

A manual of dissections of the human body, for the use of students and more particularly for those preparing for the higher examinations in anatomy / by the late R.E. Carrington.

Contributors

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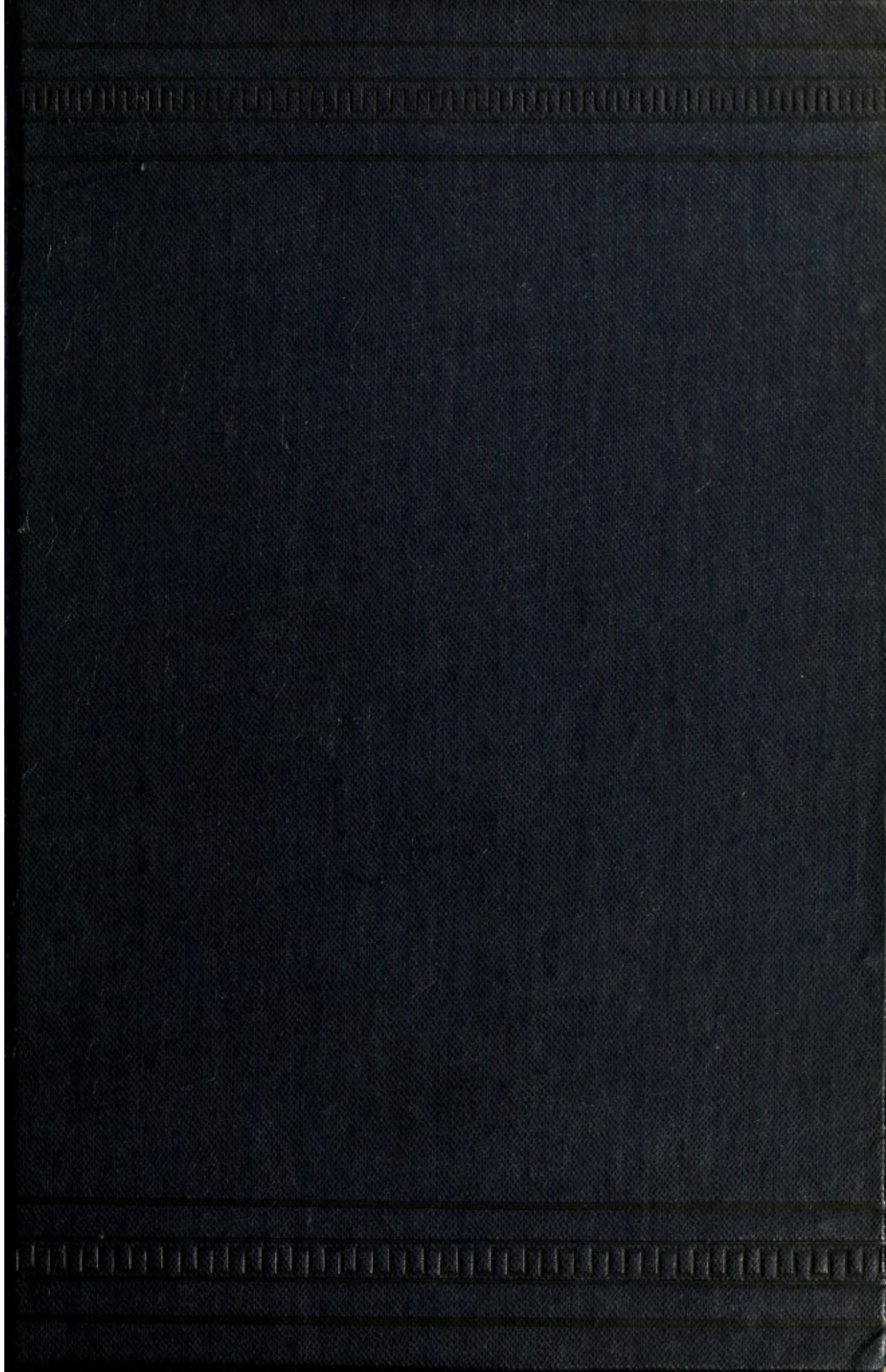
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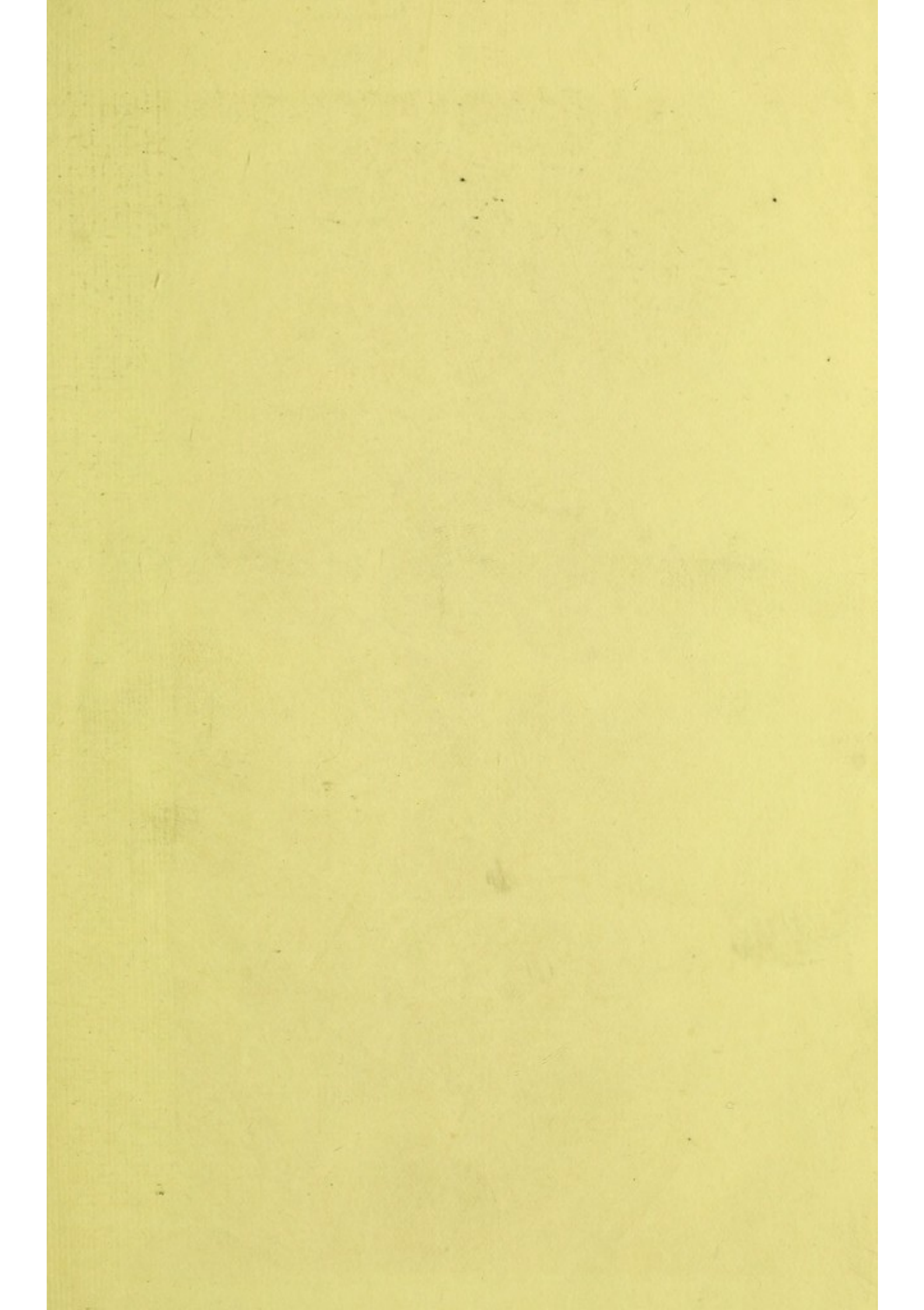
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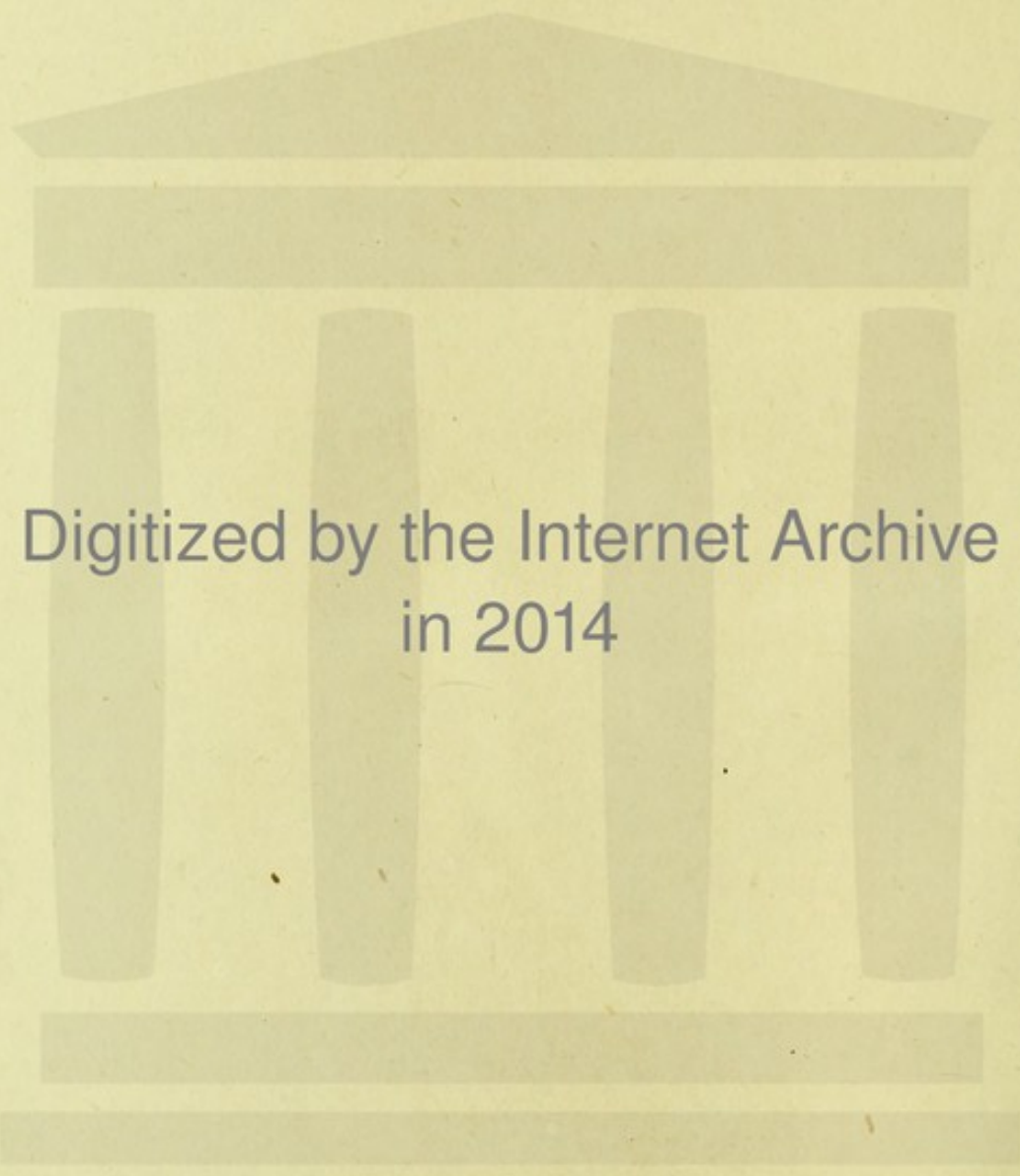


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A MANUAL OF DISSECTIONS OF THE
HUMAN BODY.

A MANUAL OF DIRECTIONS OF THE
HUMAN BODY.

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J. H. Makins

A MANUAL OF
DISSECTIONS OF THE HUMAN BODY,
FOR THE
USE OF STUDENTS, AND MORE PARTICULARLY
FOR THOSE PREPARING FOR THE HIGHER
EXAMINATIONS IN ANATOMY.

BY THE LATE
R. E. CARRINGTON, M.D. LOND., F.R.C.P.,
Late Senior Assistant Physician, Guy's Hospital.

SECOND EDITION,

REVISED AND ENLARGED BY

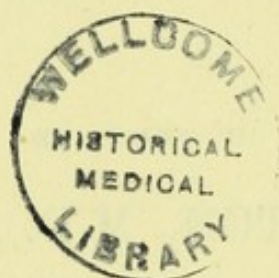
W. ARBUTHNOT LANE, M.S., F.R.C.S.,

*Senior Demonstrator of Anatomy, Guy's Hospital; Assistant Surgeon to the
Hospital for Sick Children, Great Ormond Street; Surgeon to the
National Truss Society; Member of the Court of Examiners,
Apothecaries' Hall; Examiner in Elementary Anatomy
under the Conjoint Board; Author of a "Manual
of Operative Surgery."*

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PREFACE TO FIRST EDITION.

IT has not been found possible in the arrangement of these dissections to classify them under the usual headings of Head and Neck, Upper Extremity, Abdomen, and Lower Extremity, because many of them would have been included under two or even more of these : in fact, they have often been specially planned with this object, so as to include the border lines of parts which, as they belong strictly neither to one nor the other dissector, are often neglected entirely. Nevertheless, this order has been followed for the most part, and in cases where a dissection involves partly one part and partly another, it has as far as possible been used as an intermediate link between the two. It is taken for granted that the student should have carefully dissected the whole body through before he turns his attention to special dissections. The steps outside the usual routine that are necessary to be taken to expose different structures, form a special feature of the higher anatomical examinations, and, indeed, are not absent from the more ordinary ones, and my experience of the past four years has shown me that students are often non-plussed as to the mode in which questions of this sort should be answered : it is to meet this difficulty, and also to assist those who may wish to carry their anatomical knowledge further than the usual dissecting-room course would allow them, that this work has been published.

I am thoroughly convinced that it is well nigh impos-

sible to accurately answer many of the questions that are asked in the higher examinations, except they have previously been worked out practically, and am strongly of opinion that special arrangements should be made to meet the requirements of candidates for these tests. If a subject were allotted to four instead of eight dissectors, I think, by mutual arrangement and consultation between themselves, they might each of them perform many special dissections, and might collectively work out many others.

The present manual is the result of special work during the conduct for the past two years of the anatomical class for the first M.B. examination of the University of London. I have been greatly assisted by Messrs. W. A. Lane and J. A. P. Price, Assistant Demonstrators at Guy's Hospital, and to them I desire to express my great obligations for thorough and painstaking work in the prosecution for this class.

The principle that has been followed throughout, has been to perform the dissection with the *least possible destruction of surrounding parts compatible with the full exposure of the structure under consideration*. The skin incisions have been carefully planned with this object, and I may incidentally remark that this is often one of the most difficult steps of the dissection, and that further, owing to the retraction of the divided skin, the surface exposed will always be greater than that strictly included between the lines of incision. It will frequently happen that there are several preliminary steps to be taken before the actual point of the question is reached. Thus in a dissection to expose the Thoracic duct, the opening of the Thoracic and Abdominal cavities may fairly be considered as not an essential part of the dissection, whilst in one to display the Internal Mammary Artery, a detailed

account of the Thoracic and Abdominal parietes is evidently required. Students are often puzzled to know whether they are to consider such cavities as opened, or whether they are to write down every separate structure they divide in the course of the dissection. It is difficult to give an absolute answer, but in the absence of specific information from the examiner himself, much will depend upon the amount of time allowed them to write their paper. It may, however, be taken for granted that nothing but naked eye anatomy is required.

The plan that has been followed in arranging and writing out the various dissections is this:—

1. The position of the body, or part, is indicated.
2. The requisite skin incisions have then been stated carefully.
3. The dissection has been divided into stages numbered I., II., III., &c., and the different steps of each stage have been indicated by the small letters, *a, b, c, d, &c.*
4. After each stage short accounts numbered 1, 2, 3, 4, &c., of the structures exposed have been given, following as far as possible some definite direction, as from above downwards, or from side to side, and taking them in the order of bones, muscles, arteries, veins, nerves, &c. The student should avoid giving a bare list: he is not required to *describe* each structure that may be exposed, but he should indicate the *relative positions* of parts succinctly and distinctly.
5. When a structure to be exposed lies in two or more distinct regions each has, in some cases, been taken separately and indicated by the capitals A, B, C.

I am painfully aware of the imperfections of this work, but trust that as each dissection has been actually performed, want of accuracy will not be one of them. No doubt the absence of plates is a striking deficiency, but in the presence of the beautiful atlases of Professor Ellis, and more recently that of Mr. Godlee, I am strongly of opinion that these will not be found necessary. My object, however, has been mainly to supply a little manual within the reach of all, which may be a guide to actual dissecting-room work.

R. E. CARRINGTON.

PREFACE TO SECOND EDITION.

AT the request of my late valued friend, Dr. Carrington, I have prepared the second edition of his useful "Manual of Dissections."

I have carefully revised the whole work and have increased very considerably the number of the Dissections, so that no important area of the body is left undescribed.

At the same time the Dissections have been so arranged that the several parts of the body can be dissected in the same order as in this book or not, according to the convenience of the student and the material at his disposal.

W. ARBUTHNOT LANE.

ST. THOMAS'S STREET, S.E.

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A MANUAL OF DISSECTIONS.

BEFORE doing a dissection to expose any given area of the cortex of the brain, the student must first make himself thoroughly familiar with the relationship of the several convolutions and fissures to the sutures and bones of the skull.

He can do this best by a careful study of the investigations on the subject by Sir William Turner, which are contained in the "Journal of Anatomy and Physiology," vols. xiii. and xiv. His conclusions are stated briefly in the following account:—

He maps out each lateral half of the surface of the skull or scalp into ten well-defined areas or regions, and then localizes within these areas the convolutions on the outer surface of the hemisphere.

The **Frontal** or **Præ-coronal** region is bounded posteriorly by the Coronal suture. (See fig. 1.)

The Frontal region is subdivided into three by two lines. One is drawn vertically upwards and backwards from the Superior Orbital border through the Frontal eminence to the Coronal suture, and is parallel to the frontal suture.

The other is the Temporal ridge.

The upper area is called the **Upper Frontal area** (S.F. fig. 2).

The middle, the **Mid-Frontal area** (M.F.).

The lower, the **Lower Frontal area** (I.F.).

The **Parietal region** corresponds to that of the Parietal bone. It is subdivided into an **Antero-parietal** and a **Postero-**

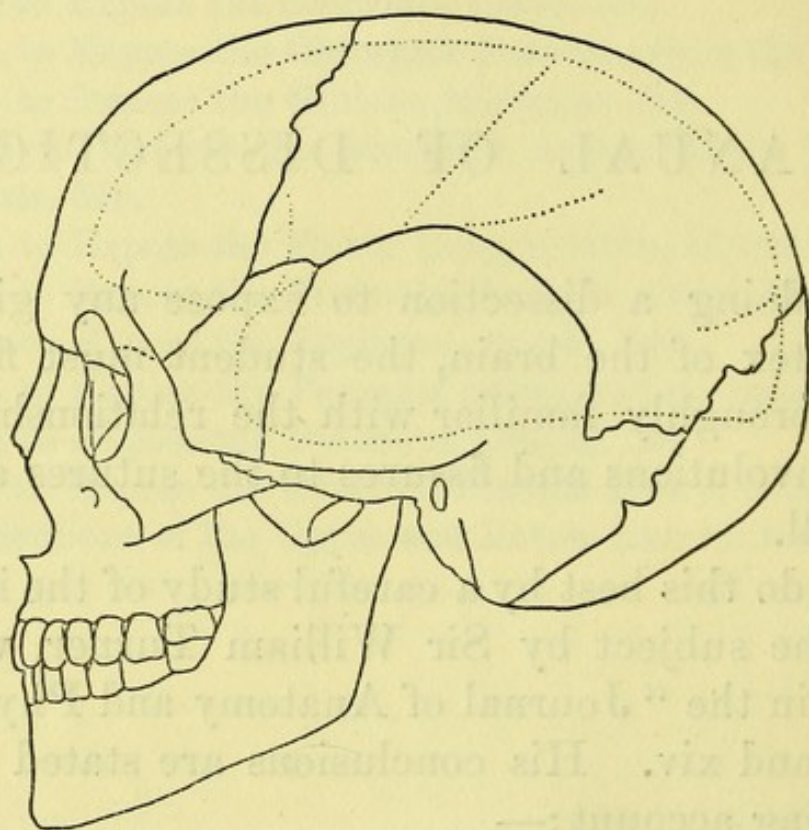


Fig. 1.

Fig. 1 represents a diagram of the skull, and shows the relations which the principal fissures bear to the bones and sutures of the skull.

The fissure of Rolando is indicated by the dotted line behind the Coronal suture, and the Parieto-occipital fissure by the dotted line above the Lambdoid suture. The position of the Sylvian fissure is also shown.

parietal region by a vertical line (see fig. 2) drawn from the Squamous suture upwards through the Parietal eminence to the Sagittal suture. This line lies almost parallel to the Coronal suture. These two areas are each subdivided into two by the Temporal ridge.

The four regions are called the **Upper Antero-parietal**

area (S.A.P.) ; the **Lower Antero-parietal** area (I.A.P.) ; the **Upper Postero-parietal** area (S.P.P.), and the **Lower Postero-parietal** area (I.P.P.).

The **Occipital** region is bounded by the Lambdoid suture above, and by the External Occipital protuberance and superior curved line below.

