should be put under the joint, so as to make the fibres of the principal muscle,—the DELTOID, tense. Deltoid. We shall find that the cellular membrane and fat pass to such a depth between the fibres of this muscle, that the knife must be set on very boldly, before we can make it appear clean. After the origins and insertion of the muscle have been shown, the tendinous fascia, by which it is connected to the base of the scapula, is to be dissected up, so as to expose the muscles which are *below* the spine of the scapula. This mass appears at first to be formed by one muscle only; but, by looking near to the lower costa of the scapula, a line of division will be

* In the first dissection, every thing is to be cut away, except the muscles.

Teres Minor and Infra Spinatus.

seen, which separates the TERES MINOR from the INFRA SPINATUS,—both of which may be traced to the great tubercle on the head of the humerus. On the lower edge of the teres minor, a distinct and large muscle, the TERES MAJOR, will be seen, running from the inferior angle of

Teres Major.

the scapula, to the humerus, to be inserted along with the latissimus dorsi,—in raising the tendons of these two muscles, we shall sometimes see one bursa,—but, occasionally, it is divided into two distinct sacs.

The origins of the deltoid, from the clavicle, acromion, and spine of the scapula, must now be raised, (in doing this, a large bursa will be discovered under it.)—A small part of the muscle may be left attached to the humerus. A set of fibres will now be seen, occupying the space which is above the spine of the scapula,* and which pass under the acromion, to the great tubercle on the head of the humerus: these form the SUPRA SPINATUS muscle. At the edge of

Supra Spinatus.

the notch, we may observe the origin of the small muscle, which passes to the neck, viz. the *omo hyoideus*.

We may now turn to the lower surface of the scapula. The loose portion, which will proba-

---

* Perhaps a part of the trapezius may still be attached to the clavicle and spine of the scapula;—this should be removed

bly appear ragged and slightly putrid, is a part of the serratus major anticus: when this, with the cellular membrane which is below it, is dissected off towards the base of the scapula, the SUBSCAPULARIS will be exposed. This muscle will be found to occupy all the concave surface of the scapula, and to be inserted into the lesser tubercle of the humerus. We shall generally find a bursa communicating with the joint under this tendon. Subscapularis.

We may now pass to the dissection of the muscles which lie on the humerus. The first muscle to be dissected, on the fore part, is the CORACO BRACHIALIS; the fibres of which run, in a straight line, from the coracoid process to the inside of the humerus. In exposing the fibres of this muscle, those of the *short head* of the biceps will also be shown. The belly of the BICEPS is covered by a thin fascia, which is to be raised, by cutting in the direction of the fibres.—When near the bend of the arm, we must be careful not to cut through the band of fascia which passes off from the edge of the biceps; for this is an attachment which the muscle has with the fascia of the fore arm. The insertion of the biceps into the tubercle of the radius,* cannot be shown until the muscles of Coraco Brachialis. Biceps.

* When we expose the insertions of the biceps into the tubercle of the radius, we shall find a bursa between the tendon and the bone.

the fore arm are dissected; nor should we, at present, cut the capsular ligament of the shoulder joint, to expose the origin of the *long head* of the biceps from the glenoid cavity.

Brachialis Internus. The BRACHIALIS INTERNUS may be seen under the biceps. As the fibres of this muscle run nearly parallel to the bone, there can be no difficulty in showing them in their whole extent, from their origin on the humerus to their insertion into the coronoid process of the ulna.

Triceps. The large mass of muscle which is on the back part of the arm, forms the TRICEPS EXTENSOR: it is merely necessary to look to the direction of the fibres of the three different heads, to enable us to dissect them down to their union and insertion into the olecranon; but, in dissecting the lower part of this muscle, we must not confound it with the ANCONEUS, which passes from the external condyle to the ulna. Anconeus.

Muscles of the Fore Arm. Before dissecting the muscles of the fore-arm, the fascia which binds them together, should be exposed: this is most easily done, by commencing the dissection at the outer part of the arm, and carrying it towards the inner.—The dissection should be continued to the wrist; and then the several muscles which compose the first layer, may be seen through the transparent fascia. The only rule necessary to be recollected in the dissection of these muscles is to remove the cellular membrane in the direction of the fibres.* For their arrangement, and their origins and insertions, see the annexed table.

The muscles of the hand are rather difficult to dissect, in consequence of their connexion with the palmar aponeurosis. This fascia ought to be exposed, before we begin to dissect the muscles.—The incision should be made in the middle of the hand, from the annular ligament to the middle finger.—The skin is to be carried towards the thumb, and towards the ulnar side of the hand. But, in cutting in the last direction, we must take care that we do not dissect off the little muscle, PALMARIS BREVIS, which is attached to the skin for about an inch below the pisiform bone: indeed, this muscle should be exposed before the fascia is dissected. Palmar Aponeurosis. Palmaris Brevis.

CLASSIFICATION OF THE MUSCLES OF THE ARM.

IT is hardly possible to arrange the muscles moving the humerus, into classes which shall have each a distinct action to perform,—in consequence of the motions of the humerus, on the scapula, being so varied. But the following enu-

* Several bursæ will be found connected with the tendons of these muscles. If the student is anxious to discover all of them, he should consult the description of the bursæ, by Dr. Monro.

meration will, perhaps, assist the student in recollecting them :—

The muscles which are inserted into the upper part, must raise the arm; thus the *supra spinatus*, *infra spinatus*, and *teres minor*, being inserted into the great tubercle, are of this class: so is the *deltoides*, which is also inserted into the upper part of the arm, but farther from the head.

There is only one muscle inserted into the lesser tubercle,—the *subscapularis*, which must pull the arm backwards and downwards.

Two muscles are inserted into the outer edge of the bicipital groove,—the *pectoralis major* and *coraco brachialis;* these must pull the arm inwards and forwards.

The two muscles which are inserted into the inner part of the bicipital groove, will pull the arm backwards;—viz. the *latissimus dorsi* and *teres major*.

TABLE OF THE ORIGINS AND INSERTIONS OF THE MUSCLES MOVING THE HUMERUS.*

MUSCLES OF THE SHOULDER LYING ON THE SCAPULA.

SUBSCAPULARIS. OR. 1. All the base and hollow of the scapula internally. 2. Its superior and inferior costæ.

* The origins and insertions of the pectoralis and latissimus dorsi, are described at pages 84 and 142.

In. The upper part of the internal or lesser tuberosity on the head of the humerus.

Supra Spinatus. Or. 1. From all that part of the base of the scapula which is above its spine. 2. From the spine and superior costa. 3. From the fascia of the scapula.

In. The part of the great tuberosity on the head of the os humeri next the groove.

Infra Spinatus. Or. 1. All that part of the base of the scapula which is between its spine and inferior angle. 2. The spine, as far as the cervix of the scapula. 3. The fascia of the scapula.

In. The upper and middle part of the great tuberosity on the head of the os humeri.

Teres Minor. Or. From the inferior costa of the scapula, extending from the neck to an inch and a half from the inferior angle.

In. The back part of the great tuberosity on the head of the os humeri.

Teres Major. Or. 1. The inferior angle. 2. Inferior costa of the scapula.

In. The ridge at the inner side of the groove for lodging the tendon of the long head of the biceps (along with the tendon of the latissimus dorsi.)

Deltoides. Or. 1. From the outer part of the clavicle. 2. From the acromion. 3. From the lower margin of almost the whole spine of the scapula opposite to the insertion of the trapezius.

In. A rough protuberance in the outer side of the os humeri, near its middle.

USE. Its centre raises the humerus, the lateral portions sustain the shoulder joint.

CORACO BRACHIALIS. OR. The coracoid process of the scapula, adhering in its descent to the short head of the biceps.

IN. The middle of the internal part of the os humeri, near the origin of the third head of the triceps.

USE. To raise the arm upwards and forwards.

The muscles which move the fore arm, are exceedingly simple; as the form of the joint, between the humerus and bones of the arm, is such as to admit only of two motions, viz. *flexion* and *extension*. The Flexor muscles are two,—*Biceps* and *Brachialis Internus:* the Extensors are also two.—*Triceps* and *Anconeus*.

TABLE OF THE MUSCLES WHICH MOVE THE FORE ARM ON THE HUMERUS.

FLEXORS.—BICEPS FLEXOR CUBITI. OR. By two heads: 1. Tendinous, from the upper edge of the glenoid cavity of the scapula. This tendon passes over the head of the os humeri within the capsule, and, in its descent without the joint, runs in a groove on the head of the os humeri, and is covered by a membranous ligament that proceeds from the capsule and adjacent tendons. 2. The *second*, and shorter head, arises from the coracoid process of the scapula, in common with the çoraco brachialis muscle.

In. 1. By a strong round tendon, into the tubercle near the upper end of the radius; 2. and, by a lateral slip of fascia, into the sheath of the fore-arm.

Brachialis Internus. Or. The middle of the os humeri, at each side of the insertion of the deltoid muscle, covering all the inferior and fore part of this bone; adheres to the ligament of the joint.

In. The coronoid process of the ulna.

Extensors.—Triceps Extensor Cubiti. Or, By three heads; the first and longest, from the inferior costa of the scapula, near its cervix. The second head, from the back part of the os humeri, under the great tubercle. The third* arises by an acute beginning from the baek and inner part of the humerus, and continues its origin all down the bone. These three heads unite lower than the insertion of the teres major, and cover the whole posterior part of the humerus; from which, they receive additional origins in their descent.

In. The *olecranon*, and partly into the condyles of the os humeri, adhering to the ligament.

Anconeus. Or. From the back part of the external condyle of the os humeri; it soon grows fleshy.

In. A ridge on the outer and posterior edge of the ulna, being continued some way below the olecranon. It is covered with a strong fascia.

* The third head is sometimes called *brachialis externus*, and then the two first heads are described as forming a *biceps extensor*.