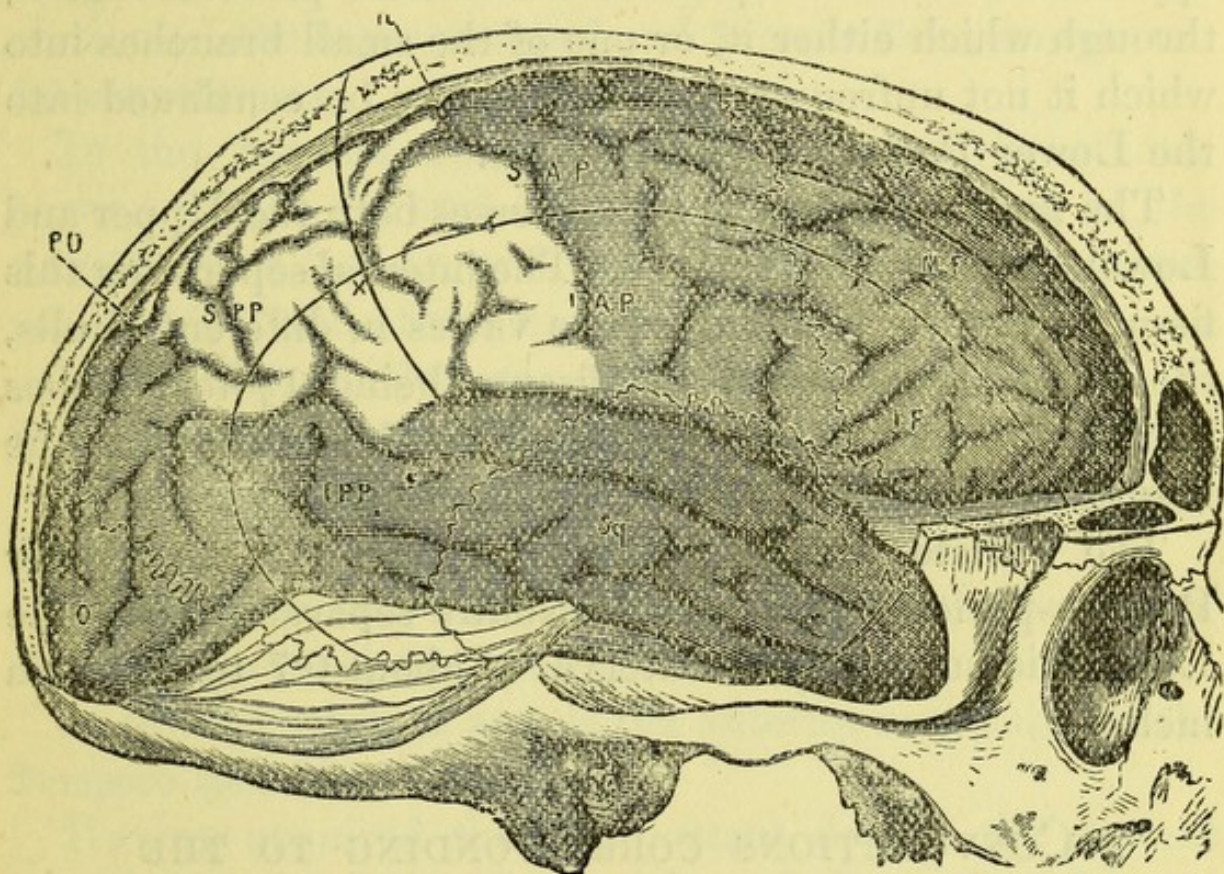


Fig. 2.

DIAGRAM SHOWING THE RELATIONS OF THE CONVOLUTIONS AND
FISSURES TO THE BONES AND SUTURES OF THE
SKULL (TURNER).

The **Squamoso-temporal** region (S.Q.) corresponds to the squamous portion of the Temporal bone, and

The **Ali-sphenoidal** (A.S.) to that portion of the great wing of the Sphenoid which enters into the formation of the Temporal fossa.

The **Sylvian fissure** (S.) commences immediately behind

the posterior border of the lesser wing of the Sphenoid, and in its course upwards and backwards is covered by the great wing of the Sphenoid, where it articulates with the anterior inferior angle of the Parietal. It then passes obliquely backwards under cover of the anterior superior part of the squamous plate of the Temporal bone, and appears in the lower part of the Antero-parietal region, through which either it, or one of the small branches into which it not unfrequently divides, may be continued into the Lower Postero-parietal region.

The fissure of **Rolando** (R.) traverses both the Upper and Lower Antero-parietal areas. The interval separating this fissure from the Coronal suture varies in different skulls, the upper extremity of the fissure being $1\frac{1}{2}$ to 2 inches behind the Coronal suture, and the lower end of the fissure from $1\frac{1}{3}$ to $1\frac{1}{2}$ inches.

The **Parieto-occipital fissure** (P.O.) lies in the Upper Postero-parietal area. It is usually separated from the Lambdoid suture by an interval of about 0·7 to 0·8 of an inch.

CONVOLUTIONS CORRESPONDING TO THE SEVERAL AREAS.

In the **Superior Frontal** area is the **Superior Frontal convolution** (S.F.).

In the **Middle Frontal** area is the **Middle Frontal convolution** (M.F.).

In the **Inferior Frontal** area is a large portion of the **Inferior Frontal convolution** (I.F.). A small bit of the **Middle Frontal convolution** is placed in its posterior superior angle.

In the **Superior Antero-parietal** area are the upper two-

thirds of the **Ascending Frontal** (A.P.) and **Parietal** (S.) gyri, 1·2 or 1·3 of an inch of the **Superior Frontal** gyrus, one inch of the **Middle Frontal** gyrus, and portions of the **Postero-parietal** and **Supra-marginal** convolutions.

In the **Inferior Antero-parietal** area are the lower third of the **Ascending Frontal** (A.P.) and **Parietal** (I.) convolutions, less than an inch of the **Lower Frontal** convolution, and small portions of the **Supra-marginal** and **Superior Temporo-sphenoidal** convolutions.

In the **Superior Postero-parietal** area are the greater portion of the **Parietal** lobule, the upper portion of the **Angular** gyrus (S.P.P.), and part of the **Supra-marginal** convolution (X.) and of the **Annectant** gyri.

In the **Inferior Postero-parietal** area are portions of the **Supra-marginal**, **Angular**, and **Temporo-sphenoidal** convolutions.

In the **Occipital** area is the greater part of the **Occipital** lobe (O.).

In the **Squamoso-temporal** area is the greater portion of the **Temporo-sphenoidal** convolutions (S.Q.).

In the **Ali-sphenoid** area is the anterior extremity of the **Temporo-sphenoidal** lobe (A.S.).

Having acquired these important details, the student can readily determine the position of the various fissures and convolutions on the dead subject by the rules proposed by Reid.¹ (See fig. 3.)

This writer draws a **base line** through the inferior margin of the orbit and the centre of the **External Auditory Meatus**.

A line joining the **Glabella** with the **External Occipital protuberance** indicates the position of the **longitudinal fissure**, and a line running from the **External Occipital**

¹ "The Principal Fissures and Convolutions of the Cerebrum," *Lancet*, 1884.

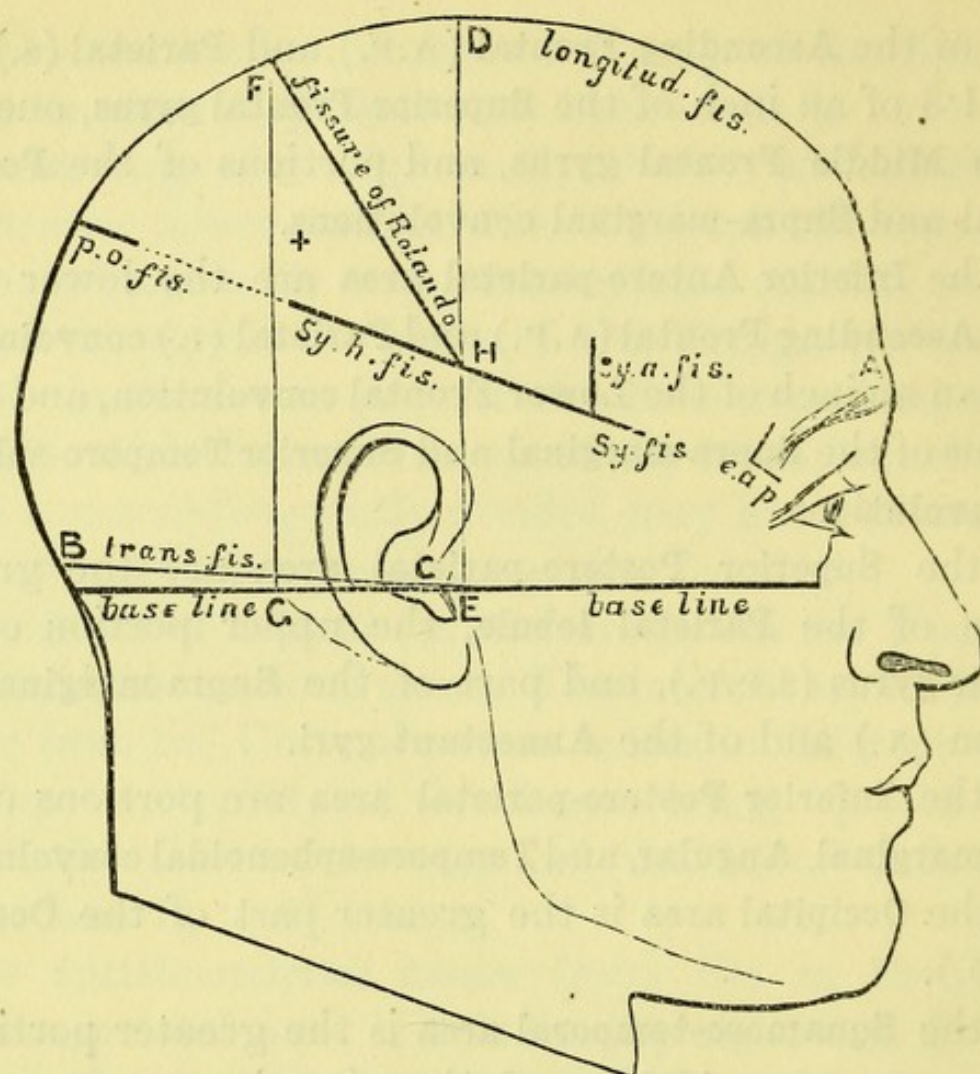


Fig. 3.

DIAGRAM OF CRANIO-CEREBRAL RELATIONS (REID).

- A. Glabella.
- B. External Occipital protuberance.
- e. a. p. External angular process of Frontal bone.
- B. C. Transverse fissure.
- A. B. Longitudinal fissure.
- Sy. fis. Sylvian fissure.
- Sy. h. fis. Horizontal limb of Sylvian fissure.
- Sy. a. fis. Ascending limb of Sylvian fissure.
- D. E. Perpendicular line from depression in front of Meatus to vertex.
- F. G. Perpendicular line from posterior margin of base of Mastoid process to vertex.
- F. H. Fissure of Rolando.
- P. o. fis. Parieto-occipital fissure.
- + Most prominent part of Parietal eminence.

protuberance to the External Auditory Meatus the transverse fissure.

The fissure of **Sylvius** corresponds to a line stretching from a point an inch and a quarter behind the external angular process of the frontal bone, to another three-quarters of an inch below the most prominent part of the Parietal eminence.

The anterior three-quarters of an inch of its length indicates the undivided portion of the fissure, and from the posterior extremity of the undivided portion the ascending limb ascends for an inch or less.

To find the position of the fissure of **Rolando** raise two perpendiculars to the base line, the one from the posterior border of the Mastoid process, and the other from the depression in front of the External Auditory Meatus. A diagonal joining the upper extremity of the former with the point of intersection of the latter with the Sylvian fissure represents the position of the fissure of Rolando.

The **Parieto-occipital** fissure is represented approximately by the posterior extremity of the prolongation backwards to the middle line of the direction of the fissure of Sylvius.

The **Intra-parietal** fissure in its anterior or vertical portion runs parallel with the fissure of Rolando, and three-quarters of an inch behind it. Its horizontal limb runs parallel to the longitudinal fissure, and is separated from the extremity of the Parieto-occipital fissure by an interval of half an inch. (See fig. 4.)

The **Superior Temporo-sphenoidal** fissure is represented by a line parallel with the fissure of Sylvius and an inch below it.

The **Inferior Temporo-sphenoidal** fissure lies three-quarters of an inch below the Superior.

The **Ascending Frontal** convolution corresponds to an area

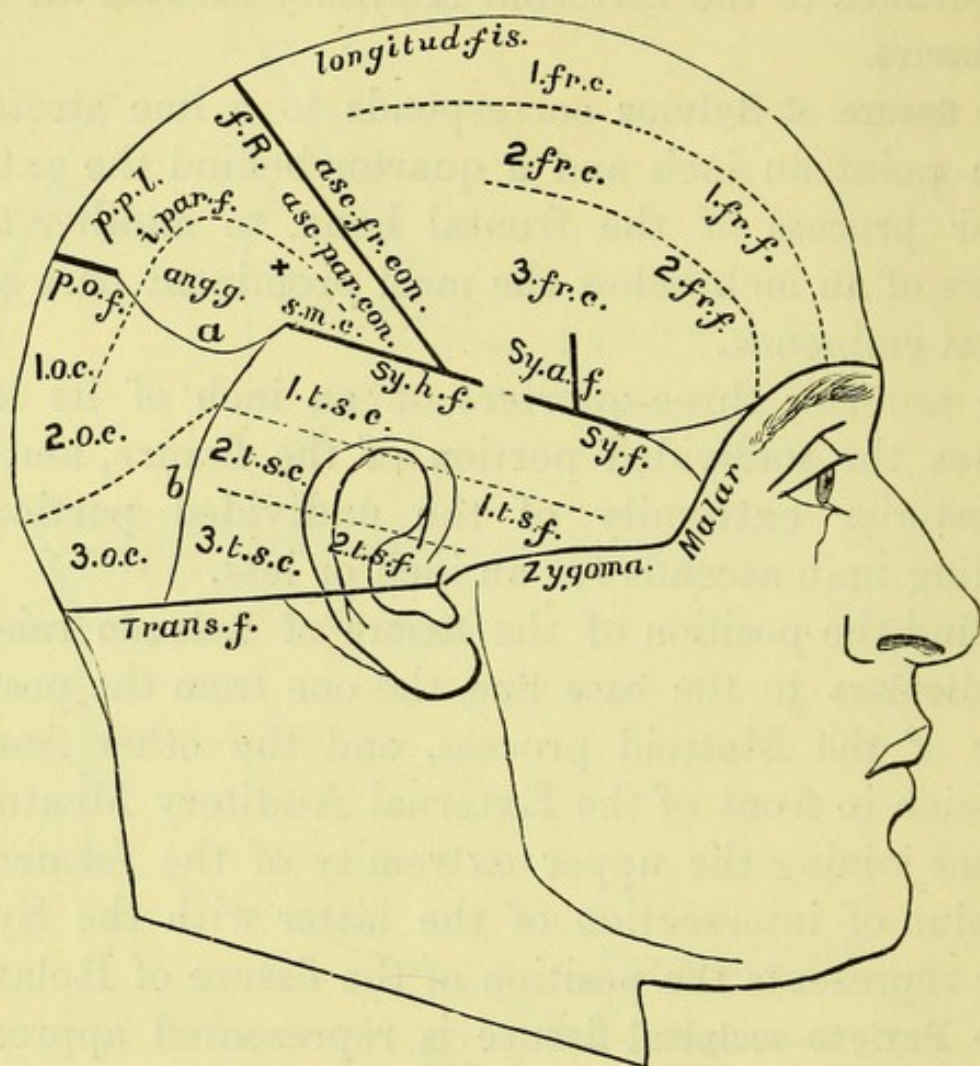


Fig. 4.

DIAGRAM OF CRANIO-CEREBRAL RELATIONS (REID).

- + Most prominent part of Parietal eminence.
- a. Convex line forming lower boundary of Parietal lobe.
- 1. fr. c. First Frontal convolution.
- 1. fr. f. First Frontal fissure.
- f. R. Fissure of Rolando.
- I. par. f. Intra-parietal fissure.
- Ang. g. Angular gyrus.
- S. m. c. Supra-marginal convolution.
- 1. t. s. First Temporo-sphenoidal convolution.
- 1. t. f. s. First Temporo-sphenoidal fissure.
- 1. o. c. First Occipital convolution.
- P. p. l. Posterior Parietal lobule.

three-quarters of an inch in breadth in front of the fissure of Rolando.

The **three frontal convolutions** are separated by lines running parallel to the middle line, one passing through the frontal notch, and the other along the frontal portion of the Temporal ridge.

The **Posterior Parietal lobule** lies above the horizontal portion of the Intra-parietal fissure, and the **Supra-marginal gyrus**, and a portion of the **Angular gyrus**, below it.

The Parietal lobe is separated from the Occipital by a curved line whose convexity is downwards and whose extremities terminate by joining with those of the Parieto-occipital and Sylvian fissures.

The **Supra-marginal convolution** lies beneath the most prominent portion of the Parietal eminence.

The **Temporo-sphenoidal lobe** is limited below by the upper border of the Zygoma. In front it reaches to the level of the posterior superior border of the Malar bone. It blends with the Occipital lobe midway between the external Occipital protuberance and the posterior border of the Mastoid process.

As an instance of the method to be pursued in exposing any area of the surface of the brain, the student will perform the following dissection. After that he can do dissections to expose other areas.

A DISSECTION TO EXPOSE THE ASCENDING FRONTAL CONVOLUTION.

The scalp having been shaved, define the position of the Longitudinal fissure, the fissure of Rolando, and the fissure of Sylvius.

I. SKIN INCISIONS.

1. Make an incision down to bone from the middle line parallel to the fissure of Rolando, and one-eighth of an inch behind it to the Sylvian fissure.
2. Make an incision parallel to No. 1, and one inch in front of it, reaching from the middle line to the Sylvian fissure.
3. Connect the upper and lower extremities of No. 1 and No. 2.

(The small interval of one-eighth of an inch in front of and behind the average limits of the convolution is to allow for variations.)

In these incisions you divide—**Skin** : **Superficial fascia**, containing branches of the **Temporal artery and vein**, the **Auriculo-temporal nerve**, the **Supra-orbital artery, vein, and nerve**, the **Occipital artery, vein, and Great Occipital nerve**, and of the **Facial nerve** ; the **Aponeurosis of the Occipito-frontalis** and fibres of origin from it of the **Attollens aurem** ; delicate **Areolar tissue** connecting the **Pericranium** to the **Aponeurosis of the Occipito-frontalis** and to the **Temporal fascia** ; the **Temporal fascia** ; the **Temporal muscle**, and in it branches of the **middle and deep Temporal arteries and veins** ; the **Temporal nerves** ; and the **Pericranium**.

II. Remove this area of soft parts, dividing in doing so a branch of vein which emerges from the Parietal foramen, and expose—

1. The **Frontal bone**.
2. The upper portion of the squamous portion of the **Temporal bone** and the **Squamo-parietal suture**.
3. The upper and posterior angle of the great wing of

the **Sphenoid** and the **Spheno-parietal** and **Spheno-squamosal** sutures.

4. Possibly the lower portion of the **Coronal** suture.

Cut through the several bones in the lines of the skin incisions with a **Hey's** saw, and remove the resected portion of the vault of the skull. In doing this you cut through branches of the **anterior** and **posterior Parietal Diploic veins**, and possibly the **anterior branch** of the **Middle Meningeal artery** should it be contained in a channel in the bone.

You expose—

1. The slightly flocculent **outer aspect** of the **Dura mater**.
Projecting from its surface in and about the middle line may be seen a variable number of **Pacchionian glands**.
2. A **vein** from the **Parietal foramen** is observed to enter the **Longitudinal sinus**, and the **anterior division** of the **Middle Meningeal vessels** are distributed in the area of **Dura mater** exposed.

III. Remove the **Dura mater** within the limits of the dissection, cutting through it along the outer margin of the **Longitudinal sinus**. In doing this you divide the **anterior divisions** of the **Meningeal vessels** and branches of the several nerves supplying the **Dura mater**.

You expose—

1. The **Subdural space**,
2. The **Arachnoid membrane**, and
3. The **trunks** formed by the **veins** of the outer surface, and those of the inner aspect of the **Cerebrum**, as they enter the **Longitudinal sinus**.

IV. Remove the **Arachnoid membrane** and expose—

1. The **Subarachnoid space**, in which there is much **cerebro-spinal fluid**. This space is pervaded by a

network of fine **Trabeculæ**, and from it the fungiform villi project into the **Dura mater**.

2. The **Pia mater** closely investing the convolutions and dipping into the **Sulci**.
3. The **Superior Cerebral veins** ramifying in it and running from behind upwards and forwards, and joining at the inner margin of the hemisphere with the veins from its inner aspect.

You see running on the **Pia mater** and breaking up into branches in its substance—

1. Twigs of the first branch of the **Middle Cerebral artery** supplying the **Inferior Frontal convolution**.
2. The second branch, supplying the chief part of the **Ascending Frontal convolution**.
3. The third branch, supplying the remainder of the **Ascending Frontal gyrus** and sending branches to the **Ascending Parietal gyrus**.
4. Twigs of the fourth branch, supplying the **Superior Temporo-sphenoidal convolution**.

V. Remove the **Pia mater** and contained vessels and expose—

1. The fissure of **Rolando**.
2. The **Sylvian fissure**.
3. The posterior extremities of the **Upper and Lower Frontal fissures**.
4. The posterior extremities of the three **Frontal convolutions**.
5. The anterior limit of the **Ascending Parietal convolution**, and
6. The upper margin of the **Superior Temporo-sphenoidal convolution**.
7. The whole of the **Ascending Frontal convolution**.

TO EXPOSE THE UNDER SURFACE OF THE CEREBELLUM.

POSITION.—Place the body in the prone position, and rotate the head slightly. Hook the ear forwards.

I. SKIN INCISIONS.

1. Make an incision from the highest point of the External Occipital protuberance forwards to the upper margin of the root of the Zygoma, immediately above the anterior border of the Mastoid process.
2. From the anterior extremity of No. 1 make a vertical incision along the anterior margin of the Mastoid process to its lower extremity.
3. Make an incision backwards from the tip of the Mastoid process to the middle line and parallel to No. 1.

II. Reflect the skin and expose—

1. **Superficial fascia**, containing
2. A variable amount of fat ;
3. Branches of the **Great Occipital**,
4. **Small Occipital**,
5. **Suboccipital**,
6. **Third Occipital**,
7. **Great Auricular**, and
8. **Arnold's nerves** ;
9. Branches of the **Posterior Auricular**, and
10. **Occipital vessels** ;
11. The **Suboccipital** and
12. **Mastoid lymphatic glands**.

III. Remove the Superficial fascia and the structures contained in it, and expose—

1. The deep cervical fascia attached to the **Ligamentum Nuchæ** in the middle line, to the External Occipital protuberance and superior curved line, and to the Mastoid process.
2. The origin of the **Occipitalis** muscle and aponeurosis from the External Occipital protuberance and superior curved line.
3. The **Retrahens aurem**, consisting of one or two fasciculi, which arise from the outer surface of the Mastoid process, and are inserted into the back of the Concha.
4. Besides the several nerves and vessels already enumerated in the Superficial fascia, the **Posterior Auricular** branch of the **Facial** nerve is seen to turn backwards over the Mastoid process, and to give off branches to the **Retrahens aurem** and **Occipitalis** muscles.

IV. Remove the deep cervical fascia from the area of the dissection, dividing the attachments of deep processes to its under surface and expose—

1. The **Trapezius**, attached to the Occipital protuberance, superior curved line, and **Ligamentum Nuchæ**.
2. The **Sterno-mastoid** attached to the Mastoid process and to the superior curved line.
3. The **Splenius capitis** in the interval between the Sterno-mastoid and Trapezius, and
4. The **Complexus** (occasionally) in an angular interval between the Trapezius and Splenius capitis.
5. The **Occipital** vessels lying on the insertion of the Complexus and emerging from the insertion of the Trapezius.
6. The **Great Occipital** nerve accompanying it.

7. The cutaneous branches of the **Suboccipital** and **Third Cervical** nerves, emerging from the **Trapezius**.

8. The **Small Occipital** lying on the posterior margin of the **Sterno-mastoid**.

V. Remove the **Trapezius** within the limits of the dissection, with the subjacent fascia, and expose—

1. Further portions of the **Splenius capitis**, and
2. **Complexus** muscles ;
3. The **Occipital** vessels lying upon the **Complexus** ;
4. The **Great Occipital**,
5. The **Small Occipital**, **Suboccipital**, and
6. The **Third Cervical** nerves perforating the **Complexus**.

VI. Remove the **Sterno-mastoid** within the limits of the dissection, with the subjacent fascia, and expose—

1. A further portion of the **Splenius capitis**.
2. The posterior belly of the **Digastric** emerging from beneath the **Splenius**.
3. The deep process of the **Parotid** gland.

VII. Cut away the **Splenius** within the limits of the dissection, and expose—

1. A further portion of the **Complexus**.
2. The upper extremity of the **Trachelo-mastoid**.
3. A portion of the **Superior Oblique** muscle in the interval between the **Complexus** and **Trachelo-mastoid**.
4. The **Occipital** artery and vein emerging from beneath the **Trachelo-mastoid**, and lying upon the insertions of the **Superior Oblique** and **Complexus** muscles.

While on the **Superior Oblique**, it gives off the **Princeps Cervicis** artery, which divides into a branch that descends upon the **Complexus** and one that passes beneath it.

The **Occipital** vein is seen to receive a vein from the **Mastoid foramen**.

VIII. Cut away the Trachelo-mastoid from its insertion into the tip of the Mastoid process.

Remove the portion of the Complexus seen in this dissection, with the Occipital vessels which lie upon it, and the branches of nerves which we have seen emerge from its substance, together with a branch of the Suboccipital nerve which supplies it, and expose—

1. The **Rectus Capitis Posticus Major**.
2. The **Rectus Capitis Posticus Minor**.
3. **Branches of the Vertebral vein**, and of
4. The **Princeps Cervicis artery**.
5. And a further portion of the **Superior Oblique muscle**.

IX. Remove within the limits of the dissection the two **Recti muscles**, the **Superior Oblique**, the **Occipital vessels**, and the **Princeps Cervicis artery**, and expose—

1. The **Posterior arch of the Atlas**.
2. The **two Posterior Occipito-atloid ligaments**.
3. The **Rectus lateralis**.
4. The **Vertebral artery** lying on the arch of the **Atlas** and perforating the **Posterior Occipito-atloid ligament**.
5. The **Vertebral vein** joining it.
6. The **Suboccipital nerve**, its **ganglion**, and its **posterior branch** supplying filaments to the several muscles in the **Suboccipital triangle**.
7. The **Ligamentum Nuchæ** and its attachment to the **External Occipital crest**.

X. Cut through the attachment of the **Posterior Occipito-atloid ligaments** to the **Occipital bone**.

With a key-hole saw divide the **Occipital bone** in the middle line from the posterior margin of the **Foramen magnum** to the **External Occipital protuberance**.

Divide the **Digastric** and **Rectus lateralis muscles** at

their attachments to the Temporal bone, and cut through the *Retrahens aurem*.

Then, with the same saw, cut through the base of the skull transversely along the anterior margin of the Mastoid process to the outer portion of the Occipital condyle internally, and above to the upper margin of the Posterior root of the Zygoma.

Cut through the skull from the external Occipital protuberance to the upper extremity of the last incision. Insert a chisel beneath the bone, and break through the condyle of the Occipital bone, tearing through the attachment of the several ligaments to it, and expose—

1. The **Outer surface** of the **Dura mater**, the lower margin of the **Horizontal portion** of the **Lateral sinus**, and the whole of the **Oblique portion**. The **Mastoid vein** is seen entering the latter, and several **Emissory veins** open into the sinus about the torcular *Herophili*.
2. **Meningeal branches** of the **Ascending Pharyngeal** and **Vertebral arteries** ramify on the **Dura mater**.

XI. Cut through the **Dura mater** along the lower margin of the horizontal portion of the lateral sinus, divide the sinus in the same horizontal plane as it alters its direction, and following the bony margin of the dissection, remove the **Dura mater** within its limits, and expose—

1. The **Falx Cerebelli**, containing—
2. The **Occipital sinus**.
3. The **Arachnoid space**, which contains some fluid, and
4. The **Arachnoid membrane**.

XII. Remove this membrane within the area of the dissection, and expose—

1. The **Subarachnoid space**, which contains a considerable

quantity of fluid in the meshes of loose trabecular tissue.

This space communicates with the fourth ventricle by a foramen in the middle line, the **Foramen of Majendie**, and by another behind the upper roots of the glosso-pharyngeal nerve. It is particularly large in the interval between the two lateral lobes inferiorly.

XIII. Remove the Arachnoid membrane, and expose—

1. The **Pia mater**, which closely follows the surface of the cerebellar convolutions dipping into the fissures. It extends over the roof of the fourth ventricle forming the **Tela choroidea inferior** and the **Choroid plexus of the Fourth ventricle**.
2. The **Posterior Inferior Cerebellar artery** coming off from the vertebral, giving branches to the choroid plexus of the fourth ventricle, and dividing into two branches in the vallecule. One runs in the depression between the inferior vermiform process and the lateral hemisphere of the cerebellum, the other supplies the under surface of the lateral lobe.
3. The **Anterior Inferior Cerebellar artery**, supplying the anterior part of the under surface of the cerebellum, and anastomosing with the last artery.
4. **Cerebellar veins** running up to open into the lateral sinus.

Remove the Pia mater and vessels, and expose—

The whole of the under surface of the Cerebellar hemisphere.

Having completed the several dissections of the Brain, the student will perform

A DISSECTION TO EXPOSE

THE EXTERNAL PTERYGOID MUSCLE.

THE FIRST AND SECOND PORTIONS OF THE INTERNAL MAXILLARY ARTERY.

THE OTIC GANGLION FROM THE OUTSIDE.

THE SINUS OF MORGAGNI, OR THE INTERVAL ABOVE THE FREE UPPER MARGIN OF THE SUPERIOR CONSTRUCTOR.

THE CHORDA TYMPANI OUTSIDE THE SKULL.

THE CARTILAGINOUS PORTION OF THE EUSTACHIAN TUBE.

AND PART OF EACH OF THE FOLLOWING STRUCTURES:

THE LEVATOR PALATI MUSCLE.

THE TENSOR PALATI MUSCLE.

THE LINGUAL GUSTATORY NERVE.

THE INFERIOR DENTAL NERVE.

After finishing the dissections completed in this area, the student will pass on to make the further dissections necessary to expose the remainder of the four last-mentioned structures.

POSITION.—Place the body on its back, and rotate the face to the opposite side.

DEFINE the horizontal upper margin of the Zygomatic arch, the anterior margin of the Masseter muscle, and the Posterior margin of the Ramus of the jaw.

I. Skin Incisions. (See Fig. 5.)

1. Make an incision along the horizontal upper margin of the Zygomatic arch to a point vertically

above the posterior limit of the Temporo-Maxillary articulation.

2. Make an oblique incision from the anterior extremity of No. 1 downwards and forwards to the anterior limit of origin of the Masseter muscle from the Zygomatic arch, and continue this incision obliquely downwards and backwards

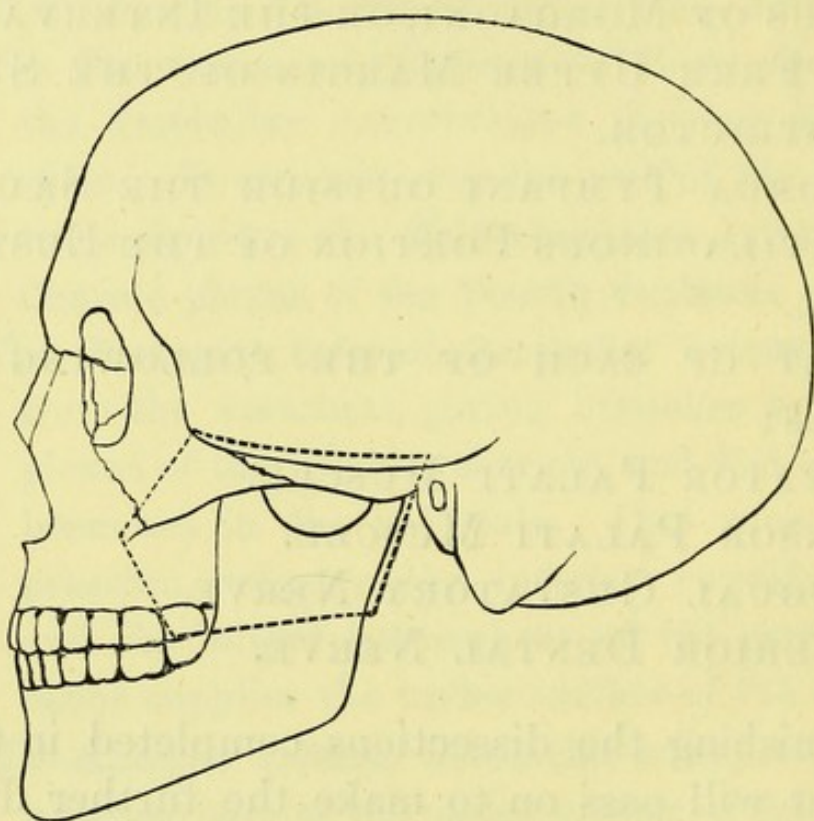


Fig. 5.

along the anterior margin of the Masseter to its centre.

3. From the posterior extremity of No. 1 make an incision along the posterior margin of the Ramus of the jaw to its centre ; and
4. Join the lower extremities of No. 2 and No. 3.

II. Remove the skin, and expose—

1. **Superficial fascia**, blending above, with
2. The **Aponeurosis of the Occipito-frontalis**. Arising

from this Aponeurosis above may be seen the lower portion of

3. The *Attrahens aurem*.

III. Remove these structures and expose—

1. The **Temporal fascia** attached to the upper margin of the zygomatic arch.
2. The **Zygomatic arch** formed by the **Malar Process** of the **Superior Maxilla**, the **Malar bone**, and the **Zygomatic process** of the **Temporal bone**.
3. The outer portion of the **Orbicularis Palpebrarum**, covering this arch in front.
4. The **Zygomaticus Major**, and
5. The **Zygomaticus Minor** muscles arising from it.
6. The **Masseteric fascia**, attached to the lower margin of the arch, and continuous behind with **Parotidean fascia**.
7. A portion of **Buccal fascia** in front of the masseteric fascia.
8. The **Malar branches** of the **Temporo-malar nerve**, with accompanying branches of the **Lachrymal artery**, perforating the **Malar bone**.

IV. Remove the portions of **Orbicularis Palpebrarum**, **Zygomatic muscles**, and **Masseteric fascia** seen in this dissection, and expose—

1. The upper portion of the **Masseter muscle**, and
2. The **External Lateral ligament**, and
3. The outer portion of the **Capsule of the Temporo-maxillary articulation** behind it.

Lying on the **Masseter**

4. The **Socia Parotidis** and **Steno's duct**.
5. The **Transverse Facial artery and vein** above the duct, and parallel to the **Zygomatic arch**.
6. The **Temporal, Malar, Infraorbital, Buccal, and Supra-**

maxillary branches of the **Facial nerve**, as they emerge from the substance of the **Parotid gland**.

7. The **Buccal branch** of the **Fifth nerve**, with a branch of the **Internal Maxillary artery**, and

8. The **Anterior Internal Maxillary vein**, emerging from beneath the anterior margin of the **Masseter**.

V. Remove the structures which lie on the **masseter**. Cut through the attachment of the two layers of the **Temporal fascia** to the horizontal upper margin of the **Zygomatic arch**, noticing the intervening layer of fat.

Divide the **Malar bone** and **Zygomatic process** of the **Superior Maxilla** obliquely along the line of the skin incision, and the **Zygomatic process** of the **Temporal bone** immediately in front of its anterior root.

Cut transversely through the **Masseter**, along the lower horizontal incision.

Remove the **Zygomatic arch** and the attached portion of **Masseter muscle**, dividing, in doing so, the **Masseteric branches** of the **Internal Maxillary artery** and **Inferior Maxillary nerve** as they cross the **Sigmoid notch**.

Remove some loose fat, and expose—

1. The **Upper half** of the **Ramus of the jaw**, and its two processes.

2. The **Temporal muscle** inserted into the inner surface of the **Coronoid process** and into its anterior margin.

3. The **Zygomatic surface** of the **Superior Maxilla**, and arising from it below a portion of

4. The **Buccinator muscle** covered by **Buccal fascia**.

5. The **Posterior Dental nerves**, the branches of the **Alveolar artery**, and the **Alveolar plexus of veins** upon the **Superior Maxilla**.

6. The **Buccal nerve**, as it emerges from the substance of the **Temporal muscle**.

7. The **Buccal artery** as it emerges from beneath this muscle with

8. The **Anterior Internal Maxillary vein**.

VI. Divide the Ramus obliquely with a Hey's saw, cutting from the Sigmoid notch to that portion of the anterior margin of the Ramus which is exposed in the anterior inferior angle of the dissection, dividing, in doing so the lower portion of the insertion of the Temporal muscle into that border.

Cut transversely through the Temporal muscle along the upper limit of the dissection, dividing in the substance of the muscle ascending branches of the Buccal nerve, and twigs of the deep Temporal nerves and arteries.

Remove the Coronoid process with the exposed portion of Temporal muscle, dividing, in doing so, the Buccal nerve as it perforates that muscle, and expose—

1. The **External Pterygoid muscle** in the whole of its extent, and emerging from beneath its lower margin a portion of the

2. **Internal Pterygoid muscle**.

3. A portion of the **Pterygoid process** of the **Parotid gland** in the angular interval between the two Pterygoid muscles.

4. Frequently lying on the external Pterygoid and passing between its two heads, the **Second Portion of the Internal Maxillary artery** with its several **Muscular branches**, one of which, the **Masseteric**, has been cut through, the **two deep Temporal branches** ascending over the external Pterygoid and passing beneath the Temporal muscle, the **Buccal branch** passing forwards and downwards, and the **Pterygoid branches** to the Pterygoid muscles.

5. The **Pterygoid Plexus of veins** receiving the **Anterior Internal Maxillary vein**, branches from the **Alveolar Plexus**, and branches corresponding to the **Muscular Arterial Twigs**.
6. The **Lingual Gustatory and Inferior Dental nerves**, as they emerge from beneath the lower margin of the **External Pterygoid** and lie upon the **Internal Pterygoid**, the **Lingual Gustatory** being anterior to the **Inferior Dental**.
7. The **Buccal nerve** emerging from between the two heads of the **External Pterygoid**, and
8. The **Anterior and Posterior deep Temporal** and the **Masseteric nerves** emerging from beneath the upper margin of the same muscle, the two **Temporal nerves** ascending beneath the **Temporal muscle**.

(Should it be the intention of the dissector to expose the whole outer surface of the external Pterygoid muscle, he may now do so by removing the veins, arteries, and nerves which lie superficial to it.)

VII. Divide the neck of the jaw immediately below the insertion of the external Pterygoid muscle, and cut through the Ramus transversely at the lower limit of the dissection, taking care to insure the safety of the Inferior Dental nerve.

Remove this portion of the Ramus and expose—

1. Further portions of the **Internal Pterygoid muscle**, and of
2. The **Pterygoid process of the Parotid gland**.
3. The **Internal Lateral ligament** as it emerges from beneath the lower margin of the **External Pterygoid muscle**, and descends to be attached to the free inner margin of the **Inferior Dental foramen**.

4. The **Inferior Dental nerve** as it enters the **Inferior Dental foramen**, giving off before doing so the **Mylohyoid branch**, which descends beneath the ramus.
5. The **Internal Maxillary vein** as it receives anteriorly the **Pterygoid plexus** and from above and below branches corresponding to those of the
6. **First division of the Internal Maxillary artery** which is exposed beneath it.
7. The **Middle and Small Meningeal arteries** and the **Tympanic artery** ascending beneath the **External Pterygoid**, and the **Inferior Dental branch** accompanying the **Inferior Dental nerve**, and giving off a **Mylohyoid branch** which runs with the artery of the same name.

(If the **Internal Maxillary artery** lies superficial to the **External Pterygoid muscle**, it is now exposed in the first and second portions of its course.)

VIII. Remove the structures which lie superficial to the **External Pterygoid muscle**.

Divide the **External Lateral ligament** and the capsule of the **Temporo-maxillary articulation** above the **Inter-articular Fibro-cartilage**.

Remove the **External Pterygoid muscle** from its origin, dividing in doing so branches of nerves and arteries to the **External pterygoid**, and branches of the **Temporal artery** and **Auriculo-temporal nerve** to the **Temporo-maxillary articulation**, and expose—

1. The **Outer surface** of the **External Pterygoid plate** and of the **great wing** of the **Sphenoid** from which the muscle arose.
2. The upper portion of the **Internal Pterygoid muscle**

arising from the inner aspect of the External Pterygoid plate and from the tuberosity of the palate and superior maxilla.

3. A deeper portion of the **Pterygoid** plexus of veins with branches joining it from above.
4. Further portions of the **Meningeal** and **Tympanic** arteries.
5. The second portion of the **Internal Maxillary** artery and its muscular branches, should it lie beneath the External Pterygoid.
6. The remainder of the **Internal Lateral** ligament with its attachment to the spine of the Sphenoid.

IX. Remove the Internal Lateral ligament, the Internal Maxillary artery and branches, the Pterygoid plexus of veins, the Internal Maxillary vein, and the whole of the Pterygoid process of the Parotid gland, and expose—

1. Portion of the **Tensor Palati** arising from the Scaphoid fossa and under surface of the great wing of sphenoid as far back as its spine.
2. Portion of the **Levator Palati** passing forwards, downwards, and inwards within the free upper margin of the
3. **Superior Constrictor**, the upper part of which is now seen.
4. The third division of the fifth nerve as it emerges from the Foramen ovale, giving off the three ascending muscular branches to the **Temporal** and **Masseter** muscles; the anterior branch to the **Buccinator**; the **Lingual gustatory** nerve which passes forwards and downwards, receiving near the skull, at an acute angle, the **Chorda Tympani**, which may be traced upwards and backwards into the canal of Huguier; the **Inferior Dental** nerve disappearing

from the dissection below and in front; the **Auriculo-temporal nerve**, as it arises by two heads which run backwards, enclosing the middle Meningeal artery, and then uniting, also its communicating branches with the **Otic ganglion** and its branches of distribution to the **Temporo-Maxillary articulation**; the nerve to the **Internal Pterygoid** lying somewhat internal to the **Lingual gustatory** and entering the posterior limit of the inner surface of the **Internal Pterygoid muscle**.

(If the student intend to expose the **Lingual gustatory** or **Inferior Dental nerve**, he should not proceed further with this dissection. He has also now exposed the **Chorda Tympani nerve** in its course outside the skull.)

X. Cut through the **Lingual Gustatory**, **Inferior Dental**, and **Chorda Tympani nerves** and expose—

1. The **Otic ganglion** on the deep surface of the **Inferior Maxillary trunk**, at the point of junction of the **Motor Fasciculus** with that nerve and around the **Internal Pterygoid branch**. It receives a branch from the **Sympathetic on the Middle Meningeal artery** and the small superficial **Petrosal nerve**, which is seen to emerge from the fissure between the petrous process of the **Temporal bone** and the great wing of the **Sphenoid**. Its branches of distribution, namely, two small filaments which join the roots of the **Auriculo-Temporal nerve**, a communicating branch to the **Chorda Tympani**, a branch to the **Tensor Palati**, and another which passes upwards and backwards to supply the **Tensor Tympani** are also exposed.

(The **Otic ganglion** and its branches are now fully exposed.)

XI. Cut transversely through the Internal Pterygoid muscle along the lower limit of the dissection.

Remove the External Pterygoid plate by means of bone forceps, taking away the portion of Internal Pterygoid muscle exposed, dividing the nerve which enters the posterior border of that muscle, and removing the whole of the third division of the fifth nerve and its branches, and expose —

1. A further portion of the **Buccinator** arising from the hamular process and the upper part of the Pterygo-maxillary ligament.
2. The whole of the vertical triangular portion of the **Tensor Palati**, whose tendon passes inwards between the two heads of the Buccinator in front of the hamular process.
3. A further portion of the **Superior Constrictor** as it passes backwards from beneath the Tensor Palati.
4. Branches of the **Ascending Pharyngeal artery** accompanying the Levator Palati, and
5. Branches of the **Ascending Palatine artery** running with the tendon of the Tensor Palati.

(In order to expose the Tensor Palati, it is not necessary to proceed further with this dissection.)

XII. Remove the vertical portion of the Tensor Palati from its bony origin, and from its attachment to the cartilaginous outer wall of the Eustachian tube, and expose—

1. The **Cartilaginous outer wall** of the **Eustachian tube** from its attachment above to the bony aperture between the Squamous and Petrous portions of the Temporal bone till it passes below, beneath the upper margin of the Superior Constrictor.

2. The attachment of the Superior Constrictor to the posterior margin of the Internal Pterygoid plate below its centre.

(If the student intend to expose the Levator Palati in the whole of its extent, it is necessary to leave this dissection at this stage.)

XIII. To expose the whole length of the Cartilaginous portion of the Eustachian tube, cut away the upper portion of the Superior Constrictor from the Posterior margin of the Internal Pterygoid plate, separate the Levator Palati from its attachment to the membranous floor of the Eustachian tube, remove that portion of the Internal Pterygoid plate which lies superficial to the lower extremity of the Eustachian tube, leaving its periosteal inner lining, to which the fibro-cartilaginous outer wall is attached and from which it is now to be dissected.

The narrow inner Cartilaginous wall, its Membranous floor, the prominent lower Margin and anterior Angle of its inner wall with the origin of the Salpingo-pharyngeus muscle are now exposed.