The muscles lying on the fore arm, are generally considered very difficult for a student to understand;—perhaps the following plan of arranging them in numbers, will obviate some of the difficulties. If we take the biceps flexor as a supinator, which it truly is, and the mass of the flexor muscles (on the fore arm) as one great pronator, for such is their conjoint operation, then the muscles will go in threes—thus:

For the motion of the wrist, three flexors, the *ulnaris*, *radialis*, and *medius* (commonly called palmaris longus); three extensors—*ulnaris*, *radialis longior*, and *brevior;* three pronators,—the *teres*, *quadratus*, and the *mass of the flexor muscles;* three supinators,—the *supinator longus*, *brevis*, and *biceps cubiti.*

There are three extensors of the fingers, viz. *extensor communis digitorum*, *extensor primi digiti*, and *extensor minimi digiti;* three extensors of the thumb,—*extensor primus*, *secundus*, and *tertius;* three flexors of the fingers and thumb,—*flexor digitorum sublimis*, *flexor digitorum profundus*, *flexor pollicis longus.*

In describing the muscles of the fore arm, it is nearly correct to say, that the *flexors* and *pronators* arise from the *inner condyle*, and the *extensors* and *supinators* from the *outer condyle*: but the *supinators* and *pronators* will be more properly distinguished by their insertions, as all muscles which turn the hand must be inserted into the radius; as for example,—the *supinator longus,* the *supinator brevis,* the *pronator teres,* the *pronator quadratus.*

TABLE OF THE MUSCLES LYING ON THE FORE ARM.

FLEXORS OF THE WRIST.

Flexor Carpi Radialis. Or. The internal condyle of the os humeri, and from the fore and upper part of the ulna.

In. Runs over the os trapezium into the fore and upper part of the metacarpal bone that sustains the fore finger.

Flexor Carpi Ulnaris. Or. The internal condyle of the os humeri, and side of the olecranon, and from the fascia.

In. The os pisiforme and ligament of the wrist.

Flexor Carpi Medius or Palmaris Longus. Or. The internal condyle of the os humeri, from the intermuscular ligament: it forms a neat small belly, and by a long slender tendon, has—

In. Into the annular ligament of the wrist, and palmar aponeurosis.

EXTENSORS OF THE WRIST.

Extensor Carpi Radialis Longior. Or. From the lower part of the external ridge of the os humeri, above its external condyle, and below the supinator radii longus.

In. The back and upper part of the metacarpal bone that sustains the fore finger.

Extensor Carpi Radialis Brevior. Or. 1. The external condyle of the os humeri; 2. the ligament that connects the radius to it.

In. The upper and back part of the metacarpal bone that sustains the middle finger.

Extensor Carpi Ulnaris. Or. 1. The external condyle of the os humeri; 2. the ulna, from its posterior border.

In. The posterior and upper part of the metacarpal bone that sustains the little finger.

MUSCLES OF SUPINATION AND PRONATION.

Proper Supinators; that is, those which turn the palm of the hand upward, and have no other office.

Supinator Radii Longus. Or. The external ridge of the os humeri, nearly as far up as the middle of that bone.

In. The lower end of the radius, on its outer side.

Supinator Radii Brevis. Or. 1. From the external condyle of the os humeri; 2. from the external, and upper part of the ulna; 3. the ligament which joins these two bones.

In. The neck and tubercle of the radius, and ridge running downwards from the tubercle.

Pronators; that is, which throw the palm of the hand prone to the ground.

Pronator Radii Teres. Or. 1. The internal condyle of the humerus; 2. tendinous from the coronoid process of the ulna.

In. The outside of the radius, about the middle of the bone.

MUSCLES MOVING THE FINGERS, LYING ON THE FORE ARM.

FLEXORS.

Flexor Sublimis Perforatus. Or. 1. The internal condyle of the os humeri; 2. the coronoid process of the ulna; 3. the tubercle of the radius; 4. the middle of the fore part of the radius, where the flexor pollicis longus arises. The tendons pass under the ligament of the wrist.

In. The second bone of each finger, being, near its extremity, divided for the passage of the tendons of the perforans, or profundus.

Flexor Profundus Perforans. Or. 1. The side and upper part of the ulna; 2. from a large space of the interosseous ligament, and remotely through the fascia, from the inner condyle; its tendons pass under the annular ligament of the wrist, and then pass through the slits in the tendons of the flexor sublimis.

In. Last bones of the four fingers.

Flexor Longus Pollicis Manus. Or. 1. The side of the coronoid process of the ulna; 2. the radius, immediately below its tubercle; it is continued down for some way on the fore part of the bone; 3. the interosseous ligament: its tendon passes under the ligament of the wrist. It has, frequently, an origin from the internal condyle of the os humeri.

In. The last bone of the thumb.

EXTENSORS OF THE FINGERS AND THUMB.

Extensor Digitorum Cummunis. Or. 1. From the external condyle of the os humeri, where it adheres to the supinator radii brevis. Before it passes under the ligamentum carpi annulare externum, it splits into four tendons, some of which may be divided into several smaller. On the back of the hand, the tendons are often united by interchange of tendinous filaments.

In. The posterior part of the bones of the fingers, by a tendinous expansion,

Use. To extend all the fingers.

Extensor Minimi Digiti. Or. The external condyle: it adheres to the common extensor.

In. The last bone of the little finger.

Indicator, or Extensor Primi Digiti. Or. The middle of the back part of the ulna; its tendon passes under the same ligament with the extensor digitorum communis, with part of which it is—

In. Into the posterior part of the fore finger.

Extensor Primi Internodii Pollicis Manus, vel Ossis Metacarpi Pollicis. Or. 1. The middle and posterior part of the ulna, immediately below the insertion of the anconeus muscle; 2. the back part of the middle of the radius; 3. the interosseous ligament.

In. (By two tendons) into the os trapezium, and upper back part of the metacarpal bone of the thumb, and often joins with the abductor pollicis.

USE. To draw the metacarpal bone of the thumb outwardly.

EXTENSOR SECUNDI INTERNODII. OR. 1. The back part of the ulna, near the former muscle; 2. the interosseous ligament.

IN. The posterior part of the first bone of the thumb: part of it may be traced as far as the second bone.

USE. To extend and draw the second bone of the thumb outwards.

EXTENSOR TERTII INTERNODII. OR. 1. The middle and back part of the ulna; 2. from the interosseous ligament: its tendon runs through a small groove, at the inner and back part of the lower end of the radius.

IN. The last bone of the thumb.

USE. To extend the last joint of the thumb.

The variety of motions which we are enabled to execute with the fingers, is sufficient evidence of the complication of the small muscles which lie on the hand. But if we make an arrangement of the muscles which move the thumb, and those which move the little finger, there wlll not be much difficulty in recollecting the other muscles.

We find a muscle for pulling the thumb from the fingers, ABDUCTOR POLLICIS; one for drawing the thumb towards the fingers, ADDUC-

TOR POLLICIS: and to bend the thumb, FLEXOR BREVIS:—with this muscle may be classed the one called OPPONENS, or FLEXOR OSSIS METACARPI POLLICIS.

For the little finger we have an ABDUCTOR, ADDUCTOR, and FLEXOR. There still remain the small muscles which bend all the fingers, viz. the LUMBRICALES. There is also a set of muscles which lie between the metacarpal bones; these are called INTEROSSEI EXTERNI and INTERNI; the use of which, is, to draw the fingers separate: with this class may be arranged the muscle called ABDUCTOR INDICIS: as it lies between the metacarpal bone of the fore finger, and that of the thumb.

There is one muscle omitted in this arrangement, because it stands by itself—the PALMARIS BREVIS; being the set of fibres which were seen on the palmar aponeurosis; and covering the muscles of the little finger.

TABLE OF THE MUSCLES OF THE HAND.

PALMARIS BREVIS. OR. The ligamentum carpi annulare, and tendinous membrane that is expanded on the palm of the hand.

IN. Into the skin and fat that cover the abductor minimi digiti, and into the os pisiforme.

USE. To assist in contracting the palm of the hand: to sustain the grasp of the hand.

MUSCLES WHICH FORM THE BALL OF THE THUMB.

Abductor Pollicis. Or. The os trapezium and ligament of the carpus.

In. Root of the second bone of the thumb.

Use. To separate the thumb from the fingers.

Opponens Pollicis. (Under the last.) Or. Os trapezium, and ligament of the carpus.

In. First bone of the thumb, or, metacarpal of the thumb, as it is sometimes called.

Use. To bring the thumb towards the palm and fingers.

Flexor Brevis Pollicis. (Divided by the tendon of the long flexor.) Or. 1. Os trapezoides; 2. os magnum; 3. os unciforme.

In. Ossa sesamoidea, and second bone of the thumb.

Use. To bend the thumb.

Adductor Pollicis. Or. From the metacarpal bone of the middle finger.

In. First phalanx of the thumb, at its carpal extremity.

MUSCLES OF THE LITTLE FINGER.

Abductor Minimi Digiti. Or. Os pisiforme and ligament of the carpus.

In. The side of the first bone of the little finger.

Flexor Parvus Minimi Digiti. Or. The ulnar side of the os unciforme and ligament of the wrist.

In. First bone of the little finger.

Use. It is an assisting flexor of the little finger.

Adductor Minimi Digiti. Or. Edge of the os unciforme, and ligament of the wrist.

In. The side of the metacarpal bone of the little finger.

Use. To draw the little finger towards the others.

Lumbricales. These are four muscles, lying in the palm of the hand, thin and fleshy, so as to resemble earth worms. Each of these muscles may thus be described:—Or. One of the tendons of the flexor profundus digitorum.

In. The sheath on the back of the fingers, along with the interossei.

Use. To move the finger on the metacarpal bone.

Abductor Indicis. Or. Os trapezium, and metarcarpal bone of the thumb.

In. The first bone of the fore finger.

Use. To bring the fore finger towards the thumb.

Interossei Interni. These are muscles lying deep betwixt the metacarpal bones, each having its origin thus:—Or. By one head, from a metacarpal bone.

In. Into the sheath of the extensor muscles, on the back of the first phalanx.

Interossei Externi. These are bicipites, and lie on the back of the hand, but betwixt the metacarpal bones. Or. The roots of the metacarpal bones.

In. The tendinous expansion of the extensor communis.

The PRIOR INDICIS is a muscle of the same character with the former, only that, lying on the radial edge of the metacarpal of the fore finger, it cannot be so properly called an interosseous, as those which are seated betwixt the metacarpal bones.