TO COMPLETE THE DISSECTION TO EXPOSE THE LINGUAL GUSTATORY NERVE.

I. Make an incision through the cheek from the anterior inferior angle of the preceding dissection into the angle of the mouth, dividing in doing so Skin, Superficial Fascia, fibres of the Platysma myoides, the Levator anguli oris, the Levator Labii superioris, the Zygomatici, the Depressor anguli, and the Depressor Labii inferioris, the Buccinator and Buccal fascia, the Submucous tissue, Mucous glands and Mucous membrane; the Facial artery, vein and muscular branches upon the Buccinator, with branches of the Buccal of the Fifth and Facial nerves.

Hook the flaps of the divided cheek upwards and downwards and separate the jaws as much as possible. Pass a thread through the tip of the Tongue and draw it upwards and outwards out of the mouth, fixing it in that position, and expose—

1. The whole of the side of the Tongue.
2. The reflection of Mucous membrane from the tongue on to the jaw.
3. Prominences produced by the Sublingual gland and the Lingual Gustatory nerve.

II. Remove the Mucous membrane from the side of the Tongue and from the interval between it and the Jaw, and expose—

1. Portions of the **Hyo-glossus**,
2. **Stylo-glossus**,
3. **Palato-glossus**,
4. **Inferior Lingualis**,
5. **Genio-hyo-glossus**, and
6. **Superior Lingualis**, and posteriorly.
7. The **Superior Constrictor** at its origin from the Inferior Maxilla, below and behind the third molar tooth.
8. The **Mylo-hyoid** as it is inserted into the oblique line.
9. The Deep part of the **Submaxillary gland**.
10. The **Duct of the Submaxillary gland**, arising from its deep process, passing forwards beneath the Sublingual gland, receiving from it the duct of Bartholin and opening in an elevation on one side of the **Frænum Linguae**.
11. The **Sublingual gland** with the ducts of **Rivini**.
12. The **Ranine vein** and **artery** as they emerge from beneath the **hyo-glossus** and run to the tip of the tongue upon the **Inferior Lingualis**.

13. The **Sublingual branch of the Lingual artery.**
14. The **Lingual Gustatory nerve**, as it emerges from beneath that portion of the Superior Constrictor which arises from the Inferior Maxilla, and runs forwards above the deep process of the Submaxillary gland, giving off branches to the **Submaxillary ganglion**, which is now exposed with its several branches of communication and distribution. The Lingual gustatory nerve then loops around **Wharton's duct**, lying first outside and then below it, being finally distributed to the side and tip of the tongue. To see its distribution it is necessary to hook the Sublingual gland upwards. Branches of the Hypoglossal nerve are seen communicating with those of the Lingual gustatory upon the Hypoglossus muscle, and along its anterior margin.

III. Divide the Superior Constrictor at its origin from the lower jaw, when the Lingual Gustatory nerve will be exposed in the whole of its course outside the skull.

TO COMPLETE THE DISSECTION TO EXPOSE THE TENSOR PALATI MUSCLE.

I. Having exposed the triangular vertical portion of this muscle in the Pterygoid dissection, proceed to split the cheek as in the preceding dissection, and then divide the small portion of Buccinator which intervenes between the transverse Buccal incision, and the interval between the two heads through which the tendon of the Tensor Palati passes.

II. Having done this, separate the jaws completely and hook upwards and downwards the flaps of the divided cheek.

III. Pass a suture through the extremity of the uvula, and pulling this structure forwards and to the opposite side, fix it in that position.

IV. Remove the **Mucous membrane** from the Anterior surface of half of the soft palate and expose—

1. A thick layer of **Submucous tissue**, and beneath it, and blending with its substance,
2. The thin layer formed by the **Palato-glossus muscle**.
3. **Branches of the Descending Palatine arteries and nerves**.
4. **Branches of the Ascending Palatine, or Ascending Pharyngeal artery**, or of both vessels, and
5. **Branches of the Glosso-pharyngeal nerve**.

V. Remove these structures and expose—

1. The **plaited tendon of the Tensor Palati muscle**, as it passes inward over the anterior surface of the hamular process, both bone and tendon being covered by **Synovial membrane**. It then extends horizontally inwards forming an extensive **Apo-neurosis**, which extends over the whole area of the soft palate, uniting in the Median line with the fellow of the opposite side, and being inserted above into the transverse ridge on the under surface of the palate process of the palate bone.

The Tensor Palati muscle has now been exposed in the whole of its extent.

TO COMPLETE THE DISSECTION OF THE LEVATOR PALATI.

I. Having exposed this muscle in the Pterygoid dissection as it arises from the quadrilateral rough surface on the inferior aspect of the Petrous portion of the Temporal

bone, and from the membranous floor of the Eustachian tube, and seen it pass downwards, inwards, and forwards, and disappear beneath the free upper margin of the Superior Constrictor.

II. Split the cheek, separate the jaws, hook the divided portions of the cheek upwards and downwards, and fix the uvula as in the preceding dissection.

III. Remove the **Mucous membrane** from the front of this half of the soft palate, exposing—

1. **Mucous membrane.**
2. A thick layer of **Submucous lymphoid tissue**, and beneath it, and also blending with it,
3. The **Palato-glossus muscle.**
4. **Branches of the Descending Palatine vessels and nerves.**
5. **Branches of the Glosso-pharyngeal nerve.**
6. **Branches of the Ascending Pharyngeal, or Ascending Palatine artery, or of both vessels.**

IV. Remove these structures and expose—

1. The **expansion of the tendon of the Tensor Palati**, and its insertion into the transverse ridge on the under surface of the palate bone. The vertical fleshy portion of this muscle has been removed in the Pterygoid dissection, and the divided plaited tendon is seen in front of the hamular process, both bone and tendon being covered by Synovial membrane.

V. Remove the **Aponeurosis of the Tensor Palati** and expose—

1. The **Anterior layer of the Palato-pharyngeus muscle.**

VI. Remove the **Anterior layer of the Palato-pharyngeus** and divide the posterior portion of the **Buccinator**, the

Pterygo-maxillary ligament, and the Superior Constrictor muscle up to its upper free margin, and expose—

1. The **Levator Palati** muscle, as it passes downwards, forwards, and inwards, to be inserted into the soft palate, a few fibres blending in the Uvula with the **Azygos Uvulae** muscle which lies behind it.
2. The **posterior layer** of the **Palato-pharyngeus** is exposed as it runs downwards and backwards.
3. **Branches** of the **Ascending Pharyngeal artery** accompanying the **Levator Palati**, and being distributed to the soft palate.

The **Levator Palati** muscle is now exposed in the whole of its extent.

TO COMPLETE THE DISSECTION OF THE INFERIOR DENTAL NERVE.

I. Having exposed the **Inferior Dental** nerve in the **Pterygoid** dissection from the **Foramen ovale** to the **Foramen** in the inner aspect of the **Ramus**.

II. Continue the direction of the lower transverse skin incision in the **Pterygoid** dissection forwards to the angle of the mouth, dividing **Skin**, **Superficial fascia**, fibres of the **Risorius**, **Zygomatic**, **Buccinator**, **Depressor anguli oris**, and **Orbicularis oris** muscles, the **Buccal fascia**, **Mucous membrane**, **Submucous tissue** and **Buccal glands**. Also the **Facial artery** and vein, **Buccal branches** of the **Fifth** and **Facial nerves**, and the **Buccal artery**.

III. Make a vertical incision from the middle of the lower lip to the lower margin of the **Symphysis**, dividing **Skin**, **Superficial fascia**, fibres of the **Levator menti**, the **Orbicularis**, **Mucous membrane**, **Submucous tissue** and **Mucous glands**. Between the **Mucous membrane** and **Orbicularis**

the **Coronary artery** of the lower lip is cut through, and in the **Superficial fascia** branches of the **Inferior Labial vessels**, **Mental vessels**, **Mental nerve**, and **Supra-maxillary branches** of the **Facial nerve**.

IV. Continue the incision along the posterior margin of the **Ramus** in the **Pterygoid dissection** to the angle of the jaw, dividing the soft structures down to the bone, cutting through in so doing, **Skin**, **Superficial fascia**, junction of **Parotidean** and **Masseteric fasciæ**, a portion of the **Socia Parotidis**, **Supra-maxillary**, and **Buccal branches** of the **Facial nerve** beneath and perforating the **Masseteric fascia**, and branches of the **Great Auricular nerve** in the **Superficial fascia**.

V. Reflect this quadrilateral flap of skin and subjacent soft structures from the outer surface of the body and **Ramus** of the jaw, carefully retaining the branches of the **Mental nerve** and vessels as they emerge from the **Mental foramen** and supply the adjacent muscles, **Mucous membrane**, **Superficial fascia** and skin. In turning down this flap, you divide **Mucous membrane** where it is reflected from the gum to the cheek, the insertion of the **Masseter**, and the origins of the **Buccinator**, **Depressor Anguli oris**, **Depressor Labii inferioris** and **Levator menti**, and the **Fasciculus** of origin of the **Orbicularis oris** from the incisive fossa external to the **Levator menti**.

VI. With a fine chisel and mallet expose the **Inferior Dental nerve** and vessels, their incisive branches and their distribution to the several teeth by cutting away the outer layer of compact tissue from the lower jaw.

VII. Having accurately defined the course and direction of the **Mylo-hyoid branch** of the **Inferior Dental**

nerve, cut through the jaw obliquely over it, and separating the two fragments of the jaw, expose the **Mylo-hyoid nerve** and **artery** as they cross obliquely the **Internal Pterygoid muscle**, and break up into the branches of distribution to the **Mylo-hyoid muscle** upon which they lie, and to the **Anterior belly of the Digastric**.

The upper portion of the **Submaxillary gland** is exposed with branches of the **Facial artery**. The gland must be displaced downwards in order that the **Mylo-hyoid nerve** may be fully displayed.

The **Inferior Dental nerve** and its branches are now fully exposed.

A DISSECTION OF THE ORBIT FROM THE OUTSIDE,
BY MEANS OF WHICH ANY OF THE FOLLOWING
STRUCTURES CAN BE
EXPOSED, NAMELY—

THE LENTICULAR GANGLION WITH ITS ROOTS AND
BRANCHES.

ANY OF THE EXTRINSIC MUSCLES OF THE EYEBALL.
THE EYEBALL AND THE OPTIC NERVE WITHIN THE
ORBIT,

THE LACHRYMAL GLAND WITH ITS VESSELS AND
NERVES WITHIN THE ORBITAL AREA, ETC.

POSITION.—The body lying in the supine posture, and the face turned to the opposite side.

I. SKIN INCISIONS.

1. Make an incision from the Inferior External angle of the base of the orbit backwards for an inch

and a-half along the upper border of the Zygomatic arch.

2. Make an incision from the Superior External angle of the aperture of the Orbit backwards for the same distance, and parallel to No. 1.
3. Join the posterior extremities of No. 1 and No. 2 by means of a vertical incision.

II. Reflect the skin forwards and expose—

1. **Superficial fascia**, containing in the anterior portion of the dissection little or no fat. This portion of the fascia is very thin, so that the subjacent muscle is closely connected to the skin.
2. **Branches of the Lachrymal vessels.**
3. **Palpebral twigs of the Lachrymal nerve.**
4. **Branches of the Auriculo-temporal nerve.**
5. **The Temporal branch of the Orbital nerve, and**
6. **A small artery accompanying it.**
7. **The Malar branch of the Orbital nerve, and**
8. **A small artery accompanying it.**
9. **Branches of the Temporal artery and vein.**

III. Remove the Superficial fascia and the structures contained in it, and expose—

1. **The outer portion of the Orbicularis palpebrarum**, consisting of two parts, the Palpebral portion being contained in the eyelids, and being composed of thin, pale fibres. These are inserted into the subjacent External Tarsal ligament. The Orbital portion is much thicker and of a darker colour. Its fibres are seen in this dissection to pass uninterruptedly over the subjacent structures.
2. **The Aponeurosis of the Occipito-frontalis** lying behind and beneath the outer portion of the Orbicularis, and giving origin to some fibres of

3. The **Attrahens aurem**, which is partly exposed.
4. Branches of the **Facial nerve** supplying the **Orbicularis**, and ascending behind it.
5. The several nerves and vessels already enumerated in the superficial fascia.

IV. Remove within the limits of the dissection the **Orbicularis Palpebrarum**, the **Aponeurosis** of the **Occipitofrontalis**, and the **Attrahens aurem**, and expose—

1. The **Palpebral ligament** with its thickening
2. The **External Tarsal ligament**.
3. The **External Angular process** of the **Frontal bone**.
4. The outer surface of the **Malar bone**.
5. The upper margin of the **Zygomatic arch**, and
6. The **Temporal fascia** attached to it.
7. The **Temporal branch** of the **Orbital nerve** and artery, perforating the **Temporal fascia**.

V. Cut through the **Temporal fascia** and **Temporal muscle** along the limits of the dissection, observing the two layers of the former, the intermediate fat and branches of the middle **Temporal artery**, and in the divided muscle next the bone the **Anterior** and **Posterior deep Temporal nerves** and arteries and branches of the middle **Temporal artery**.

Cut through the **Periosteum** in the same incisions.

VI. Remove the muscle, fascia and **Periosteum**, and expose—

1. A portion of the **Temporal aspect** of the **Frontal bone**.
2. The outer surface of the **Orbital plate** of the **Malar bone**, and the **Temporal foramen** through which the **Temporal branches** of the **Orbital nerve** and artery emerge.
3. The outer aspect of the **great wing** of the **Sphenoid** as low as the **Pterygoid ridge**.

VII. Detach the External Tarsal ligament, the Palpebral ligament, and the Periosteum from that portion of the margin of the orbit exposed in the dissection. Separate the Periosteum of the orbit from its outer wall, and define the outer extremity of the Sphenoidal fissure.

With a sharp, narrow-bladed pair of bone forceps cut from the Superior and outer angle of the orbit into the outer extremity of the Sphenoidal fissure, dividing in so doing portions of the frontal, malar, and greater wing of Sphenoid.

Define the outer extremity of the Spheno-maxillary fissure, and with a key-hole-saw cut from the lower and outer angle of the Orbital aperture into the outer limit of the Spheno-maxillary fissure, dividing the Malar bone in doing so.

Join the Spheno-maxillary and Sphenoidal fissures at their back part by means of a vertical section of the great wing of the Sphenoid at the junction of its Orbital and Temporal portions, and detach the whole outer wall of the orbit, and expose—

1. The **Dura mater** lining the anterior portion of the Middle fossa of the skull in the posterior part of the dissection.
2. The **Periosteum** of the orbit, continuous through the Sphenoidal fissure with the **Dura mater**.
3. The **Temporal** and **Malar** branches of the **Orbital** nerve, accompanied by branches of the Lachrymal artery emerging from the Periosteum of the orbit.

VIII. Remove the Periosteum from within the area of the dissection, dividing in doing so branches of nerve to it from Meckel's ganglion. Remove loose fat, and separate the Conjunctiva from the exposed upper, lower, and outer portions of the Sclerotic, and expose—

1. The **External Rectus** arising by two heads, the upper being attached between the Sphenoidal fissure and the Optic foramen with the Superior Rectus, the lower arising from a fibrous band occupying the inner part of the Sphenoidal fissure.

Its origin from the spine on the margin of the great wing of the Sphenoid has been torn away in the removal of the outer wall of the orbit. Its tendon is inserted into the Sclerotic by a short membranous expansion at a distance of four lines from the Corneal margin.

2. The outer margin of the **Levator Palpebræ superioris**, from its origin in front of the Optic foramen to the Palpebral ligament, which it perforates, to be attached as a membranous expansion into the anterior surface of the Upper Tarsal cartilage.
3. The outer margin of the **Superior Rectus** from its origin in front of the Optic foramen to its insertion into the Sclerotic about three or four lines from the Corneal margin.
4. The outer margin of the **Inferior Rectus** from its origin in common with the lower head of the External Rectus, till it passes above the Inferior Oblique to be inserted into the Sclerotic about four lines outside the Corneal margin.
5. The **Inferior Oblique** muscle as it passes outwards from beneath the Inferior Rectus, then between the External Rectus and globe of the eye, to be inserted under cover of that muscle into the posterior and outer part of the Sclerotic.
6. The insertion of the **Superior Oblique** into the Sclerotic a little beyond the outer edge of the Superior Rectus, and half-way between the margin of the Cornea and the Optic nerve.

7. The **Lachrymal gland**, placed a little behind the margin of the orbit in its upper and outer part. Its convex upper surface is connected to the Periosteum covering the hollow in the upper and outer portion of the orbit by fibrous processes, while its concave under surface rests upon the Superior and the External Rectus. The deeper process of the **Lachrymal gland**, which lies behind the upper lid, and closely adherent to it, is exposed by the removal of the Conjunctiva which covers its posterior surface. The small ducts of this **Glandula Lachrymalis Inferior** open separately, or join with the several ducts of the main portion of the gland which open in a line at the upper and outer part of the Fornix Conjunctivæ.
8. The **Orbital branch** of the **Superior Maxillary nerve** dividing into the two divisions we have already observed.
9. The **Lachrymal artery and vein** running forwards along the upper margin of the External Rectus to supply the Lachrymal gland. They give off small **Malar branches** which accompany the branches of the Orbital nerve, and **branches to the lids**.
10. The **Lachrymal nerve** emerging from the Sphenoidal fissure and passing forwards above the External Rectus to the Lachrymal gland and upper lid. It gives off a **communicating branch** with the **Orbital nerve** in the anterior part of the orbit.

The Lachrymal gland, ducts, nerve, and vessels are now fully exposed.

IX. Remove the Lachrymal gland with its vessels, ducts, and nerves.

Remove the External Rectus from its insertion into the

Sclerotic, observing at the same time the manner in which it, like the other Extrinsic muscles of the eye, perforates the **Capsule of Tenon**.

On turning back this muscle you expose—

1. The **Sixth nerve** as it enters the orbit between its two heads and is distributed to its inner aspect.
2. The **Optic nerve** emerging from the Optic foramen and passing forwards and outwards to perforate the Sclerotic and Capsule of Tenon about one-eighth of an inch inside the axis of the eye.
3. The **Frontal nerve** entering the orbit through the Sphenoidal fissure, running forwards upon the Levator palpebræ and dividing about the centre of the roof of the orbit into the **Supra-trochlear nerve**, which passes forwards and inwards, and the **Supra-orbital nerve**, which runs on to enter the Supra-orbital notch.
4. The **Nasal nerve** entering the orbit through the Sphenoidal fissure between the two heads of the External Rectus. It passes inwards and forwards, first lying external, then superior to, and then internal to the Optic nerve, and beneath the Superior Rectus.

It gives off a branch to the **Lenticular ganglion**, and immediately inside the Optic nerve two long **Ciliary branches**.

5. The **Lenticular ganglion**, situated external to the Optic nerve at the back part of the orbit, and in contact with the Ophthalmic artery.

The **Long Sensory root**, entering its posterior border from the nasal nerve, also the **short root** from that branch of the third nerve which supplies the Inferior Oblique, and the **Middle or Sym-**

pathetic root, which usually joins with the long root before reaching the ganglion.

Six or eight short **Ciliary nerves** arise from the front of the ganglion. They branch as they run forwards, and are distributed in two groups, one set lying above, and the other, the more numerous, below the Optic nerve. They enter the Sclerotic at its back part.

6. The two divisions of the third nerve entering the orbit between the two heads of the External Rectus, separated by the nasal nerve. The upper division supplies branches to the under surface of the **Superior Rectus** and **Levator Palpebræ**, the lower division forming three branches; one passes forwards and inwards, and will be seen subsequently to enter the **Internal Rectus**, another supplies the upper surface of the **Inferior Rectus**, and the third runs forward along the outer border of the Inferior Rectus and enters the posterior margin of the **Inferior Oblique**. This last branch also sends off two filaments to the **Inferior Rectus** and the short root of the Ganglion.
7. The **Ophthalmic artery** entering the orbit by the Optic foramen below and to the outer side of the Optic nerve. It passes inwards and forwards over the Optic nerve. It gives off here the **Lachrymal artery**—whose distribution we have already observed—the **Arteria Centralis retinæ**, which perforates the Optic nerve a quarter of an inch behind its anterior extremity; the **Supra-orbital**, which accompanies the Supra-orbital nerve; the four or five **Posterior Ciliary arteries** which, branching, run forwards around the Optic nerve and perforate the Sclerotic

at the back of the eyeball, and the two long **Ciliary arteries** which perforate the back of the Sclerotic on either side of the Optic nerve.

8. The **Superior Ophthalmic vein** accompanying the Ophthalmic artery, and entering the Sphenoidal fissure, and the **Inferior Ophthalmic vein**, formed by the junction of the **Posterior Ciliary** with some **muscular veins**, passing backwards near the floor of the orbit to enter the Sphenoidal fissure. It sends **communicating branches to the Pterygoid plexus** through the Spheno-maxillary fissure.

The Lenticular ganglion with its roots and branches of distribution are fully exposed.

X. To expose the Optic nerve and eyeball it is necessary to remove the Lenticular ganglion and its branches, and branches of the Posterior Ciliary vessels.

XI. To expose the remainder of the distribution of the Third nerve, namely, the branch to the Internal Rectus, cut through the Levator Palpebræ and the Superior and Inferior Recti immediately behind their insertions.

Divide the Optic nerve far back in the orbit, pulling it forwards with the eyeball, and expose—

1. The whole of the **Internal Rectus** from its origin to its insertion.
2. The branch of the **Third nerve** that enters its ocular aspect.
3. The **Superior Oblique** in the whole of its extent.
4. The **Inferior Oblique**.
5. The **Nasal nerve** passing forwards beneath the Superior Oblique muscle, and leaving the orbit by the Anterior Ethmoidal foramen. It gives off two long **Ciliary nerves**, which frequently join with

Ciliary branches of the Lenticular ganglion, and perforate the back of the Sclerotic, and the **Supratrochlear nerve**, which runs forwards below the Superior Oblique muscle, and parallel to the **Supratrochlear nerve**, which is now fully exposed within the orbit.

6. The **Ophthalmic artery** running forwards between the Superior Oblique and Internal Rectus, and dividing into the **Nasal** and **Frontal** branches. It gives off a **Superior** and an **Inferior Muscular** branch, **Anterior** and **Posterior Ethmoidal** arteries, which enter the foramina of the same name, and two **Palpebral** branches.
7. Branches of the **Superior Orbital vein** accompanying the Ophthalmic artery and its branches.

A DISSECTION TO EXPOSE THE OUTER SURFACE OF THE TONSIL.¹

POSITION.—Place the body on its back, and rotate the face to the opposite side.

Define the anterior margin of the Masseter, the posterior margin of the Ramus, and the angle and body of the jaw.

SKIN INCISIONS.

1. Make an incision from the centre of the posterior margin of the Ramus of the jaw to the centre of the anterior margin of the Masseter.

¹ Should the student have performed the preceding dissections on the one side, it will be necessary to do this one on the other side of the body, in which the Pterygoid region is intact.

2. Make an incision from the centre of the posterior margin of the Ramus to the angle of the jaw.
3. Make an incision from the centre of the anterior margin of the Masseter downwards along the anterior margin of that muscle to its lower limit.
4. Join the lower extremities of No. 2 and No. 3 by a transverse incision.

I. Remove the skin and expose—

1. **Superficial fascia**, and
2. The **Platysma** blending with its under surface.
3. **Branches of the Great Auricular** and
4. **Facial nerves**, ramifying in the **Superficial fascia** and **Platysma**.

II. Remove these structures and expose—

1. **Masseteric fascia** attached below to the lower margin and angle of the jaw, and behind being continuous with **Parotidean fascia**.
2. The **Facial artery** and **vein** crossing the body of the jaw immediately in front of the anterior margin of the **Masseter**.
3. Portion of the **Buccal fascia** covering the **Buccinator muscle**.

III. Remove the portion of **Masseteric fascia** seen in the dissection, and expose—

1. The lower half of the **Masseter muscle**.
2. The lower portion of the **Socia Parotidis**.
3. **Supra-maxillary**, and
4. **Buccal branches of the Facial nerve**.

IV. Remove this portion of the **Socia Parotidis** with the branches of the **Supra-maxillary** and **Buccal divisions** of the **Facial nerve**, and cut away the **Masseter muscle** from the **Ramus**, and transversely along the upper limit of the

dissection, dividing in its substance branches of the Masseteric nerve and artery, and expose—

1. The **lower half** of the outer surface of the **Ramus**.
2. A further portion of the **Buccinator** covered by **Buccal fascia**.
3. **Branches** of the **Buccal** of the **Fifth** nerve emerging from beneath the **Ramus** and running forwards and downwards on the **Buccinator** muscle, accompanied by a branch of the **Internal Maxillary artery**.
4. The **Anterior Internal Maxillary vein** as it passes upwards and backwards beneath the **Ramus**.

V. With a Hey's saw cut transversely through the **Ramus** of the jaw along the direction of the upper transverse skin incision, dividing in the substance of the bone the **Inferior Dental** nerve and artery, and probably the **Mylo-hyoid** branches of this nerve and artery as they groove the inner surface of the **Ramus**.

With the same instrument saw through the body of the jaw along the anterior margin of the **Masseter**, again dividing the **Inferior Dental** nerve and vessels in the substance of the bone.

Remove this quadrilateral plate of jaw-bone, dividing the insertion of the **Internal Pterygoid** muscle into its inner aspect, the attachment of the **Stylo-maxillary** ligament to its posterior margin, and of the deep **Cervical fascia** into its lower border, and expose—

1. The outer surface of the **Internal Pterygoid** muscle,
2. The **Mylo-hyoid** branch of the **Inferior Dental** nerve and artery crossing it obliquely from above, downwards and forwards, and
3. The **Lingual Gustatory** nerve lying on it in the anterior superior angle of the dissection.

VI. Remove the Internal Pterygoid muscle within the limits of the dissection, and expose—

1. The deep **Pterygoid** process of the **Parotid** gland above, and
2. The **Submaxillary** gland below.
3. The loop of the **Facial** artery in the **Submaxillary** gland, and emerging from its substance and running upwards
4. The **Tonsillar**, and
5. **Ascending Palatine** branches of the **Facial** artery, the former lying upon the **Stylo-glossus**, and the latter running beneath it and upon the **Superior Constrictor**.

VII. Remove the portions of **Submaxillary** and **Parotid** glands seen within the limits of the dissection, and expose—

1. The **Superior Constrictor**, whose fibres pass backwards and slightly upwards.
2. The **Stylo-glossus**, crossing this muscle superficially,
3. The **Stylo-pharyngeus**, covered by deep fascia and projecting into the lower and back part of the dissection.
4. **Branches** of the **Glosso-pharyngeal** nerve, perforating the **Superior Constrictor**.

VIII. Define by means of the finger placed in the pharynx the exact position of the tonsil, and remove those portions of the **Superior Constrictor** and **Stylo-glossus** muscles, and branches of the **Tonsillar** and **Ascending Palatine** arteries and **Glosso-pharyngeal** nerve which lie superficial to it, and expose, in the **Submucous** tissue, the outer surface of—

1. The **Tonsil**, and
2. **Fibres** of the **Palato-glossus** and **Palato-pharyngeus**.

muscles as they run obliquely downwards and forwards, and downwards and backwards in front of and behind the tonsil.

The whole of the outer surface of the tonsil is now fully exposed.

DISSECTIONS TO EXPOSE THE EXTERNAL CAROTID AND THE INTERNAL CAROTID ARTERIES OUTSIDE THE SKULL, AND THE INTERNAL JUGULAR VEIN FROM ITS ORIGIN TO THE LEVEL OF THE UPPER BORDER OF THE THYROID CARTILAGE.

POSITION.—Place the body on the back, turn the face to the opposite side, and hook upwards and backwards the lobule of the ear.

I. SKIN INCISIONS.

1. Make an incision along the posterior margin of the Ramus from the Temporo-maxillary articulation to the angle of the jaw, and from the angle continue the incision to the anterior border of the Sterno-mastoid on a level with the upper border of the Thyroid cartilage.
2. From the upper extremity of No. 1 make an incision around the anterior and lower portion of the cartilage of the Meatus to the anterior margin of the Mastoid process, and continue this incision downwards to the tip of this process.
3. Make a vertical incision from the tip of the Mas-

toid process to the level of the upper border of the Thyroid cartilage.

4. Connect the lower extremities of No. 1 and No. 3.

II. Remove the skin and expose—

1. **Superficial fascia**, blending above with
2. The **Aponeurosis of the Occipito-frontalis**.
3. The **Platysma** lying beneath the Superficial fascia in the lower part of the dissection.
4. **Cutaneous branches of vessels and nerves** which will be enumerated in subsequent steps of the dissection.

III. Remove the Superficial fascia and the structures in it and expose—

1. The **deep cervical fascia**, as it covers the **Sterno-mastoid muscle** and the angular interval in front of it, and its continuation upwards as **Parotidean fascia** over the **Parotid gland**. This process of fascia is attached to the **Zygomatic arch** above, and in front it is continuous with the **Masseteric fascia**.

IV. Remove the deep fascia within the limits of the dissection and expose—

1. A triangular area of **Sterno-mastoid muscle**.
2. The **Parotid gland** in the interval between the **Ramus of the jaw** in front, and the **External Auditory meatus**, **Mastoid process**, and upper portion of **Sterno-mastoid** behind.
3. In the angular interval between the **Parotid**, **Sterno-mastoid**, and the anterior skin incision, portions of the **Stylo-hyoid**, **Digastric**, **Hyoglossus**, **Middle and Inferior Constrictors**, and the **Thyro-hyoid muscles**.
4. The **External Jugular vein** emerging from the substance of the **Parotid gland**, and running downwards over the **Sterno-mastoid muscle**;

5. A branch of the **Superficial Cervical** nerve accompanying the **External Jugular** vein ;
6. The **Great Auricular** nerve lying on the surface of the **Sterno-mastoid**, and breaking up into **Facial**, **Parotidean**, and **Auricular** branches.

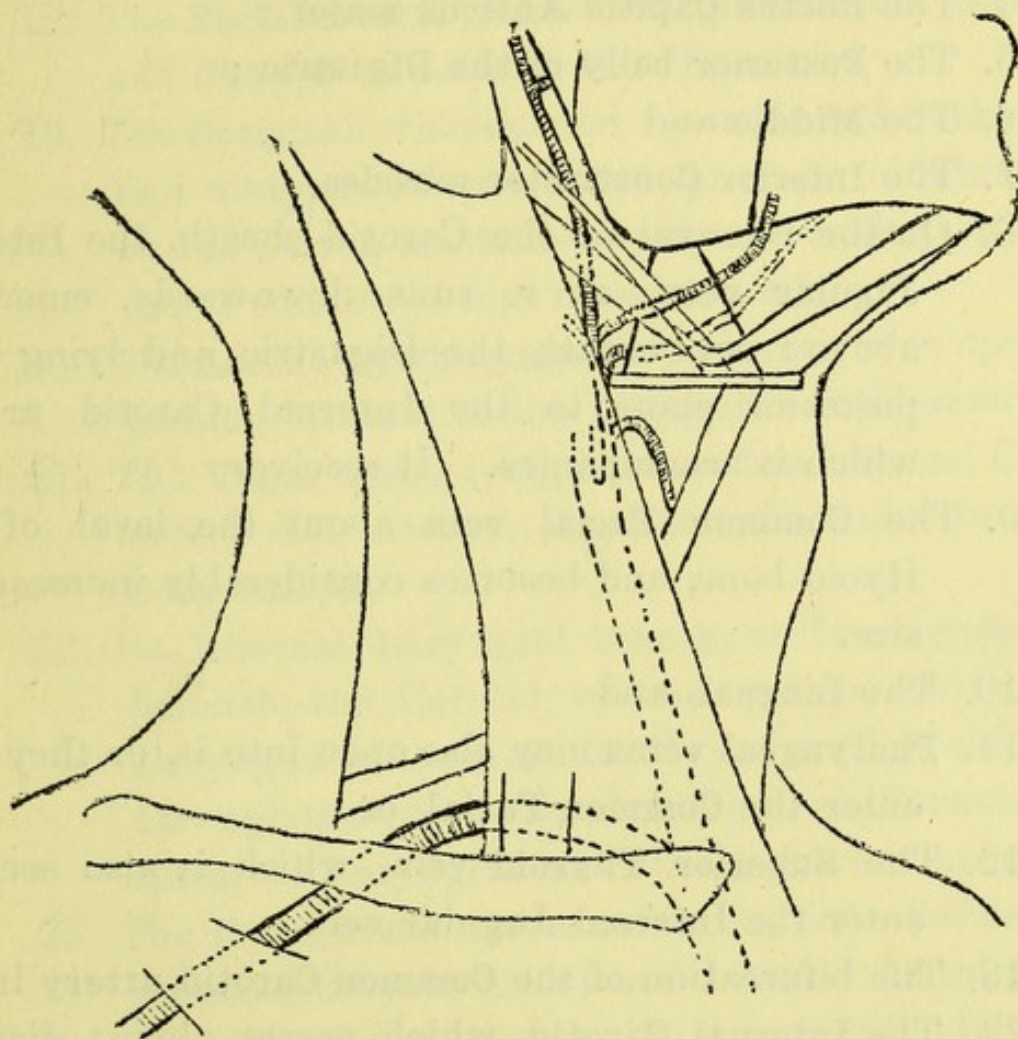


Fig. 6.

REPRESENTS SOMEWHAT ROUGHLY THE RELATION OF SEVERAL OF THE STRUCTURES EXPOSED IN THIS DISSECTION.

7. The **Anterior** division of the **Temporo-maxillary** vein emerging from the gland and passing forwards and downwards into the **Submaxillary** region.
 8. The **Parotid Lymphatic** glands lying on or within the substance of the **Parotid** gland.
- V. Remove the portion of **Sterno-mastoid** exposed, to-

gether with the subjacent layer of deep fascia, and expose—

1. The deep process of the **Parotid gland** ;
2. The **Scalenus anticus** ;
3. The **Scalenus medius** ;
4. The **Rectus Capitis Anticus major** ;
5. The **Posterior belly of the Digastric** ;
6. The **Middle** and
7. The **Inferior Constrictor muscles**.
8. On the removal of the Carotid sheath, the **Internal Jugular vein**, as it runs downwards, emerging above from beneath the Digastric and lying on a posterior plane to the Internal Carotid artery, which it accompanies. It receives
9. The **Common Facial vein** about the level of the Hyoid bone, and becomes considerably increased in size.
10. The **Lingual**, and
11. **Pharyngeal veins** may also open into it, or they may enter the **Common Facial**, or
12. The **Superior Thyroid vein**, which is also seen to enter the Internal Jugular vein.
13. The bifurcation of the **Common Carotid artery** into
14. The **Internal Carotid**, which passes almost directly upwards and disappears above, beneath the Digastric, and into
15. The **External Carotid**, which passes forwards and upwards, lying on a plane anterior to that of the Internal Carotid. It then runs upwards and backwards, becoming superficial to the Internal Carotid artery, and disappearing beneath the Digastric. It gives off in this dissection
16. The **Superior Thyroid**, which runs forwards and then

downwards, giving off the **Hyoid, Laryngeal, and Sterno-mastoid branches.**

17. The **Lingual**, which passes upwards and forwards upon the Middle constrictor, and disappears beneath the Hyo-glossus. Its **Hyoid branch** is now exposed.
18. The **Facial artery**, which runs upwards and forwards, and disappears beneath the Digastric.
19. The **Occipital**, which passes upwards and backwards, and disappears beneath the splenius. Its **branches** to the **Sterno-mastoid** are exposed as they enter the under surface of that muscle ; and
20. The **Ascending Pharyngeal artery**, as it runs upwards, passing internal to the Internal Carotid artery.
21. The **Vagus nerve**, lying between the Internal Carotid artery and Internal Jugular vein, and internal to both vessels.
22. Its **Internal Laryngeal branch**, as it emerges from beneath the Carotid vessels and passes with the Laryngeal branch of the Superior Thyroid artery through the Thyro-hyoid membrane. Portion of the External Laryngeal nerve may also be exposed.
23. The **Hypoglossal nerve**, emerging from between the Internal Carotid artery and Internal Jugular vein, looping around the Occipital artery, and lying in succession upon the Internal Carotid, Occipital, External Carotid and Lingual arteries. It gives off the **Descendens noni**, which descends on the sheath of the vessels, and the **Thyro-hyoid branch**, which supplies the Thyro-hyoid muscle.
24. The **Spinal Accessory nerve**, as it passes outwards from behind or in front of the Internal Jugular vein, and runs downwards and backwards below the Lateral mass of the Atlas, where it lies

upon the first Digitation of the Levator Anguli scapulæ.

25. The **Anterior** branches of the **Second, Third, and Fourth Cervical** nerves, lying upon the Levator Anguli scapulæ and Scalenus medius.

26. The **Communicans noni**, from the second and third Cervical nerves, descending upon the sheath of the vessels.

27. A deep chain of **Lymphatic vessels** and glands lying around the large vessels of the neck.

VI. On cutting into the Parotid gland you first expose—

1. The **Facial** nerve, emerging from the Stylo-mastoid foramen, and giving off at that point

A branch to the **Posterior** belly of the **Digastric**, which branch will be seen at a later stage of the dissection to have a communication with the **Glosso-Pharyngeal** nerve ;

A branch to the **Stylo-hyoid** muscle, and

The **Posterior Auricular** nerve, which passes outwards and backwards over the Mastoid process, and communicates with Arnold's nerve, which emerges from the Auricular fissure.

The **Facial** nerve then breaks up into two divisions, the **Temporo-facial** and the **Cervico-facial**.

The **Temporo-facial** receives two large branches from the **Auriculo-temporal** nerve, which is now seen to pass outwards behind the articulation of the jaw, and then upwards over the Zygoma, and to give off branches to the **External Ear**, branches to the **Meatus**, which pass between the bony Meatus and the Cartilage, and branches to the **Parotid** gland and **Temporo-maxillary** articulation.

The **Temporo-facial** division breaks up into three sets of

branches, which emerge from the dissection, namely :—

The **Temporal**, which pass upwards over the Zygoma,

The **Malar**, which pass forwards and upwards, and

The **Infraorbital**, which pass directly forwards.

The **Cervico-facial** division is directed obliquely downwards through the gland, and receives communicating branches from the **Superficial Cervical** and **Great Auricular** nerves, branches of which have been already observed to perforate the gland. This division then breaks up into

Buccal branches.

Supra-maxillary branches, which pass forwards over the Ramus of the jaw, and

Infra-maxillary branches, which pass forwards below the jaw.

VII. Remove the **Facial** nerve and its branches, together with the **Auriculo-temporal** nerve and its branches, and expose—

1. The **Temporal vein**, passing downwards from over the Zygoma, receiving
2. The **Transverse Facial vein**, which passes backwards from the outer surface of the **Masseter**, and
3. The **Internal Maxillary vein**, which passes back from beneath the neck of the jaw, forming
4. A common trunk, called the **Temporo-maxillary vein**. This trunk divides into two branches,
5. One which runs forwards and downwards out of the gland to join the **Facial vein**, and
6. Another, the **External Jugular vein**, which runs backwards and downwards, and receives the **Posterior Auricular vein**.

VIII. Remove the several branches of vein described to—

gether with a further portion of the Parotid gland, and expose—

1. The **Styloid process**.
2. The **Stylo-hyoid muscle**, arising from the centre of its outer surface by a narrow tendon.
3. The **Stylo-maxillary ligament**, attached to the extremity of the Styloid process and to the angle of the jaw.
4. The **Stylo-glossus muscle**, arising from the Stylo-maxillary ligament and the tip of the Styloid process.
5. The **Stylo-pharyngeus muscle**, arising from the inner surface of the base of the Styloid process, and
6. The upper portion of the **Posterior belly** of the **Digastric muscle**.
7. The **External Carotid artery**, as it emerges from under cover of the Digastric and Stylo-hyoid muscles, giving off
8. The **Posterior Auricular artery**, which runs upwards and backwards upon the Styloid process, giving off a **Stylo-mastoid branch** to enter the Stylo-mastoid foramen, and then passing outwards and backwards over the Mastoid process together with the Posterior Auricular vein and nerve.

The **External Carotid** then divides opposite the neck of the jaw into

9. The **Internal Maxillary artery**, which passes forwards beneath the neck of the jaw, and into
10. The **Temporal artery**, which runs upwards over the Zygoma with the Temporal vein and Auriculo-temporal nerve, giving off within the area of the dissection the **Transverse Facial artery**, and branches to the Parotid gland, Temporo-maxillary articulation, and **External Ear**.

IX. Remove the portions of Stylo-hyoid and Digastric which lies superficial to the External Carotid artery, when that vessel is exposed in the whole of its extent.

By the removal of the Digastric and Stylo-hyoid muscles a further portion of the Stylo-pharyngeus muscle is exposed as it passes downwards and forwards and disappears beneath the upper margin of the Middle constrictor.

The Glosso-pharyngeal nerve is also seen to loop around its outer surface, and to disappear from the dissection anteriorly.

X. Cut through the Styloid process at its base, turn the process forwards with the muscles attached, remove a layer of deep fascia which here forms the sheath of the deep vessels, and expose—

1. The **Internal Jugular vein**, running directly upwards, lying posteriorly upon the Rectus lateralis and above entering the Jugular foramen.
2. The **Internal Carotid artery**, taking a similar straight course to the Internal Jugular vein, and lying on a plane anterior to it.
3. The **Glosso-pharyngeal nerve**, as it emerges from between the Internal Carotid artery and Internal Jugular vein, and gives off **Carotid branches**, which descend upon the vessels.
4. The **Pharyngeal branch of the Vagus**, as it emerges from between the two vessels, and passes forwards over the Internal Carotid artery.
5. The **Superior Laryngeal nerve**, as it emerges from beneath the Internal Carotid artery.
6. The **Spinal Accessory nerve**, as it passes upwards between the vein and artery, or as it runs upwards behind the vein.

7. The **Vagus nerve** and its **Lower ganglion**, lying between the artery and vein, together with
8. The **Upper ganglion** of the **Sympathetic**. To see many of these structures it is necessary to hook aside the **Internal Jugular vein**.

The **Internal Carotid artery** outside the skull, and the **Internal Jugular vein** above the level of the **Thyroid cartilage** are now completely exposed.

TO EXPOSE THE GLOSSO-PHARYNGEAL AND HYPOGLOSSAL NERVES IN THE EXTRA-CRANIAL PORTION OF THEIR COURSE.

POSITION.—Place the body on its back, turn the face to the opposite side, and hook the jaw well upwards and the ear backwards.

I. SKIN INCISIONS.

1. Make an incision from the middle line along the lower border of the body of the jaw to its angle, and continue it upwards along the **Posterior margin** of the **Ramus** up to the lower margin of the **Zygomatic arch**. From this point run backwards along the lower border of the **Zygoma**, and then downwards in front of the **External Auditory meatus** to the **Anterior border** and tip of the **Mastoid process** (1-1, Fig. 7).
2. Make a horizontal incision from the centre of the body of the **Hyoid bone** outwards to a point vertically below the tip of the **Mastoid process** (2-2).

3. Make a median incision from the Symphysis of the jaw to the Hyoid bone.

II. Reflect the skin outwards and expose—

1. **Superficial fascia**, containing
2. A variable amount of **fat** ;
3. **Cutaneous branches of the Superficial Cervical nerve** joining with terminal branches of
4. The **Infra-maxillary branches of the Facial nerve** ;

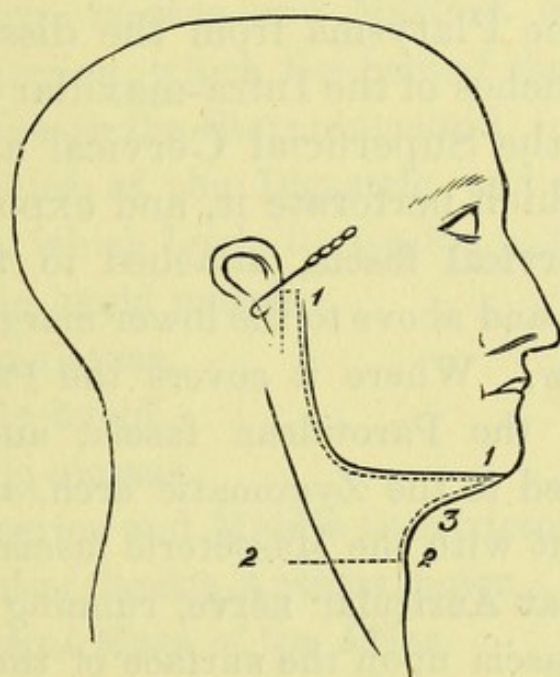


Fig. 7.