USE OF THE INTEROSSII. While there seems much reason in the supposition, that the lumbricales, being small muscles, are better calculated for the quick movements of the fingers (whence they have been called fidicinales); the interossei interni, and externi, are for the lateral movements of the fingers, or the adduction, and abduction of the fingers, and are of the same class with the adductors and abductors of the thumb and little finger.

DISSECTION

OF THE

LIGAMENTS OF THE ARM.

AFTER having completed the dissection of the muscles of the arm, we should remove them, that we may examine the ligaments; and in doing this, we should take the opportunity of again comparing their origins and insertions with the description in the *Table*. We should not remove every part of the tendons of the muscles which are attached to the head of the humerus; for they are so intimately connected with the capsular ligament, that we shall destroy it, in the attempt.

The ligaments about the shoulder may be divided into three sets:—1. into those which connect the clavicle and scapula; 2. the ligaments which pass from one point of the scapula to the other; 3. the ligaments connecting the humerus and scapula.

When the fibres of the deltoid are removed, slips of ligament will be seen passing from the clavicle upon the acromion; these are called *Ligamenta Radiata*. There is also a proper *capsular ligament*, and occasionally an intermediate cartilage between the acromion and clavicle; but the principal ligaments pass between the coracoid process and the clavicle; one will be found running from the root of the process up to the tubercle on the lower part of the clavicle; from its round shape, this is called *Ligamentum Conoides*; another, but of a more square form, runs from the root to the lower part of the clavicle, extending from the last ligament to near the acromial end of the clavicle, and is called *Ligamentum Trapezoides*.—In the space between these ligaments a small bursa mucosa will be found. A small one will also be sometimes found between the tip of the coracoid process, and the capsular ligament.

Ligaments uniting the Clavicle and Scapula.

The ligaments which run between the points of the scapula, are very simple; one, of a triangular form, will be found attached to almost the whole length of the coracoid process, from which it passes to the tip of the acromion (it is sometimes divided into two portions, by a little cellular membrane:) this, from its shape, is called *Ligamentum Triangulare*, or *Deltoides*; under this, and connected with the capsular ligament, there is a large bursa. By removing the fibres of the supra spinatus muscle, we shall discover a small ligament running from the root of the coracoid process across the notch; this

Ligaments of the Scapula.

is the *Ligamentum Posticum* (the supra scapular nerve almost always passes under the ligament, and the artery generally over it.)

The ligaments which run between the points of the scapula, are called the *proper* ligaments; while those which connect the clavicle and scapula, are called the *common*.

In dissecting the muscles which pass from the scapula to the head of the humerus, we saw the supra spinatus, the infra spinatus, and teres minor, all spreading their tendons upon the upper surface of the thin capsule; and on the lower part, we might have seen the ligament strengthened by the tendon of the subscapularis. If we now dissect away all these tendons, the capsule will appear as a transparent membrane, rising from the edge of the glenoid cavity, and passing down to surround the neck of the humerus.

Ligaments of the Humerus and Scapula.

This view must prove to us, that the strength of the joint does not consist in its capsular ligament, but in the tendons of the muscles which surround it.

In examining the capsule, in a superficial manner, it appears to be perforated by the tendon of the long head of the biceps; but when the capsule is opened, we shall find that a thin portion of the membrane passes down into the bicipital groove, and is then reflected on the tendon of the biceps,—so that the tendon is actually external to the ligament.

When we cut open the joint, we shall see that the *glenoid cavity* is deepened by a ring of fibrous cartilaginous ligament, surrounding its edge.—We should not omit to look for the large *bursa*, which is between the deltoid and the capsular ligament.

The Ligaments of the Elbow Joint are a little complicated, in consequence of the head of the radius entering into the articulation; but, as the joint is nearly a simple hinge, the principal ligaments will be *lateral*. We shall find here, as in all other joints, a capsular ligament; but its appearance is not that of a thin membrane, except at the posterior part, in consequence of its being covered, both on the fore and lateral parts, by slips of ligament from the tendons of the muscles; those on the fore part, are called *Accessoria Antica;* while those on the sides, are described as distinct *Lateral Ligaments.*

Ligaments of the Elbow.

Each lateral ligament may be divided into two parts, which are easily distinguished, as one portion restrains the joint, when it is bent to a certain extent; the other checks it, when it is too much extended.

The radius is articulated with the external condyle; but by rolling it, we shall see that it is also connected with the ulna, by the thickening of the general capsular ligament, which is called *Ligamentum Coronarium.* In taking off the muscles, to show the *Interosseus Ligament,* we must take care that we do not cut the *Ligamentum Obliquum,* or *Transversale,* which runs from the ulna to a point of the radius, below the tubercle.

Of the Wrist. The WRIST is rather a complicated joint; but as the movements between the bones of the carpus and bones of the fore arm, are principally flexion and extension, we shall have, on the inside and outside, *Lateral Ligaments;*— these ligaments are loose and connected with the general capsule, which will be found to be very strong, in consequence of the many slips that cross it. The capsular ligament does not bind the bones very closely together, but allows of a considerable degree of lateral motion. When we open the capsular ligament, we shall find that the end of the ulna does not correspond exactly to the cuneiform and ulnar bones, but that there is a portion of cartilage interposed between them.

We may now separate the carpus from the radius and ulna, and examine the connexion which is between these two bones. The convexity of the head of the ulna will be found attached to the concavity on the radius, by a coronary ligament, which, however, is called

Ligamentum Sacciforme, or *Membrana Sacciformis.*

The carpal, and the heads of the metacarpal bones, are connected together by *Capsular Ligaments* and by *Accesssory Slips*, which are easily dissected: it would be needless to give them separate names. The metacarpal bones, and the several phalanges of the fingers, are united by *Capsular* and *Lateral Ligaments*, which, though very simple, ought to be carefully studied,—as the dislocations of the finger, and particularly of the thumb, are sometimes very troublesome.

DISSECTION

OF

THE ARTERIES

OF

THE SHOULDER AND ARM.

IN the first dissection of these arteries, they should be injected; and, that all the vessels of the shoulder may be seen, the injection should be made in the same manner as that described at p. 163. It may be done from the subclavian artery; or from the axillary, after the arm is removed from the body: but in either of these methods, a great many vessels must necessarily be destroyed.

The manner of dissecting the arteries which arise from the subclavian, has already been described at p. 168; so we may now pass to the description of the branches which arise after the artery has passed under the clavicle;—and first, of that division which is called the AXILLARY.

The pectoralis major, the deltoid, and the [illegible]mus dorsi, should be dissected in the [illegible] recommended in the dissection of the muscles, at page 81; but in doing this, we must take care to avoid the small branches, which will be found on removing the cellular membrane. If we are dissecting a female subject, in which the breasts are enlarged, or where milk has been lately secreted, we shall find upon the surface of the pectoralis major, a great many arteries passing to the mamma.

Between the deltoid and pectoralis, we shall see arteries running down, and a vein passing up; the arteries are branches of the THORACICA HUMERARIA; the vein is the CEPHALIC. On the lower edge of the pectoralis, and upper edge of the latissimus dorsi, branches of the THORACICA ALARIS and of the SUBSCAPULAR, will be found. By dissecting between the two muscles, we shall expose the nerves, complicated with many lymphatic glands.—In considering the *surgical anatomy*, all the parts of the axilla will excite much interest; but at present we should only trace the branches of the arteries through it.

Thoracica Humeraria, or Acromalis.

Thoracica Alaris.

That we may follow the arteries more easily, we should now raise part of the pectoralis major from its origins.—In doing this, we shall be obliged to cut through many branches: some of these come, through the intercostal muscles, from the mammaria interna: but the principal ones, are branches of the THORACICA LONGIOR, or MAMMARIA EXTERNA, which, when the mus-

Thoracica Longior, or Mammaria Externa.

cle is farther raised, will be seen rising in common with the THORACICA HUMERARIA, OR ACROMIALIS; the branches of which, have already been observed passing between the deltoid and pectoralis major.

If the muscle be now completely thrown back, the pectoralis minor will be exposed. A small artery will now be seen, passing into the space between the first and second ribs;—this is called the THORACICA PRIMA, OR SUPERIOR. On the lower edge of the pectoralis minor, some branches will be seen running into the fat and glands of the axilla,—they must be carefully followed with the forceps and scissars. These branches are described as coming from one trunk, called the THORACICA ALARIS; but they generally arise in two or three small branches.

Thoracica Prima, or Superior.

Thoracica Alaris.

The trunk of the artery may now be fully exposed. It will be found covered by the veins, but lying below the level of the axillary nerves. Until it has fairly passed under the pectoralis minor, there will be no difficulty in separating it from the plexus of nerves; but immediately after it passes this muscle, it will be found completely enveloped in the plexus. The arm must now be bent so as to relax the plexus, and enable us to dissect the cellular membrane from between the artery and nerves.

When the artery comes opposite to the upper part of the insertion of the latissimus dorsi, it gives off the SUBSCAPULAR artery; which will be found to pass under the scapula, and to give off numerous branches to the serratus magnus, subscapularis, latissimus dorsi, &c. and frequently to the axillary glands. We should now observe the beginning of a branch, which we cannot follow to its termination, until the body is turned, or the arm separated. This will afterwards be found to run to the dorsum of the scapula; whence it is called the *dorsalis* of the subscapularis. Subscapularis.

As the main trunk is covered by the plexus of nerves, at the point where it gives off the subscapularis, we shall probably not at once discover the POSTERIOR CIRCUMFLEX which rises close to the trunk, and sometimes in union with the subscapularis. We shall not be able to follow this artery far, in the present position of the limb, as it passes between the long head of the biceps and humerus, to be distributed on the deltoid. Its branches will be seen, on dissecting the back part of the arm. Posterior Circumflex.

We generally find another artery, immediately opposite to the last; it is called the ANTERIOR CIRCUMFLEX.—The plexus of nerves must be pulled down, to expose it. It is a small vessel, and generally runs between the tendons of the pectoralis major and the capsular ligament. Anterior Circumflex.

We shall now have traced the main trunk

fairly past the insertion of the pectoralis major and latissimus dorsi; here its name is changed to HUMERAL, or BRACHIAL, which it retains until it reaches the elbow.