5. **Cutaneous branches of the Great Auricular nerve**, and of
 6. **Arnold's nerve** ; and
 7. **Branches of the Auriculo-temporal** to the front of the ear.
 8. **Branches of the Submental**,
 9. **Temporal**, and
 10. **Posterior Auricular vessels**.
- III. Remove the Superficial fascia, and expose—
1. The **Platysma myoides**, which extends over all but

the Parotid portion of the dissection. Its fibres mingle with those of the opposite side, which cross in the middle line, those of the right side being usually superficial. It is inserted into the lower margin of the body of the lower jaw from the middle line to the anterior margin of the insertion of the Masseter. Behind this point the fibres of the Platysma pass over the angle and Ramus of the jaw.

IV. Remove the Platysma from the dissection, dividing in so doing branches of the Infra-maxillary division of the Facial, and of the Superficial Cervical and Great Auricular nerves, which perforate it, and expose—

1. **Deep Cervical fascia**, attached to the Hyoid bone below, and above to the lower margin of the body of the jaw. Where it covers the Parotid gland it is called the Parotidean fascia, and this fascia is attached to the Zygomatic arch, and is continuous in front with the Masseteric fascia.
2. The **Great Auricular nerve**, running upwards on the deep fascia upon the surface of the Sterno-mastoid towards the lobule of the ear. It divides into **Auricular branches**, which run upwards and backwards to the ear, **Mastoid branches**, which run over the Mastoid process, and **Facial branches**, which ramify over the Parotid gland.
3. **Branches of the Superficial Cervical nerve**, running upwards and forwards, joining with the loops of
4. The **Infra-maxillary branches of the Facial**, which emerge from the deep fascia.
5. The **External Jugular vein** accompanied by **Lymphatics** emerging from the parotid sheath of fascia and passing downwards on the Sterno-mastoid.

V. Remove the deep Fascia within the limits of the dissection, dividing the attachment of its process which passes beneath the Sterno-mastoid.

Remove the triangular area of Sterno-mastoid which is exposed with the subjacent process of the deep Cervical fascia, and expose—

1. The **Parotid gland** lying in the **Quadrilateral space** bounded anteriorly by the **Ramus of the jaw**, above by the **Zygomatic arch**, behind by the **External Auditory meatus** and **Mastoid process**; also its deep portion, which lies behind the **Styloid process** and beneath the **Sterno-mastoid**.
2. Both bellies of the **Digastric** and the **Aponeurotic sheath**, which binds its tendon to the **Hyoid bone**.
3. The **Mylo-hyoid muscle**.
4. The **Hyo-glossus**.
5. The **Stylo-hyoid**.
6. The **Stylo-glossus**.
7. The **Superior and Middle Constrictor muscles**.
8. The **Rectus Capitis Anticus major**.
9. The **Lateral Mass of the Atlas**.
10. The **Submaxillary gland** lying upon the **Digastric**, **Stylo-hyoid**, **Mylo-hyoid**, **Hyo-glossus**, **Stylo-glossus**, and **Superior Constrictor muscles**, and sending its deep process beneath the **Mylo-hyoid muscle**.
11. The **Submaxillary Lymphatic glands** lying below the body of the **Lower jaw**, and receiving **Lymphatics** from the **face**, **mouth**, **Submaxillary**, **Sublingual**, and **Parotid glands**.
12. The **Supra-hyoid glands** in the middle line above the **hyoid bone**.
13. The **Parotid Lymphatic glands** lying on or within the substance of the **Parotid gland**.

14. The **Superficial Cervical Lymphatic** glands lying along the **External Jugular vein**, and receiving **Lymphatics** from the **External ear**, and from the **Mastoid** and **Suboccipital glands**.

VI. Cut into the Parotid gland and expose—

1. The **Facial nerve** as it emerges from the **Stylo-mastoid foramen**, when it gives off

The **Posterior Auricular nerve**, which runs outwards and backwards over the **Mastoid process**, and unites with filaments of **Arnold's nerve**, which is seen to emerge from the **auricular fissure**.

The **Stylo-hyoid** and

The **Digastric branches**, which run downwards and forwards to supply these muscles.

The **Facial nerve** then divides into an upper and a lower division.

The **Upper** or the **Temporo-facial** portion divides into—

Temporal branches, which pass upwards out of the dissection,

Malar branches which pass forwards and upwards,

Infra-orbital branches which pass forwards.

The **Lower division**, or the **Cervico-facial** breaks up into—

Buccal and

Supra-maxillary branches, which pass forwards, and

Infra-maxillary branches, which emerge from the lower part of the gland. The terminal distribution of these branches has been already observed.

The **Upper division**, or the **Cervico-facial**, receives two branches from behind the neck of the jaw from

2. The **Auriculo-temporal nerve**. This nerve passes outwards behind the articulation of the jaw and then upwards over the **Zygoma** in front of the ear.

In this dissection it gives off branches to the **Parotid**, to the **External Auditory Meatus**, which is now fully exposed, to the **External ear**, and to the **Temporo-maxillary articulation**.

The **Lower division**, or the **Cervico-facial**, receives branches from

The **Great Auricular nerve**, and occasionally an ascending branch of the **Superficial Cervical nerve**, which accompanies the **External Jugular vein**.

VII. Remove the **Facial** and **Auriculo-temporal** nerves and their branches from the dissection and expose—

1. The **Temporal vein** passing into the dissection from over the **Zygoma**, and receiving branches from the **External ear** and **Parotid gland**, and the **Transverse Facial vein**.

It is joined by the **Internal Maxillary vein**, which emerges from beneath the neck of the jaw, and forms with it a common trunk, the **Temporo-maxillary vein**.

This vein divides into two branches, namely, one that runs downwards and backwards, receiving the **Posterior Auricular vein**, and forming the **External Jugular vein**, and the other, which passes forwards and downwards over or under the **Stylo-hyoid** and **Digastric** muscles to join the **Facial vein**.

2. The **Facial vein** inclines downwards and backwards from the point at which it crosses the body of the jaw, and, below the **Digastric**, forms with the **Anterior division** of the **Internal Maxillary vein** the **Common Facial vein**. This vein runs downwards and backwards to open into the **Internal Jugular vein**.

VIII. Remove these veins within the limits of the

dissection together with a further portion of the Parotid gland, and expose—

1. Further portions of the **Posterior** belly of the **Digastric**,
2. And **Stylo-hyoid** muscles ;
3. The **Stylo-maxillary** ligament ;
4. The **Stylo-glossus**, arising from the tip of the **Styloid** process and the deep surface of the **Stylo-maxillary** ligament ;
5. The **Stylo-pharyngeus**, as it arises from the inner surface of the base of the **Styloid** process ;
6. The **External Carotid** artery, as it ascends from under cover of the **Stylo-hyoid** and **Digastric** muscles, giving off
7. The **Posterior Auricular** artery, which runs upwards and backwards upon the **Styloid** process, giving a branch to the **Stylo-mastoid** foramen, and then passing outwards over the **Mastoid** process.

The **External Carotid** divides opposite the neck of the jaw into

8. The **Internal Maxillary** artery, which passes forwards beneath the neck, and
9. The **Temporal** artery, which runs upwards over the **Zygoma**, giving off in this direction the **Transverse Facial** artery, **Auricular**, and **Parotidean** branches.

Below the **Digastric** and **Stylo-hyoid** muscles there are exposed—

10. The **Lingual** artery lying upon the **Middle Constrictor**, giving off the **Hyoid** branch, and disappearing beneath the **Hyoglossus** ;
11. The **External Carotid** running upwards in front of the **Internal Carotid**, and then upwards and backwards, becoming superficial to the **Internal Carotid** and

disappearing with it beneath the Digastric and Stylo-hyoid muscles. It gives off

12. The **Facial**, which passes upwards and forwards, running beneath the posterior belly of the Digastric and the Stylo-hyoid muscles, and then through the substance of the Submaxillary gland. Emerging from this gland it crosses the body of the jaw in front of the insertion of the Masseter.

In this dissection it gives off two ascending branches, the **Ascending Palatine** and **Tonsillar** branches, branches to the **Submaxillary** gland, and a **Submental** branch, which runs forwards over the Submaxillary triangle, and turns upwards over the Symphysis.

13. The **Ascending Pharyngeal** may or may not be exposed at its origin from the External Carotid. It ascends between the External and Internal Carotids and then beneath the Internal.
14. The **Occipital artery**, as it arises from the External Carotid, passes upwards and backwards to the interval between the Mastoid process and the lateral mass of the Atlas. It gives off **Muscular** branches to the **Sterno-mastoid**.
15. The **Internal Carotid artery**, as it runs behind and then beneath the External Carotid artery.
16. The **Internal Jugular vein**, as it lies behind the Internal Carotid artery, and disappears with it beneath the Digastric and Stylo-hyoid. The Internal Jugular vein receives the **Pharyngeal**, **Lingual**, and **Superior Thyroid** veins.
17. The **Mylo-hyoid nerve and artery** emerging from beneath the Ramus and running forwards upon the Mylo-hyoid and Digastric muscles.

18. The **Spinal Accessory nerve**, passing downwards and backwards below the lateral mass of the Atlas and entering the Sterno-mastoid.
19. The **Vagus nerve**, lying between the Internal Carotid artery and Internal Jugular vein and internal to both.
20. The **Hypo-glossal nerve**, emerging from between the Internal Carotid artery and Internal Jugular vein and passing forwards over the Occipital, External Carotid, Internal Carotid, and Lingual arteries, over the Hyo-glossus muscle, and beneath the Digastric, Stylo-hyoid and Mylo-hyoid muscles. It gives off the **Descendens Noni**, which descends on the sheath of the vessels, and the nerve to the **Thyro-hyoid**, which runs downwards and forwards to that muscle.

IX. Divide the Posterior belly of the Digastric and the Stylo-hyoid, exposing the portion of the External Carotid which lies beneath them.

Remove the whole of the External Carotid artery and its branches within the limits of the dissection, dividing the deep process of the Submaxillary gland and removing its superficial part. In doing this the Facial artery, with its ascending Palatine and tonsillar branches, are divided.

Cut through the Anterior belly of the Digastric at its attachment to the lower jaw, and turn down the Digastric and Stylo-hyoid muscles.

Divide the Mylo-hyoid muscle at its origin from the oblique line on the lower jaw, cutting at the same time the Mylo-hyoid nerve and artery.

Reflect the Mylo-hyoid muscle to the middle line, hook the Hyoid bone forcibly down, and expose—

1. The rest of the **Hyo-glossus**.

2. The **Stylo-glossus** lying upon its insertion ;
3. The **Inferior Lingualis** emerging from beneath it and running forwards to the tip of the tongue ;
4. The **Genio-hyoid** ;
5. The **Genio-hyo-glossus**.
6. The deep part of the **Submaxillary gland**, lying upon the **Hyo-glossus**. Its duct passing forwards and upwards beneath the **Sublingual gland**, receiving from it the duct of **Bartholin**, and opening in the apex of a **Papilla** near the **Frænum**.
7. The **Sublingual gland**, resting on the **Stylo-glossus**, **Hyo-glossus**, **Inferior Lingualis**, and **Genio-hyo-glossus**. The ducts of **Rivini** opening separately and the duct of **Bartholin** joining the duct of the **Submaxillary**.
8. The **Lingual Gustatory nerve**, running along the side of the tongue, looping round the duct of the **Submaxillary gland**, and supplying branches to the side and tip of the tongue.

It sends branches to the **Submaxillary Ganglion**, which is situated above the deep process of the **Submaxillary gland**. The ganglion also receives a **Sympathetic root** from the **Plexus** upon the **Facial artery**, and sends branches to the **Mucous membrane** of the mouth, to the **Submaxillary gland**, and to **Wharton's duct**.
9. The **Hypo-glossal nerve**, distributing branches to the several muscles of the tongue, many of which perforate the **Genio-hyo-glossus**. It has communicating branches with the **Lingual Gustatory** near the **Anterior margin** of the **Hyo-glossus**.
10. The **Ranine artery**, lying below the **Inferior Lingualis**.

11. The **Sublingual artery**, arising at the Anterior margin of the **Hyo-glossus**, and supplying the **Sublingual gland**.
12. The **Ranine vein**, commencing below the tip of the tongue beneath the **Mucous membrane**, running across the outer aspect of the **Hyo-glossus muscle** in company with the **Hypo-glossal nerve** and uniting with the **Venae comites** of the **Lingual artery**.

X. To expose the distribution of the **Glosso-pharyngeal nerve** in this region, define it as it passes downwards and forwards around the posterior and outer surfaces of the **Stylo-pharyngeus muscle**. It then divides into two branches, which pass beneath the **Hyo-glossus**. It gives off **Pharyngeal branches** to the **Pharyngeal Plexus** on the middle constrictor; **Muscular branches** to the **Stylo-pharyngeus muscle**; branches which perforate the **Superior Constrictor** which supply the **Mucous membrane of the Pharynx**, and others to the **Tonsil** (tonsillar branches). The two branches which pass beneath the **Hyo-glossus** may now be followed by tracing each separately and dividing the fibres of the muscles covering them, namely, the **Hyo-glossus**, **Stylo-glossus**, **Palato-glossus**, **Superior Constrictor**, **Superior Lingualis**, and the **Transverse and Vertical Fibres** of the tongue. One of these branches supplies the **Circumvallate Papillæ** and the other the **Mucous membrane** of the posterior third of the tongue, reaching posteriorly to the **Anterior surface** of the **Epiglottis**.

XI. To complete the dissection of the **Glosso-pharyngeal** and **Hypo-glossal nerves**, divide the root of the **Styloid process**, displace it forwards and downwards with the muscles attached to it, and on the removal of some deep fascia, expose—

1. The **Internal Carotid** artery, and
2. The **Internal Jugular vein**, as high up as their several Foramina in the base of the skull.

These two vessels lie in the same Antero-posterior plane, the Internal Jugular vein slightly overlapping the artery.

3. The **Spinal Accessory** nerve, as it emerges from the Jugular Foramen and descends between the Carotid or Jugular vein. It then passes outwards from behind the Internal Jugular vein, or between it and the Artery.
4. The **Vagus** nerve and its **Lower Ganglion**, lying between the Internal Carotid artery and Internal Jugular vein, and internal to both. It can also be traced to the Jugular Foramen.
5. The **Pharyngeal** branch of the **Vagus** arising from the upper part of the Ganglion of the trunk, and passing outwards between the Internal Carotid artery and Internal Jugular vein, and then forwards over the Carotid artery to the Pharyngeal Plexus.
6. The **Superior Laryngeal** nerve, arising from the centre of the Ganglion of the trunk, and passing obliquely downwards and forwards beneath the Internal Carotid artery.
7. The **Upper Cardiac** branch of the **Vagus** arising from the trunk of that nerve.
8. The **Glosso-pharyngeal** nerve, emerging from between the Internal Carotid artery and vein. As it does so it gives off **Carotid** branches to the sheath of the vessels. It may be traced upwards with
9. The **Hypo-glossal** nerve. These nerves take the same course, as they run between the Internal Carotid artery and Internal Jugular vein and internal to

both, the Glosso-pharyngeal and Vagus going to the Jugular Foramen, and the ninth nerve to the Anterior Condylloid Foramen. This may be done more readily if the Internal Jugular vein be removed.

10. The **Upper Ganglion** of the **Sympathetic**, with its several branches of communication and distribution, may also be seen lying internal to the two vessels and between them, and

11. The several **communications** of the **Cranial Nerves**, with the **loop** formed by the **Anterior branches** of the **First and Second Cervical nerves**.

The Hypo-glossal and Glosso-pharyngeal nerves have now been fully exposed in their course and distribution outside the skull.

A DISSECTION TO EXPOSE THE CHORDA TYMPANI FROM ITS ORIGIN TO ITS JUNCTION WITH THE LINGUAL GUSTATORY NERVE.

POSITION.—The body being placed on its back, turn the face well to one side.

Hook the ear downwards and forwards.

I. SKIN INCISIONS.

1. Make an incision along the horizontal upper margin of the Zygomatic arch directly backwards to a point vertically above the tip of the Mastoid process.

2. From the posterior extremity of this incision make a vertical incision to the tip of the Mastoid process.

3. From the anterior limit of the horizontal upper

margin of the Zygomatic arch make an incision downwards and forwards to the anterior limit of the origin of the Masseter, and from that point continue the incision downwards and backwards along the anterior margin of the Masseter to the horizontal level of the tip of the Mastoid process.

4. Join the lower extremities of No. 2 and No. 3.

II. Remove the skin, and expose—

1. **Superficial fascia.**

2. The **Aponeurosis of the Occipito-frontalis**, blending with it above.

III. Remove the **Superficial fascia**, carefully preserving the distribution of any vessels and nerves in it, and expose—

1. The **Temporal fascia** attached to the upper border of the Zygomatic arch ;

2. The **Zygomatic arch**, formed by the Malar bone and the Zygomatic processes of the Temporal and Superior Maxillary bones ;

3. The **Mastoid portion** of the Temporal bone ;

4. The **Masseteric and Parotidean processes** of deep Cervical fascia attached to the lower border of the Zygomatic arch ;

5. Some fibres of the **Platysma** in the lower portion of the dissection ;

6. The outer fibres of the **Orbicularis palpebrarum** overlapping the Malar bone in the anterior and upper portion of the dissection ;

7. The **Zygomatic muscles** arising from the Malar bone ;

8. The **Retrahens aurem**, and

9. The **Attollens aurem**, at their insertions into the External ear ;

10. The lower portion of the **Attrahens aurem**, arising from the Aponeurosis of the Occipito-frontalis ;
11. **Malar** branches of the **Orbital** nerve and accompanying branches of the **Lachrymal** artery, emerging from Foramina in the Malar bone ;
12. The **Temporal** artery and vein and the **Auriculo-temporal** nerve, passing upwards in front of the **External** ear ;
13. The **Posterior Auricular** artery, vein, and nerve, running backwards over the Mastoid process, the nerve communicating with
14. The **Auricular** branch of the **Vagus**, **Arnold's** nerve, which emerges from the Auricular fissure ;
15. The great **Auricular** nerve, breaking up into terminal branches, many of which perforate and supply the **External** ear ;
16. **Temporal** branches of the **Facial** nerve, passing upwards over the Zygomatic arch.

IV. Remove the Masseteric and Parotidean processes of deep fascia, exposing—

1. The upper portion of the **Parotid** gland ;
2. The **Masseter** muscle ;
3. The **Capsule** and **External** lateral ligament of the **Temporo-maxillary** articulation ;
4. The **Socia Parotidis** and the duct of the **Parotid** lying upon the **Masseter** ;
5. Above, below, and beneath the duct, branches of the **Temporal**, **Malar**, and **Infra-orbital** branches of the **Facial** nerve ;
6. Lying above the duct the **Transverse Facial** vessels.

V. Trace these branches of the **Facial** back to the main trunk, and expose the **Facial** nerve as it emerges from the **Stylo-mastoid** foramen, and gives off the **Posterior** auricu-

lar, Stylo-hyoid, and Digastric branches. Expose the two branches of communication from the Auriculo-temporal nerve to the Temporo-facial division of the Facial, and trace the branches of the Auriculo-temporal to their distribution in the cartilage of the External auditory meatus, Parotid gland, and External ear.

VI. Remove the branches of the Facial nerve within the limits of the dissection, together with a further portion of the Parotid gland, and expose—

1. The **Temporal vein**, receiving the **Transverse Facial** and **Internal Maxillary veins**.

VII. Cut away the **Socia Parotidis**, the duct of that gland, and the transverse Facial vessels, and divide the two layers of Temporal fascia and intervening fat. Cut through the Zygomatic arch, and remove the exposed portion of Masseter, as in the Pterygoid dissection on page 19. Proceed with the Pterygoid dissection till the Chorda Tympani is exposed from the canal of Huguier to its junction with the Lingual Gustatory. This is fully described in the dissection referred to above.

VIII. Remove the Temporal vein, and the vein formed by its junction with the Internal Maxillary vein from the Parotid portion of the dissection, and expose—

1. The **External Carotid**, dividing into
2. The **Internal Maxillary**, already cut through, and
3. The **Temporal**, whose **Transverse Facial** and **Auricular branches** have been also exposed and removed.

IX. Remove the External Carotid and these branches. Cut through the Cartilaginous External Auditory Meatus at its attachment to the bony portion of that canal.

X. Using a fine chisel, cut down on the lower portion of the aqueduct of Fallopius, the Stylo-mastoid foramen serving as a guide, and expose—

1. The **Stylo-mastoid artery** ;
2. The **Facial nerve**, giving off
3. The **Chorda Tympani**, which runs upwards and forwards through the bone.

XI. Follow it till it enters the Tympanum by the **Iter Chordæ posterius**, trace it across the **Membrani Tympani** by dividing the **Membrani tympani** and the handle of the **Malleus**, and expose the nerve lying upon the Mucous membrane, and escaping from the Tympanum by the **Iter Chordæ antierius**.

XII. By removing a further piece of bone the portion of the **Chorda Tympani** between the **Iter Chordæ antierius** and the canal of **Huguier** is readily exposed.

A DISSECTION TO EXPOSE THE RIGHT RECURRENT LARYNGEAL NERVE.

POSITION.—The body is placed in the supine position, the neck is slightly extended, and the face turned to the left.

Define the anterior margin of the Sterno-mastoid and the position of the Hyoid bone.

I. SKIN INCISIONS.

1. Make a median incision from the Hyoid bone to the Sternal notch.
2. Make a transverse incision from the centre of the body of the Hyoid bone along the body and

greater cornu to the anterior margin of the Sterno-mastoid.

3. From the outer extremity of No. 2 make a more or less vertical incision to the posterior limit of origin of the Sterno-mastoid from the Clavicle.

4. Join the lower extremities of No. 1 and No. 3.

II. Reflect the skin, and expose—

1. **Superficial fascia**, and beneath it in the upper and outer portion of the dissection

2. The **Platysma myoides**.

3. The **Ascending and Descending branches of the Superficial Cervical nerve**;

4. The **Infra-maxillary branches of the Facial nerve**, breaking up in the **Platysma** and **Superficial fascia**;

5. The **Sternal branches of the Superficial Cervical plexus** crossing very obliquely the lower and outer angle of the dissection;

6. The **Anterior Jugular vein**, forming a single trunk in the middle line, or running down to one side of the middle line, in either case perforating the deep fascia about half an inch above the Sternum.

III. Remove these structures, and expose—

1. **Deep fascia**, attached above to the body of the Hyoid bone, and below to the Sternum and Inter-clavicular ligament.

IV. Remove the deep fascia where it lies superficial to the Sterno-mastoid, and expose—

1. A triangular area of that muscle;

2. Branches of the **Superficial Cervical nerve**, and

3. **Sternal branches of the Cervical plexus** upon its surface.