If we do not wish to keep the arm and chest connected, we may now, without hurting any vessels, separate the arm from the body.

Before following the trunk of the artery, we should turn the arm round, and make a superficial dissection of the muscles lying on the scapula.* In dissecting the deltoid, several of the branches of the thoracia humeraria, and of the circumflexa posterior, will be found. There will also, perhaps, be several branches of the *supra scapularis* (which is sometimes a prolongation of the TRANSVERSALIS COLLI, described at page 169,) passing into the substance of the supra spinatus muscle.† On the muscles below the spine, many branches of the *dorsalis scapulæ*, of the subscapularis, will be found. All those arteries which pass to the muscles of the scapula, are distributed so much on the surface of

* This may be done, without separating the arm from the body, by throwing the arm over the chest.

† When there is this arrangement of the artery, it very seldom passes *under* the ligamentum posticum.—It appears to pass under the ligament, only when it arises as a distinct branch, and low down, from the subclavian.

the bone, that it will be necessary to remove the muscular fibres to shew them.

The superficial dissection which has been begun on the deltoid, may be continued down upon the triceps. As we approach the elbow, we must carefully avoid the superficial branches, which form inosculations with those of the fore arm. Those on the *external* part, are branches from the circumflexa posterior, and the profunda superior; while those on the inside, are from the profunda inferior, and the anastomotica.

We may turn the arm, and continue the dissection of the trunk. An incision is to be made, down to the elbow, in the course of the artery: when the skin is dissected off, a thin fascia will be seen to pass from the inside of the triceps to the inside of the biceps, covering the artery, which is not now enveloped in a plexus of nerves, but, with the radial, or median nerve, lying close upon the inner side of it.

The first branch (which has a name) we shall find, by looking for the muscular spiral nerve, or between the heads of the triceps.—The artery is called the PROFUNDA SUPERIOR; we may trace it into the deep parts of the arm, along with the nerve. Profunda Superior.

We may now for a moment disregard the branches, and trace the trunk to the elbow, taking care not to cut any vessels. On the side of the artery next to the biceps, we shall see a great number of branches going off; these, however, are merely muscular branches, and there are no separate names for them. The only one we should particularly observe, is a trunk, passing off at the lower part of the coraco brachialis to the bone: it is called NUTRITIA MAGNA HUMERI. On the side of the artery nearest to the brachialis internus, we shall find three, four, or five branches, all taking nearly the same course towards the inside of the elbow, and communicating with the recurrent arteries of the fore-arm. The upper one is generally called the

Profunda inferior, and the Anastomoticæ.

PROFUNDA INFERIOR; while the largest of those below, is the ANASTOMOTICUS MAGNUS,—and the next in size, the ANASTOMOTICUS MINOR.

We shall now have traced the main trunk to the bend of the arm, where it generally divides into the RADIAL and ULNAR.*

The trunk will be found lying close upon the edge of the biceps, and passing under the portion of its tendon which is inserted into the fascia of the fore-arm. Before following the trunk, we should make a dissection of the fascia

* The bifurcation occasionally takes place higher up on the arm; but in what proportion of instances, I have a difficulty of determining; during some seasons I have observed it, in nearly every third body. I think, however, it may be said to occur in a proportion, of about one to eight.

of the fore-arm: this may be done quickly, by making a cut through the skin, from the elbow to the wrist, and by then dissecting the skin off, from all around the arm. We need not preserve the small branches which perforate the fascia to supply the skin; but we must take care of those which run around the elbow, and of any small branches which may be found near the wrist; for the arteries there are very irregular.

In following the trunk, and the commencement of the radial and ulnar arteries, we must be very careful; as there is always a quantity of fat and cellular membrane interposed between the tendon of the biceps, and the insertion of the brachialis internus,—in which space, the artery generally divides: to see it distinctly, we must cut through the tendinous membrane which passes from the biceps to the fascia of the fore-arm.

As the RADIAL lies more superficial than the ulnar, we should first trace it to the wrist. This will be very easy; for by merely cutting through the fascia, we may follow the artery over the tendon of the pronator teres, towards the radius; it then runs down parallel with the bone, lying on the flexor pollicis longus, and between the supinator longus and the flexor carpi radialis. We need not here enumerate the several branches which go to the muscles as they are very irregular; but we should particularly mark the Radial.

branch which turns back, and round the tendon of the biceps, to pass on the elbow: this is the

Recurrens Radialis.

RECURRENS RADIALIS. The only other branch of importance, is that which is given off at the point where we generally feel the pulse; viz. the SUPERFICIALIS VOLÆ: but this branch is very irregular in its size.—We should not now trace the radial farther, but return to the ulnar.

Ulnar.

The ULNAR passes much deeper than the radial; consequently, it is more difficult to trace its branches. It will be found running at once deep into the arm, to pass under the pronator teres. While the artery is under this muscle, we shall often find a branch pass off, which is nearly as large as the ulnar itself; viz. the INTEROSSEA

Interrossea Interna.

INTERNA. But before this great trunk is given off, a branch often runs back to the elbow:

Recurrens Ulnaris.

viz. the RECURRENS ULNARIS. After these two branches are seen, the trunk may be traced down to the wrist, between the superficial and deep layer of the muscles: in its course, it gives off many branches,—the most important of which, will be enumerated in the *Table*.

We should now trace the branches of the INTEROSSEA, for it is the vessel which supplies the principal parts of the fore-arm.

The trunk has already been seen, coming off from the ulnar, under the pronator teres,—from which, we may now trace it, along the interosseous ligament, and between the flexor digitorum profundus and flexor pollicis. But we shall generally find that, almost immediately on its rising from the ulnar, it gives off a large branch, which may be traced, through the ligament, to the supinators and extensors, and is lost at last, on the back of the hand. But before this (the INTEROSSEA EXTERNA) arises from it, there is generally a *recurrent* sent off, to inosculate with the anastomotici upon the elbow. Interossea Externa.

When we have followed the internal artery as far down as to the pronator quadratus, we shall find it divide into two vessels; one of which may be traced, through the interosseous ligament, to the back of the wrist,—while a smaller branch is continued down to the fore part of the bones of the carpus.

The arteries of the hand are very numerous, and very complicated and difficult to dissect; but still the small branches will easily be understood after a general arrangement is made.

We should commence the dissection, by raising the skin from the palm of the hand, so as to expose the palmar aponeurosis. On removing the skin, a number of small branches will be seen;—those on the middle and outer part, come from the ulnar; while those which are on the inside, and on the muscles of the thumb, are from the radial: but here, we shall probably find one larger than others, viz. the SUPERFICIALIS VOLÆ. When the skin is dis- Arteries of the Hand. Superficialis Volæ.

sected from the back of the hand, the main trunk of the radial will be found passing between the tendons of the extensors of the thumb; from which, it passes deep between the abductor indicis and adductor pollicis, to form the deep arch.

There are no directions required, for tracing either the ulnar or the radial artery; farther than that of following them patiently from trunk to branch, with the forceps and scissars. —In the first dissection, every thing is to be cut away, except the arteries and the tendons.

Superficial & Deep Arches. We should first expose the SUPERFICIAL ARCH, which is formed by the ulnar; and then, the DEEP ARCH, formed by the radial: but this, we shall find to be very difficult. The arteries which are seen on the back of the wrist, and on the thumb, are generally from the external interosseal, and the radial.

TABLE OF THE ARTERIES OF THE SHOULDER AND ARM.

IT is agreed by all authors (who have taken the description of the arteries from the dissection of many bodies,) that there are no vessels more irregular, than those which rise from the subclavian. But the general arrangement is very simple; for we have here, as in the study of the arteries of the other parts of the body, only to recollect, that the names of the branches correspond to the part which the trunk passes.

The following sketch will be found to agree, in most respects, with the description of Haller; I have at the same time attempted to make the arrangement correspond with what I think is most commonly seen:

The great trunk, in its course from the aorta to the fingers, receives names corresponding to the parts which it passes. From its branching off from the aorta, until it passes under the clavicle, it is called SUBCLAVIAN. From the upper edge of the pectoralis minor, until it passes the insertion of the latissimus dorsi and pectoralis major,—AXILLARY. From this point, until the division at the bend of the arm,—HUMERAL, OR BRACHIAL. From the bend of the arm to the wrist,—RADIAL, ULNAR, and INTEROSSEA. From the wrist to the fingers,—SUPERFICIAL ARCH, DEEP ARCH, and POSTERIOR ARTERIES.

The names which are given to the branches, refer to each division of the trunk.

The branches of the subclavian have already been enumerated at page 183.

The next division of the artery is the AXILLARY; from it, we have,—*thoracica superior*; *thoracica longior*, or *mammaria externa*; *thoracica humeraria*, or *acromialis*; *thoracica* *alaris; subscapularis; circumflexa posterior; circumflexa anterior.*

Thoracica Superior, gives branches between the first and second ribs.

Thoracica Longior,—to the pectoralis major and mamma.

Thoracica Humeraria,—branches between the pectoralis major and deltoid.

Thoracica Alaris,—to the fat, glands, pectoralis minor, &c.

Subscapularis,—1. to the axilla and glands; 2. to the subscapular muscle; 3. infra scapular branch to the muscles of the back; 4. dorsalis, or circumflexa subscapularis, to the muscles on the back of the scapula.

Circumflexa Posterior,—branches to the heads of the triceps, coraco brachialis, deltoid, and capsule.

Circumflexa Anterior,—to the periosteum and capsule.

The third division of the artery is the HUMERAL, OR BRACHIAL: gives,—1. a set of small branches to the muscles; 2. *profunda humeri superior*; 3. *profunda humeri inferior*; 4. *anastomotica magna.*

From the *Set of small Branches*, twigs go off to the biceps and brachialis internus, and also the arteria nutritia humeri.

Profunda Superior,—1. to the muscles: 2. radialis communicans, to the external condyle; 3. branches to the back of the elbow, to unite with the recurrens interossea and radialis.

Profunda Inferior,—1. to the brachialis internus and biceps; 2. to the external condyle and supinator; 3. to the ulnar nerve and back of the elbow joint.

Anastomotica Magna,—1. branch communicating with the profunda; 2. descending superficial branch: 3. descending deep branch: these two form, with the recurrents of the arteries of the fore arm, the *arcus anterior;* 4. transverse branch which goes behind, forming with the profunda and recurrents, the *arcus posterior*.

The fourth division of the great artery is into the RADIAL and ULNAR.

The RADIAL gives off: 1. to the *supinator*; 2. *recurrens radialis; 3. in succession to the supinator, pronator, and flexor muscles;* 4. *superficialis volæ;* 5. *irregular branches to the wrist;* 6. *dorsalis pollicis;* 7. *dorsalis carpi;* 8. *dorsalis metacarpi;* 9. *magna pollicis;* 10. *radialis indicis;* 11. *deep palmar arch*, which inosculates with the superficial arch from the ulnar, and gives off the *interossea* to the metacarpal spaces.

ULNAR,—gives off the interosseal artery: but before it does so, it sends off some smaller ones. 1. To the *pronator;* 2. *perforans*, through the interosseous ligament to the back of the joint; 3. *recurrens ulnaris*, which has a superficial and deep branch; 4. *arteria nutritia*; 5. *interossea communis* (this will afterwards be considered as a principal branch;) 6. *irregular branches to the muscles*; 7. *dorsalis manus*; 8. *to the muscles of the little finger*; 9. *palmaris profunda*, which, uniting with the radial, forms the deep arch; 10. *superficial palmar arch*, giving off volans ulnaris minimi digiti, digitalis volans prima, digitalis volans secunda, digitalis volans tertia, which are the vessels to the fingers; 11. *communicans*, joining the radial on the thumb.

Interossea Communis: 1. to the muscles and ligaments of the joint: 2. perforans superior, which gives off ramus descendens, and recurrens interossea; 3. irregular branches to the flexor muscles; 4. perforans inferior; passes through the upper edge of the pronator quadratus, and gives branches to the back of the wrist; 5. interossea volans anterior, or anterior articular artery of the wrist.

DISSECTION

OF

THE VEINS OF THE ARM.

IT is almost needless to inject the Veins of the Arm, unless it be for the purpose of making a preparation; for a much better knowledge is gained of the course of the superficial veins, by putting a ligature round the arm of a thin muscular man, than is ever done by injecting, or dissecting them. As the deep veins all accompany the arteries, their course may also be easily understood; but in making the *surgical dissection* at the bend of the arm, it will be useful to have some of the veins filled. Though I do not think it necessary for the dissection, I shall here describe the manner of injecting the veins, that they may be preserved:—

In consequence of the numerous valves which are in the veins, it will be impossible to inject them from the subclavian:—the injection must be thrown in, from one of the vessels on the hand. Those on the palm are so small, that it will be needless to try to introduce a pipe into them.—We must look for a vein on the back of the hand. That vein which runs up from the fore finger, or the one between the little and ring finger, will generally be found to be the best. After we have introduced the pipe, a piece of the skin over the vein, should be included in the ligature; or we shall be in danger of tearing the coats of the vein, while we are injecting it.

The blood is to be, first, thoroughly pushed out of the veins, by injecting warm water into them, and allowing it to escape by the subclavian. This injection of warm water, should be repeated several times; and previous to the injection with the wax, the water should be forced out, by holding the arm, with the hand, perpendicular to the body, and rubbing the vessels, down towards the axilla. A ligature may be put round the subclavian vein: but it should not be tied until the injection is thrown in from below; so that any water which may not have been forced out, may be pushed before the injection:—as soon as the wax appears at the subclavian, an assistant should tie the ligature. The injection made from a single vein, will very seldom be successful, we may, therefore, be obliged to put the pipe into one or two different veins; but if, in cleansing the veins of blood, the valves be much broken, the injection may pass easily from one vein to the other.

The dissection of the veins is very simple; for all the cutaneous veins, when distended with wax, will be visible: and to expose them, it will be only necessary to remove the skin.—As the deep veins follow the course of the several arteries, they require no further description.

If the injection has been successful, it will have filled the veins of the hand below the part into which the pipe was put;—a plexus will be found running between the knuckles, and forming an arch on the back of the hand; this has been called the PLEXUS DORSALIS MANUS,—and the arch, the ARCUS VENOSUS DORSALIS. From the part of the arch nearest to the thumb, and from a vein on the thumb, there is a trunk rises, called VENA CEPHALICA POLLICIS; this name having been given to it by the Arabian anatomists, from the idea that opening it, was useful in diseases of the head; this vessel, when joined by other veins of the arch forms a trunk, which runs up the radial edge of the arm, and is called VENA CEPHALICA MINOR, OR RADIALIS EXTERNA: at the bend of the arm, this is joined by the MEDIAN CEPHALIC; and by this union, the GREAT CEPHALIC is formed, which passes up, first between the tendons of the biceps and triceps, and then between the tendons of the pectoralis major and deltoid, to dip into the axillary vein. The large vein, on the ulnar side of the arm, is called BASILICA, from a strange fancy of the ancients, that bleeding from this, was a sovereign remedy for many diseases; and they moreover conceived, that the vein of the right arm belonged to the liver, and that of the left to the spleen. This vein is formed by the vessels of the arch nearest the little finger, and by the vein that is between the little and ring finger; which has, from the same conceit, been called SALVATELLA. From this source, we may trace the basilic; sometimes in one or two branches, or as a plexus, to the ulnar side of the arm,—and here it is sometimes called ULNARIS SUPERFICIALIS, OR CUBITALIS INTERNA.—It passes up by the inside of the tendon of the biceps; there it receives the median basilic. It then passes deep by the side of the artery. It is sometimes found joined to the venæ comites; or it passes singly to the outside of the tendon of the pectoralis, and then falls into the axillary vein.

On the fore part of the wrist, we see a plexus coming from the thumb and palm. This plexus is frequently continued for a considerable way up the arm before it forms a trunk; which gives out branches, both to the basilic and cephalic;—the trunk is called MEDIAN, OR VENA SUPERFICIALIS COMMUNIS. Near the bend of the arm, it generally divides; one branch goes to the basilic, and is called MEDIAN BASILIC,—and the other to the cephalic, and is called MEDIAN CEPHALIC.

It is needless to describe the deep veins of the arm, since they accompany the arteries,—

whence they receive the names COMITES, or SATELLITES. There are generally two accompanying each of the principal arteries.

We have now traced the veins up into the axilla; here the trunk is called AXILLARIS: and at this part we may trace branches into it from the shoulder, from the scapula (the EXTERNAL and INTERNAL SCAPULAR,) and some from the side (the THORACIC VEINS.) We may then trace the vein under the clavicle; and there it is called SUBCLAVIAN. If we have injected the great veins, we shall see the union, on the left side, with the INTERNAL JUGULAR;—at this angle, the thoracic duct enters. The great trunk may be traced across the chest, to unite with those of the opposite side, to form the vena cava descendens; but the manner of showing these is described more fully at page 166.

DISSECTION

OF THE

NERVES OF THE ARM.

THE dissection of the nerves of the arm may be made on the same limb in which the arteries are traced.

Axillary Plexus.

The nerves which form the AXILLARY PLEXUS, viz. the FOUR LOWER CERVICAL, and FIRST DORSAL, will be found coming from the spine, between the scalenus anticus and scalenus medius. These may be dissected with the branches of the subclavian artery.—It is from this plexus that all the nerves pass to the arm. But in dissecting the external part of the axilla, we shall discover certain small nerves passing towards the pectoralis major, and latissimus dorsi,—

Thoracic Nerves.

these are called the *Thoracic Nerves*; they are rather irregular in their course, as they occasionally come from the intercostal nerves. By dissecting deeper, we shall expose the great plexus.—By examining the upper part of the plexus, we shall see a nerve passing towards the root of the coracoid process, viz. the SUPRA

Supra Scapular and Infra Scapular.

SCAPULAR NERVE; which may be traced through the notch, to the supra spinatus muscle. Another nerve, the INFRA SCAPULARIS, will be found passing from the posterior parts of the plexus: it lies upon the subscapularis, and sends its branches between this muscle and the latissimus dorsi; but its branches must not be confounded with those of the *external respiratory*, —which cross under the plexus, to the serratus and intercostal muscles.

If we now pull out the plexus, and look to the back of it, and immediately above the insertion of the latissimus dorsi, we shall find the nerve, which, from its encircling the joint, is called ARTICULAR, OR CIRCUMFLEX: it rises very frequently in common with the infra scapular. Articular or Circumflex.

The other nerves which pass out from the axillary plexus, will easily be recognized; for there are only three which go to the integuments, and three which supply the muscles and tips of the fingers.

The cutaneous nerves must necessarily be traced, before the deep ones. An incision may be made through the skin only, in the line of the biceps muscle, down to the middle of the fore arm. In dissecting the flap, towards the chest, small nerves will be found coming through the interstices of the ribs; some of which may, perhaps, be traced near to the elbow; but these intercostal branches generally terminate on the skin, a little below the axilla:—for the supply of the skin, immediately below this point, we shall find a nerve that rises from the most superficial part of the inner side of the plexus. As this nerve was particularly described by

Cutaneous of Wrisberg.

Wrisberg, it is called the CUTANEOUS of WRISBERG. There is, however, some difficulty in determining, whether this should be considered as a distinct nerve, or as only a branch of the

Internal Cutaneous.

INTERNAL CUTANEOUS; which will now be seen rising from the ulnar side of the plexus.—The branches of this last nerve will afterwards be found to be continued to the skin on the inside of the fore arm.

We may now dissect off the other flap of the skin.—We shall find no branches upon it, until we come opposite to the head of the brachialis internus; and there, we shall discover some considerable branches passing into the skin. If we trace these back towards their origin, we shall find that they have come from between the brachialis and biceps, having perforated the coraco brachialis; and that they arise from the radial, or upper side of the plexus. The principal branch, having been described by Casserius as the nerve which perforated the coraco brachialis muscle, has been called the

Perforans Casserii, or Musculo-Cutaneous.

PERFORANS CASSERII; or from its giving branches to the coraco brachialis and biceps, as well as to the skin, it is sometimes called the MUSCULO-CUTANEOUS: however, from its relative situation on the skin, it has more commonly got the name of EXTERNAL CUTANEOUS.