V. Remove this portion of Sterno-mastoid, and the superjacent nerves within the limits of the dissection, and expose—

1. The process of the deep Cervical fascia, which lies beneath it.

VI. Remove this process of deep Cervical fascia, together with that portion which is exposed in the triangular interval in front of the Sterno-mastoid.

In removing the latter portion, it is observed to form a single layer as low down as the lower limit of the isthmus of the Thyroid gland. Below this it consists of two layers, the more **Superficial** of which has been already exposed. It is attached below to the Sternum and Interclavicular ligament.

The thicker deeper layer is separated from the superficial layer by loose connective tissue and fat, and is attached below to the deep surface of the Manubrium.

The attachment of a deeper process of this fascia is observed, and cut through. This process passes behind the depressor muscles of the Hyoid bone, and invests the Thyroid gland.

Subsequently this process will be seen to extend downwards on the Trachea and large vessels of the neck, and to be continuous with the Carotid sheath above.

After the deep fascia and its processes have been removed, you expose in the middle line from above downwards—

1. The body of the **Hyoid bone** ;
2. The **Thyro-hyoid membrane** ;
3. The **Bursa** between this membrane and the Posterior surface of the body of the Hyoid bone ;
4. The **Thyroid cartilage** ;
5. The **Crico-thyroid membrane** ;

6. The **Cricoid cartilage**, with portion of the **Cricothyroid muscle** ;
7. The **Upper portion of the Trachea** ;
8. The **Isthmus of the Thyroid gland** lying upon the third, fourth, and fifth rings of the **Trachea** ;
9. The **Trachea** below these rings. External to the middle line
10. The **Sterno-hyoid**, whose inner margin reaches the middle line above ;
11. The **Sterno-thyroid**, whose inner margin is in contact with the fellow of the opposite side below. This muscle passes upwards and outwards beneath the **Sterno-hyoid**, and is exposed a second time in the angular interval between the **Anterior belly of the Omo-hyoid** and the **Sterno-hyoid muscles** ;
12. The **Anterior belly of the Omo-hyoid** and its tendon, crossing superficially the **Thyro-hyoid**, **Sterno-thyroid**, and **Scalenus anticus muscles** ;
13. The **Thyro-hyoid**, as it passes up from beneath the **Omo-hyoid** to its insertion into the great cornu of the **Hyoid bone** ;
14. The lower portion of the **Rectus anticus major** ;
15. Nearly the whole extent of the **Scalenus anticus** ;
16. Portions of the **Inferior Constrictor**, and of
17. The **Middle Constrictor**, and
18. In the outer limit of the dissection, possibly a part of the **Scalenus medius** ;
19. The **Internal Jugular vein** above the **Omo-hyoid**, where it receives
20. The **Lingual**,
21. The **Common Facial**, and the
22. **Superior Thyroid veins**, and again below the **Omo-**

hyoid, where it lies in the triangular interval between that muscle, and the Sterno-hyoid ;

23. The **Subclavian vein**, crossing in front of the **Scalenus anticus**, and joining the **Internal Jugular vein** at the inner margin of this muscle, to form
24. The **Innominate vein**, into the commencement of which
25. The **Vertebral vein** opens ;
26. The **Inferior Thyroid veins** as they descend from the isthmus of the **Thyroid body** upon the front of the **Trachea**, and disappear below beneath the **Sterno-thyroid muscle** ;
27. The **Anterior Jugular vein** as it passes backwards, immediately above the **Clavicle**, crossing the **Sterno-hyoid** and **Sterno-thyroid muscles**, and disappearing at the outer limit of the dissection ;
28. The **Right Lymphatic duct**, as it opens into the angle formed by the union of the **Subclavian** and **Internal Jugular veins**. It receives
29. The **Jugular Lymphatic trunk**, which is formed by the efferent ducts of
30. The **Inferior Deep Cervical glands**, which lie along the course of the **Internal Jugular** and **Subclavian veins**.
31. The **common Carotid**, in the angular interval between the **Omo-hyoid** and **Sterno-hyoid muscles**, and above the **Omo-hyoid**, bifurcating on a level with the upper margin of the **Thyroid cartilage** into
31. The **Internal Carotid**, which lies on a posterior plane, and
32. The **External Carotid**, which lies on an anterior plane, and gives off
33. The **Superior Thyroid artery**, which passes forwards

and downwards, disappearing beneath the depressors of the Hyoid bone. It gives off in this dissection

34. A branch which runs along the lower margin of the Hyoid bone ;
35. A branch which perforates the Thyro-hyoid membrane ;
36. The Crico-thyroid artery, which forms a crucial anastomosis upon the front of the Trachea with the fellow of the opposite side, and
37. Branches to the front of the Thyroid gland.
38. The Supra-scapular, and
39. The Transversalis Colli arteries, as they run outwards over the Scalenus anticus, the former vessel getting rapidly under cover of the Clavicle ;
40. The commencement of the third portion of the Subclavian artery as it appears at the outer margin of the Scalenus anticus ;
41. Branches of the loop formed by the Communicans and Descendens noni, as they lie upon the sheath of the vessels, and supply branches to the Sterno-hyoid, Sterno-thyroid, and Omo-hyoid muscles ;
42. The Internal Laryngeal nerve, as it accompanies the Laryngeal branch of the Superior Thyroid artery ;
43. The Phrenic nerve, as it crosses the Scalenus anticus obliquely, disappearing below beneath the Subclavian vein ;
44. The upper roots of the Brachial plexus, along the outer margin of the Scalenus anticus, and possibly
45. The nerve to the Subclavius, running along the outer margin of the Scalenus anticus muscle.

VII. Remove the Omo-hyoid, Sterno-hyoid, and subjacent Sterno-thyroid muscles from the dissection, dividing the branches of nerves and arteries which supply them,

and removing the remainder of the Carotid sheath, and expose—

1. That portion of the first piece of the **Subclavian artery** which lies in the considerable interval existing between the lower part of the Internal Jugular vein and common Carotid artery ;
2. The **Vagus nerve**, descending between the Internal Jugular vein and common Carotid artery, and crossing superficially the first portion of the Subclavian artery ;
3. The **Cardiac branches** of the **Vagus** and **Sympathetic**, some passing in front of, and some behind the Subclavian artery ;
4. The **Recurrent Laryngeal nerve**, coming off from the Vagus as it lies in front of the Subclavian artery, and passing backwards beneath it. It is seen again as it ascends from beneath the Subclavian artery, and passes upwards and inwards under cover of the common Carotid artery ;
5. The lateral lobes of the **Thyroid body**, lying on the side of the Trachea and ala of the Thyroid Cartilage ;
6. The middle **Thyroid vein**, passing outwards, to open into the Internal Jugular vein ;
7. The **Inferior Thyroid artery**, as it passes inwards from beneath the Internal Jugular vein, and disappears beneath the common Carotid.

VIII. Divide the common Carotid artery over the Inferior Laryngeal nerve. Turn the upper portion upwards out of the dissection, and expose—

1. The **Recurrent Laryngeal nerve**, as it ascends in the interval between the Trachea and Œsophagus, giving off branches to both structures. It passes

behind the Inferior Thyroid artery, which is now seen to terminate in supplying the posterior aspect of the Thyroid gland. It then disappears beneath the lower free margin of the Inferior Constrictor.

2. The **External Laryngeal nerve**, passing down to perforate the outer surface of the Inferior Constrictor muscle, and to supply the Crico-thyroid muscle.

The External Laryngeal nerve receives a filament from the upper Cervical ganglion, and gives off a Cardiac branch which unites with the Superior Cardiac branch of the Sympathetic.

IX. Cut through the first portion of the Subclavian artery over the course of the recurrent Laryngeal nerve, which is now exposed with its twigs of communication with the Inferior Cervical ganglion, and its branches of distribution to the Cardiac plexus.

X. Remove the Lateral lobe of the Thyroid body, dividing the Superior and Middle Thyroid veins, the Superior Thyroid artery, the Inferior Thyroid artery, and the abundant Plexus of nerves derived from the Middle Cervical ganglion which accompanies the Inferior Thyroid artery.

Cut through the Inferior Constrictor, Stylo-pharyngeus, and Palato-pharyngeus muscles along the posterior border of the Thyroid cartilage.

Remove the Thyro-hyoid muscle with its branch of nerve from the Hypo-glossal, and divide the ala of the Thyroid cartilage vertically, immediately to one side of the median line.

Cut through the Lateral and Median Thyro-hyoid ligaments at their attachments to the Thyroid cartilage.

Divide the insertion of the Crico-thyroid muscle into

the Thyroid cartilage, dividing also its nerve, and the Capsular ligament which connects the Inferior Cornu of this cartilage to the Cricoid.

Remove this portion of the Ala.

Turn the Larynx to one side, so as to expose its posterior surface. Dissect off the Pharyngeal Mucous membrane from the Posterior Crico-arytenoid and Arytenoid muscles, and expose—

1. The branches of the **Recurrent Laryngeal** nerve to these muscles ;
2. A long branch which runs up beneath the posterior portion of the **Ala**, and unites with a descending branch of the **Internal Laryngeal** nerve ;
3. Branches which supply the several other Laryngeal muscles exposed, namely, the **Thyro-arytenoid**, the **Crico-arytenoideus lateralis**, the **Thyro-epiglottideus**, and the **Aryteno-epiglottideus** ;
4. The **Internal Laryngeal** nerve, as it supplies the muscles and Mucous membrane of the Larynx ; and the several branches of distribution
5. Of the **Superior Laryngeal** artery.

The **Right Recurrent Laryngeal** nerve is now completely exposed.

A DISSECTION TO EXPOSE THE LEFT RECURRENT LARYNGEAL NERVE.

POSITION.—Place the body in the supine position, turn the face a little to the right, and extend the neck.

I. SKIN INCISIONS.

1. Make a median incision from the Hyoid bone to

the level of the lower margin of the second Costal cartilages.

2. From the upper extremity of No. 1 make an incision backwards along the body and greater Cornu of the Hyoid bone to the anterior margin of the Sterno-mastoid.
3. From the posterior extremity of No. 2, make an incision to the posterior limit of the origin of the Sterno-mastoid muscle from the clavicle, and from this point continue this incision vertically to the lower margin of the second rib.
4. Join the lower extremities of No. 1 and No. 3 by a transverse incision.

II. Reflect the skin and expose—

1. **Superficial fascia**, containing
2. A variable amount of fat ;
3. **Branches of the Supra-sternal and Supra-clavicular nerves** from the **Superficial Cervical plexus**, and the communication existing between the latter nerve and the anterior termination of the **Second Intercostal nerve** ;
4. The **Anterior terminations of the Third, Fourth, Fifth, and Sixth Intercostal nerves**, accompanied by
5. **Branches of the corresponding Intercostal vessels**, and
6. Of the **Internal Mammary vessels** ;
7. In the neck **branches of the Superficial Cervical nerve**, communicating with
8. **Branches of the Infra-maxillary loops of the facial nerve**.

III. Remove the Superficial Fascia with the structures contained in it, and expose—

1. The **Platysma** arising from the Subcutaneous tissue

over the Pectoralis major, and passing over the Clavicle upwards and inwards towards the middle line ;

2. Ramifying in the Platysma are deeper branches of the Infra-maxillary branch of the facial nerve, and
3. Of the Superficial Cervical nerve.

IV. Remove the Platysma, and expose—

1. **Deep Cervical fascia**, attached to the Hyoid bone above, to the front of the Sternal notch below, and to the anterior surface of the Clavicle.
2. The **deep fascia of the Thorax**, attached above to the Clavicle, where it is continuous with the deep fascia of the neck.

It is perforated by the branches of the Inter-costal nerves and vessels, and of the Internal Mammary vessels already described.

V. Continue the Cervical dissection as in that on the right side, and trace out the Recurrent Laryngeal nerve to its terminal distribution.

The student will observe the slight differences which exist on the left side, owing to the origin of the left Subclavian artery from the arch of the Aorta, and to the passage of the Vagus nerve into the chest between the Carotid and Subclavian vessels. He will also note the presence of the Thoracic duct on this side. Except for these few points the dissection of the left Recurrent Laryngeal nerve in the neck is the same as the dissection of the same nerve on the right side.

VI. Following the lines of the vertical skin incisions in the Thorax, cut through the soft parts down to the bone, dividing in the Median incision **deep fascia**, and in the Lateral incision **deep fascia**, **Pectoralis major**, a subjacent layer of **deep fascia**, the **Costo-coracoid membrane**,

and the **Subclavius** muscle. Cut through the **Intercostal fascia**, muscles, vessels, nerves, branches of the internal **Mammary** vessels, and **Pleura**, between the first and second rib in the same direction, and then saw through the clavicle, the first rib immediately internal to the **Scalene** tubercle, and the second rib in the same vertical plane. Saw vertically with a **Hey's** saw through the **Sternum** down to the level of the lower limit of the **Sternal** articulations of the second **Costal** cartilages.

Cut through the soft parts along the lower margin of the second **Costal** cartilage, and divide the **Gladiolus** transversely on a level with this border to the **Median** line.

In doing this you divide deep fascia, **Pectoralis major**, subjacent deep fascia, **Intercostal** fascia and muscles, **Internal Mammary** vessels, **Triangularis sterni**, and **Pleura**.

Remove the resected piece of **Sternum** with the portions of the first and second **Costal** arches, by dividing the reflected **Pleura**, and the **Internal Mammary** vessels, and expose—

1. A small interval internal to the **Pleural** cavity, and containing
2. The **Thymus** gland, or its remains.

VII. Remove the **Pleura** from the inner wall of the cavity, exposing—

1. Portion of the **Left Innominate** vein with the **Inferior Thyroid**, **Internal Mammary**, and **Superior Intercostal** veins at their entrance into it ;
2. The transverse portion of the arch of the **Aorta** to the left of the middle line. The **Left common Carotid** and **Subclavian** arteries arise from its upper aspect, and the **Pericardium** and **Ductus arteriosus** are attached to its concave lower margin ;
3. The **Phrenic** nerve lies on the inner wall of the

Pleura. It crosses the Vagus, which lies on a posterior plane, and it lies internal to that nerve upon the arch of the Aorta. It is accompanied by the Comes Nervi Phrenici artery ;

4. The **Vagus**, descending between the left Carotid and Subclavian arteries, and crossing obliquely the arch of the Aorta ;
5. The **Inferior Cardiac** branch of the **Vagus** with
6. The **Cardiac** branch of the **Sympathetic**, crossing the arch superficially between the Vagus and Phrenic nerves ;
7. The **Recurrent Laryngeal** nerve, arising from the Vagus on the front of the arch. It passes directly backward below the arch, and external to the attachment of the **Ductus arteriosus**, and in this position it gives off branches to the **Cardiac plexus**. It is seen again as it ascends from beneath the arch of the Aorta and the common Carotid artery.

VIII. Remove the Phrenic Nerve and the Comes Nervi Phrenici.

Cut through the Innominate vein at its origin, and displace it inwards, dividing the Internal Mammary and Superior Intercostal veins as they enter it.

Cut obliquely through the arch of the Aorta over the course of the Recurrent Laryngeal nerve between the origins of the left Carotid and Subclavian vessels, dividing the Cardiac branches which lie superficial to it.

Displace the right segment of the arch inwards with the Carotid which has been cut through in the neck, and expose the **Recurrent Laryngeal** nerve as it runs upwards between the **Œsophagus** and **Trachea**, distributing branches to these two structures, and receiving twigs of communication from the **Inferior Cervical ganglion**.

The left Recurrent Laryngeal nerve has now been exposed in the whole of its course.

A DISSECTION TO EXPOSE THE VERTEBRAL ARTERY IN THE NECK.

This dissection comprises a description of the mutual relationship of the several structures beneath the Sterno-mastoid. It will be performed on the left side.

POSITION.—Place the body in the supine position, and turning the face to the right, fix it with hooks.

Define the exact position and limits of the Sterno-mastoid.

I. SKIN INCISIONS.

1. Make an incision along the anterior margin of the Sterno-mastoid muscle from the anterior margin of the Mastoid process to the Sterno-clavicular articulation.
2. From the upper extremity of No. 1, make an incision backwards to the limit of the attachment of the Sterno-mastoid muscle to the skull.
3. From the Sterno-clavicular articulation make a similar incision outwards along the upper margin of the Clavicle, to the posterior limit of the Clavicular origin of the Sterno-mastoid from it.
4. Join the posterior extremities of the two transverse incisions.

II. Remove the skin, and expose—

1. **Superficial fascia**, and ramifying in it branches of vessels and nerves which will be carefully preserved and enumerated later.

III. Remove the superficial fascia, and expose—

1. The *Platysma*, extending over the greater portion of the dissection, being absent only from its upper and back part and from its anterior Inferior limit.

IV. Remove the *Platysma*, carefully dissecting out any vessels and nerves in its substance, and expose—

1. The deep fascia of the neck, attached below to the Clavicle, and above to the outer surface of the Mastoid process and Occipital bone ;

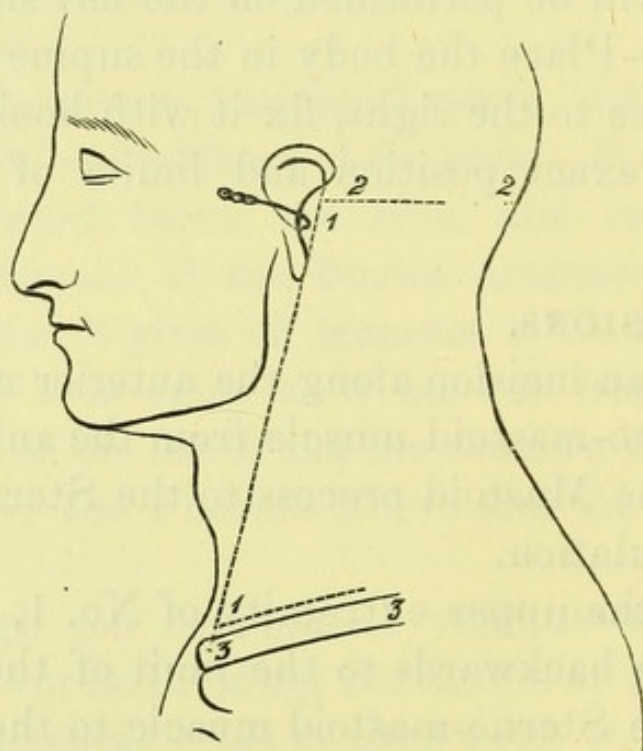


Fig. 8.

2. The **External Jugular vein**, emerging from the Parotidian fascia in the upper part of the dissection, running obliquely downwards and backwards upon the deep fascia, and perforating it in the posterior Inferior angle of the dissection. The margin of the opening in the deep fascia is observed to be intimately connected with the wall of the vein.

The **External Jugular vein** is joined in about

the centre of its course by the **Posterior External Jugular vein**, which passes upwards and backwards from the area of the dissection.

The transverse Cervical and Supra-scapular veins join it usually beneath the deep fascia, though they occasionally join it where it is much dilated just before it perforates the fascia. It is also joined by a branch from the Cephalic vein at the same point.

3. The **Anterior Jugular vein** may possibly be exposed, as it perforates the deep fascia in the anterior inferior angle of the dissection.
4. The **Posterior Auricular vein**, lying upon the Mastoid process in the anterior superior angle of the dissection.
5. The **Mastoid Lymphatic glands**, lying on the insertion of the Sterno-mastoid, and receiving **Lymphatic vessels** from the scalp.
6. Some of the **Sub-Occipital Lymphatic glands** may lie upon the posterior limit of the insertion of the Sterno-mastoid.
7. The **Superficial Cervical glands**, about six in number, lying along the External Jugular vein, and joined by the Lymphatic vessels from the external ear, from the superficial fascia of the side of the neck, and from the Mastoid and Sub-Occipital glands. Their Lymphatic ducts accompany the External Jugular vein as it passes through the deep Cervical fascia, beneath which they will be seen to enter the inferior deep Cervical glands at a subsequent stage of the dissection.
8. The **Superficial Cervical nerve**, perforating deep fascia and dividing into two branches, an ascending and

a descending, which are distributed to the anterior portion of this dissection.

The **upper division** sends a small ascending branch with the External Jugular vein, and communicates with branches of the **Infra-maxillary loops** of the **facial** in the substance of the **Platysma**.

9. The **Great Auricular nerve**, emerging from the deep fascia, and taking an oblique course towards the ear. It divides into **Auricular branches** which run on to the ear, **Mastoid branches**, which are distributed over the insertion of the **Sterno-Mastoid**, and **Facial branches** which run forwards out of the dissection.
 10. The **Small Occipital nerve**, perforating the deep fascia near the posterior and upper limit of the dissection. It breaks up into several branches.
 11. **Branches of the Supra-clavicular**, and
 12. **Supra-sternal nerves**, from the **Superficial Cervical plexus**, crossing the lower portion of the dissection obliquely.
 13. The **Posterior Auricular nerve**, passing outwards and backwards over the **Mastoid process**, and communicating with the **Great Auricular nerve**, and with
 14. **Arnold's nerve**, which emerges from the **Auricular fissure**, and supplies the superficial fascia and skin over the **Mastoid process** and back of the ear.
 15. The **Retrahens aurem**, arising from the outer surface of the **Mastoid process** by means of two or more **Aponeurotic slips** of origin.
 16. The **Posterior Auricular vessels**, running outwards and backwards over the **Mastoid process**.
 17. **Branches of the Supra-scapular, Occipital, and Superior Thyroid arteries**, emerging from the deep fascia.
- V. Remove the deep fascia and superjacent structures

within the limits of the dissection, dividing the attachments to its under surface of the process which passes beneath the Sterno-mastoid, and expose—

1. The whole of the **Sterno-mastoid muscle**, with the exception of that portion of its tendon where it arises from the front of the Manubrium.

VI. Remove the Sterno-mastoid from the dissection, dividing, in so doing, the Spinal Accessory and a branch from the Second Cervical nerve, and branches of the External Carotid, Occipital, Superior Thyroid, Transversalis Colli, and Supra-scapular arteries which enter its deep surface. Remove also as much as possible of the sheath of the large vessels. You now expose—

1. The **Process of deep Cervical fascia**, lying beneath it. This fascia forms a loop which encloses the tendon of the Omo-hyoid muscle, and binds it down to the first rib and clavicle.