The branches of the external and internal cutaneous should now be traced to their terminations. The external, as soon as it passes from below the biceps muscle, divides into three branches upon the skin: two of which are distributed over the supinators, while the other passes down to the wrist. The branches of the internal cutaneous may be traced in connexion with the basilic vein; along which they pass, in three or four branches, towards the wrist. The connexion of the branches of both these nerves with the veins at the bend of the arm, will be fully described in the *Surgical Dissection* of that part.

The three great nerves,—the RADIAL, or MEDIAN, the ULNAR, and the MUSCULAR SPIRAL, may easily be traced at the same time with the branches of the arteries. The MEDIAN, or RADIAL, will be found to rise from that division of the plexus which surrounds the artery, and to be often connected with the perforans Casserii.—It may be traced along the inside of the artery, and closely connected with it. At the bend of the arm, it gives off three branches, which supply the muscles of the fore arm. But the principal nerve does not now run in the course of either of the great arteries, but in the middle of the fore arm, between the flexor sublimis and flexor profundus; whence it is more properly called *Median* than *Radial*. It passes

Median or Radial.

under the annular ligament; but previous to this, it generally gives off some small branches to the integuments upon the inside of the thumb. In the palm of the hand, it will generally be found to divide into five branches,—one of which may be traced to the abductor and flexor pollicis brevis; another, to the adductor and side of the thumb; a third, to the fore-finger; the fourth passes to one side of the fore and middle fingers; and the fifth, to the other side of the middle, and to one side of the ring finger:—besides these branches, lesser ones will be found passing into the small muscles in the palm of the hand.

Ulnar. The ULNAR rises from the lower and inner part of the plexus.—The *Internal* cutaneous will often be found to be the first branch which it gives off. It may then be traced down behind the inner condyle of the humerus; but before it reaches this point, some branches will be seen going from it to the skin and triceps muscle. Immediately after passing the condyle, it gives a branch to the flexor muscles;—it then passes between the flexor carpi ulnaris and flexor digitorum sublimis: here it will be found to join the ulnar artery, along which it may be traced to the wrist. In this course it gives off a few muscular branches; but when near the wrist, a branch will be found, which passes under the flexor carpi ulnaris, and over the lower end of the ulna, to be distributed on the back of the hand, and on the little and ring fingers: this is the *Ramus Posticus*.

The trunk of the nerve passes under the annular ligament, into the palm,—and there, it will be found to divide into two principal branches, which are sometimes called the *Sublimis* and *Profundus*. The sublimis may be traced to the integuments on the ulnar side of the hand, and to the small muscles of the little finger; then, to the sides of the little finger, and one side of the ring finger. The profundus forms a sort of *deep palmar arch*, to supply the muscles.

The MUSCULAR SPIRAL nerve will be found lying quite behind the artery, and rising from the lower and back part of the plexus. It will be seen to give off many branches, almost at its origin, to the muscles contiguous to it. The trunk may be traced along with the profunda superior artery; but we may generally observe a large branch rising from it, before it perforates the triceps;—this branch accompanies the nerve and the artery, for a short distance; it will then be found to pass directly through the triceps, and to emerge upon the skin, by the side of the supinator longus, from whence it passes, to be distributed nearly in the same manner as the branches of the external cutaneous. Muscular Spiral.

The principal nerve may be traced between the brachialis internus and supinator longus; it there gives off a branch to the elbow, and then divides into the *profundus* and *superficialis*. The profundus may be traced through the supinator brevis; it will then be found to twist round the radius, and to divide into branches, for the supply of the muscles on the back part of the arm. But the other division—the *superficialis*, is by far the most important: it lies between the supinator longus and pronator teres, —from whence it may be traced between the supinator and flexor carpi radialis, and so close upon the radial artery, that it might be called a *radial nerve*: when near the wrist, it passes under the tendon of the supinator longus, and there it lies directly over the radial artery, viz. between the extensor muscles of the thumb. The nerve is finally distributed on the back of the hand,—on the back of the thumb,—fore, middle, and ring fingers.

In recapitulation of the nerves which arise from the axillary plexus, they may be arranged thus: Three to the shoulder; viz. SUPRA SCAPULAR, INFRA SCAPULAR, and ARTICULAR. Three to the skin;—EXTERNAL CUTANEOUS, INTERNAL CUTANEOUS, and CUTANEOUS of WRISBERG. Three to the muscles;—RADIAL OF MEDIAN, ULNAR, and MUSCULAR SPIRAL.

SURGICAL DISSECTION

OF

THE ARM.

THE most important part of the dissection, is that of the vessels about the elbow and wrist; for they are liable to be opened by accidents, which, though they appear trifling, still, if they be neglected, or treated by a surgeon who is not fully master of the anatomy, may be followed by the most serious consequences;—sometimes by the loss of the limb, or even by death.

The dissection of the subclavian artery, above the clavicle, should also be most carefully made; for though it is very improbable that operations on the artery itself, will be often followed by success, still we ought to know accurately the connexions which it has with the parts in its vicinity,—that we may be enabled to avoid it, in extirpating tumours, or even to take it up in a case of aneurism. The question of the rule Subclavian Aneurism. of practice, in aneurism of the subclavian, is very difficult to determine. We shall find, by the history of the cases of aneurism of this artery, that the relative position of the parts connected with it, are so changed by the aneurismal tumour, that even though we may have a very accurate knowledge of them in their natural state, still we may be foiled in the attempt to take up the artery when an aneurism has formed.—When it is known, that even Sir Astley Cooper has been obliged to stop in the middle of such an operation, we may be satisfied that it is not a very practicable one: his words are, —"The clavicle was thrust upwards by the tumour, so as to make it impossible to pass a ligature under the artery, without incurring a risk of including some of the nerves of the axillary plexus: the attempt was therefore abandoned."

The same histories will also lead us to doubt the propriety of *ever* attempting this operation; for, in the greater number of cases, where even the artery has been neatly tied, the vessel has ulcerated above the ligature,—and this most probably, in consequence of the very short distance that there is between the large trunks, since the passage of blood through them, will necessarily prevent the formation of a *clot* behind the ligature,—which appears to be the principal cause of the great success attending operations on the external iliac and carotid arteries. I cannot enter into the discussion of what should be done in aneurism of the subclavian; but I shall merely hint to the student, to inquire into the propriety of the proposal to remove the arm. To comprehend the rationale of this proposal, he must take into consideration the effect, which the amputation of a limb has upon its great artery.

Since the last edition of this Work was printed, a case of Axillary Aneurism has been successfully operated on by Mr. Todd, of Dublin. But, notwithstanding the fortunate issue of the operation in this instance, I conceive that the question of what is the proper course to pursue in the common cases of subclavian or axillary aneurism is still open; for even in this operation so much difficulty was experienced that the issue would have been very doubtful in the hands of one not gifted with so much decision and correct judgment as the operator.

As I well know Mr. Todd's anxiety for the improvement of surgery, I shall here take the liberty of introducing the descriptive part of the operation as it is detailed in a paper which he had the kindness to send to me.* I hope the detail will show the student what difficulties even the anatomist and experieneed surgeon, has to encounter in such operations, and I trust that it will also form an additional proof

* For a full description of the case see the third volume of the Dublin Hospital Reports.

of how little practical benefit, the counting of branches of arteries on dry preparations is to the surgeon, and how absolutely necessary it is, while studying the anatomy of the vessels, to take into consideration all the changes of situation to which they are liable by disease or accident.

"The Aneurism not only distended the axilla so as to cause the scapula to project considerably backwards, but it was particularly prominent anteriorly, its base extending upwards to the clavicle, which was much elevated; inwards to the edge of the sternum, downwards to the nipple of the breast, and on the side of the thorax to the upper edge of the sixth rib. The tumour was tense, elastic, and pulsating; the skin felt stretched upon it, but was not discoloured; slight pressure did not give pain; however, the patient complained of a deeply seated uneasiness, which he referred more to the middle of the humerus than to the tumour.

"The entire limb was œdematous, and the elbow was separated to a great distance from the side. The joints of the wrist and fingers were remarkably loose; the muscles of the fore-arm and hand were completely powerless; and although shooting pains extended down the arm to the ends of the fingers, the sense of touch below the elbow was lost, and the skin might be severely pinched without producing any sensation. The patient said he was certain the application of an hot iron to the hand or fore-arm would not give pain. No pulsation could be distinguished in the radial or ulnar arteries of the diseased limb, and it had not sustained any remarkable alteration of temperature.

" The patient was placed on a table, lying on his back, with the upper part of his thorax somewhat raised; his head and neck inclined to the left, and his right shoulder was as much as possible depressed by an assistant steadily drawing down the arm of that side. A slightly curved incision was made through the common integuments across the lower part of the neck, commencing about two inches above the acromial, and terminating half an inch above and to the outer side of the sternal extremity of the clavicle. The convexity of this incision was downwards, so that by a little dissection of the integuments upwards, a small flap was made, which afforded ample room for the subsequent stages of the operation, and evinced the inutility of a more extensive, or a more complicated division of the skin.

" The next part of the operation consisted in dividing the platisma myoides, fascia, and subjacent cellular tissue; this occupied a considerable time, in consequence of the great number of veins which it was found necessary to secure with ligatures. The external jugular, and two or three other superficial veins were easily secured, but a series of more deeply seated veins proved extremely troublesome; one branch of these in particular poured out blood in an alarming quantity, and receded so much within the layers of the fascia, that I was at last compelled to use the needle, and to include in the ligature the portion of fascia with which the divided vein was connected.

" I feel it incumbent on me here to state, that this profuse discharge of venous blood was chiefly the consequence of the veins having been divided too near the large trunk into which they opened; the blood therefore flowed freely in a retrograde direction from the subclavian vein into them, and issued from their inferior orifices; the bleeding from their superior orifices was inconsiderable and easily controlled. To have tied these veins individually, before dividing them, would have been an undertaking both tedious and difficult to execute, for they constituted a most intricate plexus of convoluted vessels imbedded in cellular tissue and layers of fascia.

" The venous hemorrhage having been at last effectually suppressed, I proceeded to search for the omo-hyoideus muscle; so much however was the relation of parts altered by the magnitude of the tumour, and consequent elevation of the clavicle, that the portion of this muscle expected to be brought into view in this stage of the operation, was situated more than an inch below the clavicle; and it was found necessary to draw it up from its concealment, and to cut it across, that the subjacent parts might become accessible.

"Having applied my finger to the edge of the scalenus anticus, I was directed by it to the situation of the artery; but at this juncture causes of further difficulty arose, chiefly from the great depth of the wound, and the doubt which the almost total absence of pulsation in the artery naturally excited in regard to its identity. It is necessary, however, to observe, that this obscurity in the pulsation of the subclavian artery was by no means referable to the debility or exhausted state of the patient, but probably depended on the vessel having been flattened upon the first rib by the degree of extension to which the aneurismal tumour in the axilla had subjected it.

"For some time I could not be convinced that the feebly pulsating vessel, to which the point of my finger was applied, was really an artery of such magnitude as the subclavian; and, aware of the disappointments which others were reported to have sustained in this operation,* I

* See Sir Astley Cooper's case in *Lond. Med. Review*, vol II. and Dr. Rutherford's account of M. Dupuytren's

resolved to satisfy myself and my assistants upon a point of so much importance, before a ligature should be applied. The depth of the wound rendered it impossible to see to the bottom of it, accordingly I kept the point of my left fore-finger on the vessel, and cautiously detached it from its connexions with the blunt extremity of a director; having then introduced the fore-finger of my right hand also into the wound, I succeeded in compressing the vessel between the ends of my fingers, when the pulsation of the tumour immediately ceased, returning when the pressure was discontinued.

---

unsuccessful operation at the Hotel Dieu, in *Edin. Med. and Surg. Journal*, No. 63.

"An eminent English Surgeon, then on a professional tour, was present at M. Dupuytren's operation and dissection, and favoured me with an account of them, which corresponds with that given by Dr. Rutherford. In the same letter (dated June 21, 1819,) he states that 'three days since a surgeon of great celebrity attempted this operation, on a most admirable subject, and in an early stage of axillary aneurism, but he could not even find the vessel, and abandoned the operation.'

"Mr. Samuel Cooper informs us, that one of the cervical nerves may be mistaken for the subclavian artery, in consequence of the pulsation of this vessel being communicated to all the adjacent parts; and that he has seen a mistake of this kind actually made by very skilful surgeons. *First Lines of the Practice of Surgery*, vol. I, p. 319."

This expedient was conclusive, and, for obvious reasons, more satisfactory than that of pressing the artery downwards against the first rib.

"From the unusual degree of displacement of the clavicle, it was expected that great difficulty would have arisen in the application of the ligature to the artery; I was therefore provided with the several instruments which have been recommended to facilitate this step of the operation, however none of these were employed, as the object was speedily effected with a common aneurism needle. At first I attempted to pass the needle in front of the artery, with the view of giving every security to the vein; to this the position of the clavicle constituted an insuperable obstacle; I therefore directed the needle along the margin of the scalenus, and then insinuated the point of it under the artery from behind, guarding the vein with the fore-finger of my left hand, until the point of the needle was sufficiently elevated. I was then enabled to seize the ligature with the extremities of my fore-fingers, which I had introduced into the wound, nearly in the same manner as when compressing the artery, and the needle being held by an assistant, one end of the ligature was drawn out anteriorly, and the needle was removed.

"The artery then lay upon the ligature; and I requested that my assistants, and such other professional gentlemen as could conveniently approach the table, should convince themselves of this fact, by making the most accurate examination. The knot was now tied, and a sufficient tightness ensured by the ends of the ligature having been passed in the ordinary way through the serre-nœud. On the ligature being tightened, the pulsation of the tumour entirely subsided; its tension was considerably diminished, and the patient felt an increased degree of numbness of the arm; the external wound was then dressed, and he was laid in bed with the limb supported on a pillow by his side.

"Although my patient was an hour and an half on the operation table, and had lost a large quantity of venous blood, he appeared but little exhausted; and the strength of his pulse and usual florid appearance of his countenance were in a few minutes quickly restored. For about two hours after the operation he suffered a slight degree of dyspnœa, which spontaneously subsided."

The anatomy of the artery *below* the clavicle, should be more interesting to the student; for the tying of it, is a more practicable operation, and has occasionally been attended with success. —I shall here introduce the description, which my friend, Mr. Smith, of the Leeds hospital, has given of an operation, which he performed on a young girl who had secondary hæmorrhage from the stump, after the arm had been torn off by machinery :—" One assistant compressed the artery, above the clavicle; another, with the hand upon the acromion process, depressed the shoulder; and a third pressed a dossil of lint in the stump, to restrain the hæmorrhage. I then made an incision, from three to four inches in length, beginning about half an inch from the sternal extremity of the clavicle, and half an inch below it, following the course of that bone towards the shoulder. By the first incision, I divided the integuments; and by the second, the clavicular portion of the pectoralis major; when this retracted, the edge of the pectoralis minor was seen. Several small arteries and veins were now visible, crossing the course of the artery: these were tied, above and below, before they were divided,—as the blood issuing from them, would have retarded the operation. The great vein was then seen,—and with an appearance of pulsation, caused by the artery below it. The artery was carefully separated from it, for about the third of an inch, by the handle of a scalpel; the vein was drawn to one side, by a curved probe; a directory was then placed under the artery, to raise it a little, and a silk ligature was passed along the groove of the directory, by means of an eyed probe: the ligature was divided, and the probe withdrawn; the

Tying the Subclavian.

upper ligature was then tied as high as possible, and the other as low,—but there was, still, just as much space left, between the ligatures, as to allow of the artery being divided with safety." On my questioning the utility of dividing the artery between the ligatures,—my friend agreed to my objections; saying, that he had done it, in compliance with the prevalent opinion, as he did not conceive any harm could result from it.

The patient lived sufficiently long, to show, that the calibre of the artery was properly obliterated by the ligature: she died in consequence of hæmorrhage from the face of the stump,—which, on dissection, was discovered to have passed from the portion of the subclavian above the ligature, by the supra scapular branch of the inferior thyroïd, into the lower portion of the subclavian, from the open mouth of which it escaped. This is highly important to recollect; because it is a proof that, in a case of axillary aneurism, though the subclavian has been tied, the aneurismal tumour may still be supplied with blood from the anastomosing branches, and may at last burst, even though the main trunk be obliterated above the aneurism. In the former editions this was stated as a matter of opinion only—but now I am able to offer an example of the occurrence of the accident, in the case related by Mr. Mayo, surgeon of the Winchester Hospital, in the twelfth volume of the Medico Chirurgical Transactions.

We should now examine the parts in the axilla. They are so exceedingly complicated, that no surgeon should venture to operate upon them, unless he has such a knowledge, as will give him boldness and decision. In making the dissection, we should endeavour to keep the parts as much in their natural situation as possible.

After laying bare the tendons of the pectoralis major, and of the latissimus dorsi, we have to observe the place of the axillary glands,—the size of the branches of the thoracic arteries, and of the scapular,—and also the nerves which come from the intercostal spaces, to pass amongst them. The whole plexus of nerves, and the axillary artery, will be found to be braced down by a web of aponeurosis.—When this is lifted, we shall find that the nerves closely surround the artery; which shows, that the artery, when wounded, must not be secured by diving with a needle: by such an operation, the nerves would be included. When the nerves and artery are disentangled, and the divisions of the plexus are traced, we may recognize the radial nerve running upon the fore part of the humeral artery; the ulnar nerve taking its course towards the inner condyle of the humerus; the muscular spiral nerve passing through the triceps, and behind the bone; the external cutaneous nerve

Parts in the Axilla.

passing before the humerus, and through the coraco brachialis. We should then turn our attention to the circumstance of wounds penetrating the axilla. When a ball has passed through the arm-pit, or when it lodges, the track, or seat of it, may be discovered by the numbness in the part of the arm supplied by the extremities of the nerve. If there should be a wound of the axilla, attended with great hæmorrhage, and if the muscles, supplied by the radial nerve, are paralytic, and the sensibility of the thumb and fore and middle fingers, lost, the ball will most probably, have passed through the main artery since the radial nerve clings round it. We may also consider how the head of the humerus, being dislocated, may press on the plexus of nerves, or the artery, and cause one symptom announcing dislocation. The question may pass through our minds,—Does a punctured wound of the axillary artery call for amputation?—Does a wound, where the artery and the whole plexus of nerves are cut through, require amputation? We should likewise consider the parts in the axilla, and the muscles of the shoulder, in relation to the amputation of the arm at the shoulder-joint.

Wounds of the Axilla.

We ought to observe the intimate connexion which there is between the lymphatic glands and the vessels and nerves. When these glands are diseased, in consequence of their connexion with a malignant tumour in the breast, it may be necessary to extirpate them. These cases are so common, that we may occasionally have opportunities of examining them in the dissecting room. We shall find, that when the glands are not far advanced in disease, when they only feel hard and enlarged, if a small incision be made over them, there is danger of their escaping, by slipping amongst the loose cellular substance. They should therefore be firmly fixed with the two fingers, so that when the incision is made, they may start out; nor should the fingers be removed from them, when small and moveable, until they are taken up by the assistant's hook. Axillary Glands.

If the glands have become much enlarged, they will form adhesions with the surrounding cellular membrane; and they will group together, forming a fixed indurated mass. In such cases, we often find numbness of the arm, and œdematous swelling. The numbness, we may understand to be a consequence of pressure on the nerves: the swelling is produced by disturbance of the absorbents. We should, also recollect, that buboes may form as readily in the axilla as in the groin; in such cases we shall frequently find a scratch or prick of the needle in the hand, to be the source of the irritation; it may also be from excoriation of the nipple.

The dissection may now be prosecuted by taking the integuments off the inside of the arm. After recognizing the muscles in this more partial view, we should trace the branches of the humeral artery :—we shall find the radial nerve in company with the main artery; the ulnar nerve accompanied by the profunda inferior; and the profunda superior, and muscular spinal nerve, passing together between the heads of the triceps.

Tying the Humeral Artery.

We should now observe the manner in which the humeral artery, radial nerve, and venæ comites, are involved in a sheath, and bound down, by a membrane; and particularly, how they pass under the strong fascia near the bend of the arm. We may see, that, to cut for the humeral artery, we have only to lay bare the edge of the biceps flexor cubiti, to open the sheath, and avoid the radial nerve;—that, high in the arm, the nerve is superficial to the artery; that, towards the bend of the arm, it is on the inside of the artery.

The ANATOMY OF THE BEND OF THE ARM is very important. The following are the chief circumstances to be noticed* :—

On the fore part of the arm, we shall see the superficial veins; viz. the cephalic vein, which

* If a little size injection be thrown into the veins, the dissection will more easily be made.

is running upon the radial edge: the basilic, on the ulnar edge: the median in the centre. We should particularly attend to the divisions of the median vein, which are commonly selected for bleeding;—and to the manner in which they are connected with the two superficial, or cutaneous nerves. Betwixt the supinator longus, and the outer edge of the biceps muscle, we shall find the external cutaneous nerve: we may trace its branches under the cephalic, and median cephalic veins. The internal cutaneous nerve will be found coming directly down from the inside of the arm, over the fascia: the principal branch goes under the vein: but sometimes a small filament passes over it. We may now lift the fascia covering the humeral artery, and observe how thin, but, at the same time, how strong it is.

Parts at the Bend of the Arm.

If, in bleeding in the median basilic, the lancet transfixes the vein and the fascia, the artery may be opened. The consequence of such an accident will most probably be, an aneurism,—the operation for which, must be done by tying the artery above and below the puncture. The cases which have of late occurred, establish the propriety of this operation, instead of that, of only tying the artery above the wound. This same accident has occasionally produced the *varicose aneurism*, but not so frequently as the common aneurism; the progress and appear-

Aneurism from Bleeding.

ance of which, nearly corresponds with the following description:—

When a young surgeon is so unfortunate as to open the artery,* he, in great alarm, applies a firm compress and roller; by which, the external wound, and that of the fascia, soon heal: but the artery will continue to bleed, though not outwardly; the blood will be impelled under the fascia; the connexions of the fascia will be torn up; a regular tumour, occupying the bend of the arm, will be formed, and this tumour, stretching the fascia, will contract the fingers, and keep the fore-arm nearly at a right angle with the arm, as in diseases where the fascia is contracted, or the muscles under the fascia are inflamed.

By observing the anatomy of the parts here, we shall see the danger of tying the median nerve along with the artery; and the difficulty there would be, in separating the nerve from the artery, if the arm be kept extended. We shall also see the danger of cutting off either the radial or ulnar artery, if, in operating here, we dissect too boldly.—The question of the in-

* The superficial seat of the artery, and its contiguity to the vein, causes the blood to flow sometimes from the vein, per saltum; this is very alarming to the young surgeon.—The pulsation ceases upon bending the arm a little.

osculations between these several vessels, should now pass through our minds. Nor should we forget the irregularities, that must occur in the vessels here, when there is a high bifurcation of the humeral artery.

A very serious accident sometimes occurs in bleeding, which our knowledge of anatomy will hardly enable us to avoid,—the puncture of one of the cutaneous nerves. When we examine the connexions of the internal cutaneous nerve with the median basilic, we shall see, that the principal branches pass under the vein; but if we look to the median and cephalic, we shall find several large branches, from the external cutaneous, passing over them. This view should induce us to prefer performing the operation of bleeding in the median basilic vein, for, with a little care, and a sharp lancet, the artery (which is immediately below it) may be avoided: but, in opening the cephalic, the most dextrous surgeon may prick one of the nerves, the consequences of which are sometimes shocking.

Puncture of the Nerve.

We should now pay particular attention to the relative position of the arteries and nerves in the middle of the fore-arm; for the arteries are of such a size, that, when wounded, they will in general require to be tied.

The *radial* artery, at about one-third down the arm, may be sought for, by first cutting through the thin fascia. By then raising the edge of the supinator longus, a second fascia will be seen, covering the artery as it passes over the tendon of the pronator teres. Near the wrist, the same artery will be found between the flexor carpi radialis and the supinator longus; it is covered by a fascia: a considerable branch of the muscular spiral nerve will be seen on its radial side; and a smaller one, from the external cutaneous, almost immediately over it:—both of these nerves are superficial to the fascia. On the back of the hand, the artery will be found between the extensor muscles of the thumb,—but here it lies deep: a branch of the muscular spiral nerve crosses it.

Tying the Radial Artery

The *ulnar* artery, about the middle of the fore-arm, will be found between the flexor carpi ulnaris and flexor digitorum sublimis, but rather under the flexor sublimis.—The ulnar nerve lies on the ulnar side of the artery. In looking for the artery, near the wrist, we should raise the fascia which binds down the tendon of the flexor carpi ulnaris: on holding aside the tendon, we shall see another fascia,—and upon cutting through this, we shall find the artery. The nerve is rather more under the tendon, but still very close to the artery.*

Tying the Ulnar.

* A surgeon in the country will find, that an arm, which has been only partially dissected, if preserved in spirits, (and so, that it may be taken out of the jar for

These are very important points to attend to, —for I have seen a great deal of mischief arise in consequence of an attempt to stop the bleeding, of even the *superficialis volæ*, by compression. Two cases, in which this small artery was wounded, I well remember. A drunken fellow, in fighting, drove his arm through a pane of glass; the superficialis volæ was cut, and so near the main trunk, that it was impossible to tie the *stump* of the artery. The radial was tied; but, in consequence of the many ineffectual attempts, which had been made in chemist's shops, by compression, applications of turpentine, &c. the wound did not heal kindly; and the man being of a dissolute habit, gradually sunk.——About twelve months ago, I was called to the daughter of a respectable tradesman, who, in cutting bread, wounded the superficialis volæ. It would appear that the artery

Wound of the Superficialis Volæ.

---

examination,) will be much more useful to him, than the finest display of the minute branches of the arteries. Such a preparation will not be very expensive, nor will it be difficult to preserve. After the blood has been pushed out of the vessels, a mixture of proof spirit, saturated with alum, should be injected into them. A liquid, composed of two thirds of proof spirit to one of distilled water, saturated with alum, will then be sufficiently strong to preserve the arm;—it may be cut through at the middle of the biceps, and at the middle of the fore arm.

had bled violently; for she had, during the course of two hours, been sent from shop to shop,—until at last, after having lost about two pints of blood, she found one druggist bolder than the others; who, however, to stop the hæmorrhage, resorted to such means as injured the arm so much, that I found great difficulty in saving it.

To impress upon the student the importance of the study of the surgical anatomy of the fore-arm, I shall here introduce what Mr. Charles Bell has said, in his System of Dissections:—

"OF THE ULNAR AND RADIAL ARTERIES AT THE WRIST. There is no part of the body, in which it is more necessary to connect the anatomy with the accidents, than here at the wrist; for, from apparently slight accidental wounds of these arteries, there come great pain, inflammation, deep driving of the blood, unskilful operations, and bad surgery, and danger of losing the arm, and even the life of a patient. The danger is from these vessels,—the ULNAR ARTERY, as it turns over the wrist, and the RADIAL, as it turns over the root of the thumb, or the PALMAR ARCH in the hand, not being neatly tied at first. The consideration of this department of surgery would lead us too far; I only say, look to it now, when the parts are before you. I would beg you also, to look to the peculiar appearance of the fat, and the aponeurosis on the palm.

"In a wound of the artery in the palm, we put in a large pad, or compress, and close the hand, and bind it firmly; but if the arch of the palm be cut, this does not completely stem the blood,—or the pain and inflammation are such, as will not allow the bandage to be drawn sufficiently tight; we must then undo the bandage, and endeavour to find the artery; but the appearance of the wound is changed; it is tumid, and the cellular membrane stuffed with blood, so, that, from the confusion, we probably cannot see the mouth of the artery. In this state of things, the patient getting weak from loss of blood, and the vessels perversely bleeding, only when the dressings are applied, and stopping when they are undone, the surgeon is tempted to follow the artery with incisions, fruitless, perhaps, because he is still amongst the disordered parts. He is at last tempted to dive for the roots of those vessels with his needle. And now let us observe the consequence of this: Suppose that a surgeon does not dissect neatly for the radial or ulnar artery at the wrist, but plunges for it with his needle, the skin, tendons, and nerves, are included, and the ligature is drawn tight upon them; there may be most dangerous nervous symptoms from the including of the nerve, or, more certainly the next day, by the fading of the parts, the ligature slackens, and the artery bleeds again.

"When the student, then, is studying this part of the anatomy, let him not run with too much rapidity over this important lesson. I would recommend it to him to read Mr. John Bell's Principles of Surgery, upon this point, where he will find surgical cases so pictured and represented to him, that he will not quickly forget them; let him return then again to his subject; let him examine the fascia at the fore part of the wrist, and the manner in which it covers the artery; let him observe the palmar aponeurosis, and mark accurately, the place at which the arteries turn over the wrist; let him mark the connexion of the ulnar artery and nerve, where they lie connected, and observe the radial nerve free from the arteries, passing under the ligament of the wrist, and then he will not be guilty of seeking the radial nerve, in order to separate it from the radial artery."

The situation of the nerves should be accurately marked; for cases occasionally occur, which may induce us to cut the branch of one of the nerves; but the propriety of such an operation is very questionable. We must not do it in a person who has the slightest symptoms of hysteria, as such cases will probably be very much aggravated by the operation.—I was lately induced, by certain very distressing symptoms, which were distinctly referable to a small tumour in a branch of the radial nerve, to extirpate the tumour; but, though the local symptoms were removed by the operation, still I would not like to repeat it; for though my patient had never previously been hysterical, she was affected, for several days succeeding the operation, by a set of symptoms, which, though not actually alarming, were very unpleasant.

After removing the muscles, the joints should be particularly examined with reference to the subject of dislocation. In this inquiry, the student will find much assistance in the plans of the different dislocations which are given in the Operative Surgery, by Mr. Charles Bell.

END OF VOL. I.

Printed by G. Hayden, Little College Street, Westminster

INDEX.

Printed by G. Hayden, Little College Street, Westminster.