VII. Remove the deep process of Cervical fascia, and expose—

1. A portion of the Mastoid process.
2. The lateral mass of the Atlas.
3. The transverse processes of the several Cervical vertebræ.
4. A portion of the **Complexus** is occasionally seen.
5. The **Splenius Capitis**, inserted into the Mastoid process and Occipital bone.
6. The **Splenius Colli**, inserted into the lateral mass of the Atlas.
7. The **Levator Angulæ Scapulæ**, arising from the posterior tubercles of the three or four upper Cervical transverse processes.
8. The **Scalenus Medius**, emerging from beneath the Levator Anguli Scapuli, being seen to be attached

to the transverse processes below the origin of the Levator Anguli Scapulæ, and reaching below beyond the posterior and lower limit of the dissection.

9. The **Posterior** belly of the **Digastric** muscle, emerging from beneath the **Splenius Capitis**.
10. The **Rectus Capitis Anticus major**, arising from the anterior tubercles of the transverse processes of the Third, Fourth, Fifth, and Sixth Cervical vertebræ, and disappearing above beneath the Digastric muscle.
11. The **Scalenus Anticus**, arising from the anterior tubercles of the transverse processes of the Third, Fourth, Fifth, and Sixth Cervical vertebræ, and being inserted into the Scalene tubercle.
12. The extremity of the great cornu of the **Hyoid bone**.
13. The **Hyo-glossus** (a small portion).
14. The middle **Constrictor**.
15. The lateral **Thyro-hyoid** ligament.
16. Portion of the central **Thyro-hyoid** ligament.
17. The **Inferior Constrictor**.
18. The **Thyro-hyoid** muscle.
19. The **Sterno-hyoid**.
20. The **Sterno-thyroid**, projecting beyond the outer margin of the superjacent **Sterno-hyoid**.
21. The **Omo-hyoid**, crossing the Scalene muscles, the Inferior Constrictor and Thyro-hyoid muscles.
22. A deep process of the **Parotid** gland.
23. The **Anterior Jugular vein**, running backwards over the **Sterno-hyoid**, **Sterno-thyroid**, and **Scalenus Anticus**, to open into the **Internal Jugular**, or into the **Subclavian vein**.

24. The **Internal Jugular vein**, passing from beneath the Digastric almost directly downwards to the outer side of the Internal Carotid artery, and then to the outer side of the Common Carotid artery, running beneath the Omo-hyoid. It is seen again below the level of the Omo-hyoid, where it is overlapped by the margin of the Sterno-thyroid muscle.
25. It receives the common **Facial vein**, at the level of the Hyoid bone, and is much increased in size in consequence. It may also receive the **Ranine vein**, the **Venæ Comites** of the **Lingual artery**, and the **Pharyngeal veins**, as separate tributaries.
26. The **Superior Thyroid vein**, ascending obliquely from the upper part of the **Thyroid body**, whose lateral lobe is exposed as it projects beyond the Sterno-thyroid muscle, and opening into the Internal Jugular vein, or into the Common Facial, immediately before its termination in it.
27. The **middle Thyroid vein**, arising from the Lateral lobe of the Thyroid gland, and opening into the Internal Jugular vein.
28. The **Subclavian vein**, lying on the anterior surface of the Scalenus Anticus, and on a plane anterior and somewhat inferior to that of the Subclavian artery. It receives the External Jugular vein in the margin of the dissection, and close to the inner margin of the Scalenus Anticus it joins the Internal Jugular vein and forms the Innominate, whose outer extremity is now exposed.
29. The **Thoracic duct**, emerging from beneath the Internal Jugular vein, forming a loop upon the Scalenus Anticus and Phrenic nerve, and opening into the

angle of union of the Subclavian and Internal Jugular veins.

30. The **Jugular Lymphatic trunk**, opening into the Thoracic duct. It receives its radicles from
31. The **Inferior Deep Cervical glands**, which surround the lower part of the Internal Jugular vein, and extend outwards into the Subclavian triangle. They are continuous above with
32. The **Superior Deep Cervical glands**, which are in connection with the upper part of the Internal Jugular vein.
33. The **Common Carotid artery**, in the angular interval between the Omo-hyoid and Sterno-thyroid muscles, and also above the Omo-hyoid. At the level of the upper border of the Thyroid Cartilage, it divides into
34. The **Internal Carotid**, which runs upwards for some little distance in this dissection, lying on the same plane as the Internal Jugular vein, and in front of it, and
35. The **External Carotid**, which runs forwards and upwards, disappearing from the dissection. It gives off within its area
36. The **Superior Thyroid artery**, which passes forwards and downwards beneath the depressor muscles of the Larynx, giving off the **Hyoid**, **Laryngeal**, and **Sterno-mastoid** branches in the dissection. The last branch lies superficial to the Carotid artery. The number of branches of the Superior Thyroid and of the Lingual arteries exposed in this dissection depends on variations in them, and in the breadth of the Sterno-mastoid.
37. The **Lingual artery**, passing upwards and then for-

wards, lying on the Middle Constrictor, and passing beneath the Hyo-glossus. It gives off the **Hyoid** branch.

38. The **Facial** artery, passing forwards and upwards out of the dissection.
39. The **Occipital** artery, running upwards and backwards, reaching the interval between the lateral mass of the Atlas and the Mastoid process, and disappearing beneath the margin of the Splenius. It gives off here a **Sterno-mastoid** branch.
40. The **Ascending Pharyngeal** artery, arising about half-an-inch from the bifurcation of the Carotid, and running upwards internal to the Internal Carotid artery.
41. The **First** portion of the **Subclavian** artery, lying immediately internal to the **Scalenus Anticus**.
42. The **Thyroid axis**, arising from the upper aspect of the Subclavian artery, and dividing into three branches, the **Inferior Thyroid**, **Supra-scapular**, and **Transversalis Colli** arteries.
43. The **Inferior Thyroid** artery, running upwards and then inwards beneath the Internal Jugular vein and the common Carotid artery. It gives off a branch, the **Ascending Cervical** artery, which runs upwards between the origins of the Anterior Scalene and the Rectus Capitis Anticus major muscles.
44. The **Supra-scapular** artery, passing outwards and downwards beneath the Clavicle, across the anterior surface of the Scalene muscles.
45. The **Transversalis Colli** artery, passing outwards over the Scalene muscles.
46. The **third** part of the **Subclavian** artery, immediately

external to the *Scalenus Anticus* muscle, giving off not unfrequently

47. The **Posterior Scapular artery**, or the **Transversalis Colli**.

48. The **Hypo-glossal nerve**, emerging from between the *Internal Carotid artery* and *Internal Jugular vein*, and looping around the *Occipital artery*, and passing forwards over the *Occipital artery*, *Internal Carotid*, *External Carotid*, and *Lingual arteries*, and upon the *Hyo-glossus muscle*.

49. It gives off the **Descendens Noni**, which runs downwards upon the sheath of the vessels, and forms a loop with

50. The **Communicans Noni**, a branch derived from the *Second and Third Cervical nerves*. The loop so formed sends branches to the *Depressor muscles* of the *Larynx*, viz., the *Sterno-hyoid*, *Sterno-thyroid*, and *Omo-hyoid muscles*. The *Hypo-glossal* then gives off

51. The nerve to the **Thyro-hyoid muscle**.

52. The **Spinal Accessory nerve**, lying upon the *Levator Anguli Scapulæ* below the lateral mass of the *Atlas*. It has been already cut through at this point where it entered the *Sterno-mastoid*.

53. The **Vagus nerve**, lying between the *Internal Carotid* and *Common Carotid vessels* in front, and the *Internal Jugular vein* behind.

54. The **Superior Laryngeal nerve**, emerging from beneath the *External Carotid*, and dividing into *Internal* and *External Laryngeal branches*.

55. The **Cervical and Brachial Plexuses**, lying upon the *Levator Angulæ Scapulæ* and *Scalenus Medius muscles*.

56. The **Superficial Cervical nerve**, arising from the Second and Third Cervical nerves.
57. The **Great Auricular**, arising from the same Cervical nerves.
58. The **Small Occipital**, arising from the Second, and occasionally from the Third Cervical nerve also.
59. **Supra-clavicular, Supra-sternal, and Supra-acromial nerves**, arising from the Third and Fourth Cervical nerves.
60. A branch to the **Sterno-mastoid**, from the Second Cervical nerve.
61. **Two branches to the Levator Anguli Scapulæ**, from the Third and Fourth Cervical nerves.
62. **Branches to the Middle Scalene**, from the Third and Fourth Cervical nerves.
63. The **Phrenic nerve**, arising from the Third and Fourth Cervical, and getting a branch from the Fifth. It runs down upon the **Scalenus Anticus**, and then upon the first piece of the left **Subclavian artery**, and beneath the **Subclavian vein**.
64. The nerve to the **Subclavius**, arising from the cord formed by the Fifth and Sixth Cervical nerves, running down along the outer margin of the **Scalenus Anticus**, crossing the **Subclavian artery**, and sending inwards a communicating branch to the **Phrenic nerve**.
65. The nerve to the **Rhomboid**, emerging from the substance of the **Scalenus Medius**.
66. Possibly the **Respiratory of Bell**, or the **Posterior Thoracic nerve**, emerging from the same muscle.
67. **Communications of the several Cervical nerves with the three Cervical Sympathetic Ganglia**.
68. **Branches of the Pharyngeal Plexus**, upon the Middle and Inferior Constrictors.

69. Some of the **Cardiac** branches of the **Sympathetic** and **Vagus** nerves.

70. The **Inter-carotid Ganglion**, in the angular interval between the origins of the **Internal** and **External Carotid** vessels.

Cut through the tendon of the **Omo-hyoid** where it crosses the large vessels, dividing the nerve to its posterior belly.

Cut through the loop formed by the **Communicans** and **Descendens Noni**.

Cut away the outer limits of origin of the **Sterno-hyoid** and **Sterno-thyroid** muscles, turning them inwards, and expose—

1. The **Internal Jugular vein**, as it overlaps
2. The **Left Common Carotid artery**, in the root of the neck.
3. A further portion of the arch of the first portion of the **Subclavian artery** is also seen.

Divide the **Internal Jugular vein** transversely at its junction with the **Subclavian**, and turn it forwards, and expose—

1. The **Vertebral vein**, emerging from the foramen in the transverse process of the **Sixth Cervical vertebra**, passing downwards and forwards over the **Subclavian artery**, and opening into the commencement of the **Innominate vein** posteriorly. Before its termination it is joined by the **Anterior Vertebral** and **deep Cervical veins**, and by a vein which accompanies the branch of the **Superior Intercostal artery** in the first intercostal space. The **deep Cervical vein** is observed to emerge from below the transverse process of the **Seventh Cervical vertebra**.

2. The **Vertebral artery**, arising from the convexity of the first portion of the Subclavian artery as it makes its exit from the chest. It runs upwards, backwards, and outwards, getting under cover of the Vertebral vein, and entering the foramen in the transverse process of the Seventh Cervical vertebra.
3. A further portion of the **Inferior Thyroid artery**. This artery passes directly inwards beneath the Common Carotid.
4. The **Thoracic Duct**, passing along the convexity of the arch of the Subclavian artery, and entering the chest between the Subclavian and Common Carotid. It lies in front of the Vertebral artery and vein.
5. The **Vagus** with its **Inferior Cervical Cardiac branch**, entering the chest between the Carotid and Subclavian arteries.
6. The **Middle Cervical Ganglion**, or the **Thyroid Ganglion**, placed upon or close to the Inferior Thyroid artery. Its communications with the Fifth and Sixth Cervical nerves are seen, and its Thyroid branches, which run inwards with the Thyroid artery. Its Middle Cardiac branch enters the chest between the Carotid and Subclavian vessels.
7. The **Lower Cervical Ganglion**, lying behind the vertebral artery, upon the neck of the first rib. Its communications with the Seventh and Eighth Cervical nerves, its lower Cardiac branch, which joins the middle Cardiac, and its dense Plexus of branches which surround the Vertebral artery, are all seen.

Remove the portion of the *Splenius Capitis* seen in the dissection, and expose portions of—

1. The **Complexus**,

2. The **Trachelo-mastoid**,
3. The **Superior Oblique**, and
4. The **Inferior Oblique** muscles.
5. The **Occipital artery**, emerging from beneath the **Trachelo-mastoid**, and running in a groove on the bone, upon the insertions of the **Superior Oblique** and **Complexus**. It gives off the **Mastoid branch**, which enters the **Mastoid foramen**, and the **Arteria Princeps Cervicis**, which descends and divides into two branches, one running on the surface of the **Complexus**, and the other disappearing beneath it.
6. A **Plexus of veins** receiving a branch from the **Mastoid foramen**, and running deeply into the neck between the muscles.

Remove the portions of the **Complexus** and **Trachelo-mastoid**, which are exposed in the dissection, together with the **Occipital artery** and its branches, and the **plexus of veins** just mentioned, and expose—

1. Further portions of the **Inferior**, and
2. **Superior Oblique** muscles ;
3. The **Rectus Capitis Posticus major** ;
4. The **Rectus Lateralis**, whose outer margin is in contact with the **Superior Oblique** ;
5. A portion of the **Occipital artery** lying upon the **Rectus Lateralis** ;
6. The **Vertebral artery**, lying on the **Posterior arch** of the **Atlas**, and perforating the **Posterior Occipito-atloid ligament** ;
7. A **Plexus of deep veins**, which by their junction form the **Vertebral vein** ;
8. The **Ganglion** on the **posterior root** of the **Sub-occipital nerve** (should the ganglion be present), lying

upon the arch of the Atlas beneath the Vertebral artery ;

9. The **Posterior division** of the **Sub-occipital nerve**, breaking up into branches, which supply the several muscles in the Sub-occipital triangle ;

10. The **Anterior division** of the **Sub-occipital nerve**, emerging from beneath the Rectus Lateralis, and uniting with the Anterior branch of the Second Cervical over the Anterior arch of the Atlas. From this loop communicating branches are given off to the **Sympathetic** and **Cranial nerves**.

11. The **Internal branch** of the **Posterior division** of the Second Cervical nerve, or the **Great Occipital nerve**, passing upwards over the Inferior Oblique muscle from the Ganglion on the Posterior Arch of the Axis.

The **External branch** of the **Posterior division** of this nerve supplies the adjacent muscles.

12. The **Anterior branch** of the **Second Cervical nerve**, passing outwards and forwards, lying posterior and then external to the Vertebral artery, and beneath the Posterior Inter-transverse muscle. It divides into an **Ascending branch**, which joins the first Cervical nerve, and a **Descending branch**, which joins the third.

Remove the Anterior branch of the Second Cervical nerve, where it lies upon the Vertebral artery.

Remove the Superior Oblique and the Rectus Lateralis, and expose—

1. The **Vertebral artery**, as it emerges from the Foramen in the lateral mass of the Atlas ;

2. The **Anterior branch** of the **Sub-occipital nerve**, as it runs forward beneath, and then internal to the Vertebral artery ;

3. The **Vertebral vein**, passing through the Foramen in the lateral mass of the Atlas with the artery.

Cut through the bone forming the outer boundary of the Foramen in the lateral mass of the Atlas, and expose the artery and vein in the canal. With bone forceps cut through the transverse processes of the *Vertebræ* above the seventh, dividing them between the Tubercles, and, forcing the Anterior tubercles forwards, break them at their junction with the bodies of the *Vertebræ*.

By this means the Vertebral artery is exposed in the space intervening between the portions already exposed.

The vein is seen to lie in front of the artery, which is surrounded by a plexus of Sympathetic, and the Cervical nerves as they emerge from the Inter-vertebral Foramina lie behind it. It gives off **Spinal branches**, which pass through the Inter-vertebral Foramina into the Spinal canal, and **Muscular branches**, which supply the deep muscles of the neck.

Remove the Vertebral vein and the Thoracic duct.

If it is desired to expose the artery in the Cranial cavity, remove the area of bone exposed in the dissection, and expose *Dura Mater* with the arteries which supply it. Remove the *Dura Mater*, and expose the Arachnoid space and the Arachnoid membrane, some fluid escaping. Remove the Arachnoid, and expose a delicate areolar tissue crossing the Sub-arachnoid space. A considerable quantity of cerebro-spinal fluid is contained in this space.

The Cerebellum is exposed with its intimate *Pia Matral* covering, and branches of Cerebellar arteries and veins.

Cut away the Posterior Occipito-atloid ligaments and *Dura Mater*, and the Anterior and Lateral portion of the Cerebellum, and expose—

1. The **Vertebral artery**, entering the skull by the Foramen Magnum, running upwards and forwards around the lateral and anterior aspects of the Medulla, and uniting at the lower margin of the Pons Varolii with its fellow to form the Basilar.

It gives off here the **Posterior Meningeal artery**, which supplies the Dura Mater in the Posterior fossa; the **Posterior Spinal artery**, which runs down on the Medulla; and the **Anterior Spinal artery**, which descends on the Medulla more anteriorly.

A DISSECTION TO EXPOSE THE THORACIC DUCT IN THE NECK.

POSITION.—Place the body in the supine position, and turn the face to the right.

Define the anterior and posterior borders of the Sterno-mastoid muscle.

I. SKIN INCISIONS.

1. Make an incision one inch long from the Clavicle upwards along the posterior margin of the Sterno-mastoid.
2. From the lower extremity of No. 1 make a transverse incision inwards along the upper margin of the Clavicle to the anterior margin of the Sterno-mastoid muscle.
3. From the upper extremity of No. 1 make a transverse incision inwards, parallel to No. 2 to the anterior margin of the Sterno-mastoid.
4. Join the anterior extremities of No. 2 and No. 3.

By this means we define a parallelogram which includes the lowest inch of the Sterno-mastoid.

II. Reflect the skin and expose—

1. **Superficial fascia**, containing
2. A variable amount of fat ;
3. **Branches of the Superficial cervical nerve** ;
4. **Supra-sternal branches of nerve from the Superficial cervical plexus** ;
5. **Cutaneous branches of the Supra-scapular artery**.

III. Remove the Superficial fascia and expose—

1. Some of the **Platysma** in the outer portion of the dissection, and **branches of the vessels and nerves** already mentioned.

IV. Remove the Platysma and expose—

1. **Deep fascia** attached below to the **Clavicle** ;
2. The **External Jugular vein**, lying on the deep fascia in the upper and outer angle of the dissection, and perforating it immediately behind the free margin of the Sterno-mastoid ;
3. A **communication from the Cephalic vein**, entering the **External Jugular vein** ;
4. **Lymphatic vessels**, running with the **External Jugular vein** ;
5. The **Anterior Jugular vein**, perforating the deep fascia immediately in front of the anterior margin of the Sterno-mastoid.

V. Remove the deep fascia from the surface of the Sterno-mastoid, removing or hooking aside the **External Jugular vein**, and dividing the attachment to its under surface of the deep process of fascia which passes beneath the Sterno-mastoid muscle, and expose—

1. The lowest inch of the **Sterno-mastoid muscle**, pre-

senting its two heads of origin, and the triangular interval that exists between them.

VI. Remove the area of Sterno-mastoid exposed, with the subjacent layer of deep fascia, dividing the attachment to it of still deeper fascial processes, and expose from within outwards—

1. A small portion of the **Sterno-thyroid**, its fibres being directed upwards and outwards ;
2. The comparatively narrow **Sterno-hyoid muscle**, whose fibres are directed upwards and inwards ;
3. Another small portion of the **Sterno-thyroid**, projecting beyond the outer margin of the preceding muscle ;
4. The **Scalenus Anticus** ;
5. The inner portion of the **Scalenus medius** ;
6. The posterior belly of the **Omo-hyoid** ;
7. The **Anterior Jugular vein**, running outwards immediately above the Clavicle ;
8. The **Internal Jugular vein**, projecting from beneath the Sterno-thyroid muscle, and joining
9. The **Subclavian vein**, which runs inwards in front of the two Scalene muscles. These veins form by their junction,
10. The **Left Innominate vein** ;
11. The **Thoracic Duct**, as it emerges from beneath the Internal Jugular vein, and, on the anterior surface of the Scalenus Anticus and Phrenic nerve, forms a loop with its convexity upwards and outwards, and opens into the angle formed by the junction of the Internal Jugular and Subclavian veins.

While on the Scalenus Anticus it receives

12. The **Jugular Lymphatic trunk** from
13. The **Inferior Deep Cervical Lymphatic glands**, many

of which are grouped around the Internal Jugular vein, and extend outwards over the Scalene muscles.

14. A small portion of the **first piece** of the **Subclavian artery**, in the interval between the Internal Jugular vein and the **Scalenus Anticus**.
15. The **Thyroid Axis** is seen to arise from it, and to give off
16. The **Supra-scapular artery**, which runs obliquely downwards and outwards across the Scalene muscles ;
17. The **Transversalis Colli artery**, which runs obliquely upwards and outwards over the same muscles, and
18. The **Inferior Thyroid artery**, which runs upwards and then inwards, disappearing beneath the Internal Jugular vein. Its branch, the **Ascending Cervical**, is also exposed.
19. A small portion of the **third part** of the **Subclavian artery** ;
20. The **Phrenic nerve**, lying upon the **Scalenus Anticus** and first portion of the **Subclavian artery**, and disappearing beneath the **Subclavian vein**.
21. Some of the **Cords** of the **Brachial plexus** emerging from beneath the outer margin of the **Scalenus Anticus** and lying above the level of the **Subclavian artery** ;
22. The **nerve to the Subclavius** running downwards along the outer margin of the **Scalenus Anticus**. Occasionally this nerve may communicate by a slender branch with the **Phrenic** on the **Scalenus Anticus**.
23. **Branches** of the **Communicans** and **Descendens Noni**, supplying the portions of **Sterno-hyoid**, **Sterno-**

thyroid and Omo-hyoid muscles, which are exposed.

VII. Remove the portions of the Sterno-hyoid and subjacent Sterno-thyroid, which are seen in the dissection, and expose—

1. The anterior and outer aspect of the **Trachea** ;
2. The **Œsophagus** behind and projecting beyond it ;
3. The **Recurrent Laryngeal nerve**, in the angular interval between them, and supplying branches to both.
4. The **Left Common Carotid**, as it courses obliquely across the Œsophagus, and comes into contact with the side of the **Trachea** ;
5. The **Internal Jugular vein**, overlapping the outer margin of the Common Carotid artery.

VIII. Remove the Internal Jugular vein within the limits of the dissection, and expose—

1. The **Vertebral artery**, and
2. The Superjacent **Vertebral vein**. The latter passes downwards, to open into the innominate vein.
3. The convex upper margin of the **Subclavian artery** ;
4. The **Thoracic Duct**, as it ascends into the neck from between the Carotid and Subclavian vessels, and arches outwards above the arch of the Subclavian artery and lying upon the Vertebral vessels.

The Thoracic duct is completely exposed in the cervical portion of its course.

TO EXPOSE THE TRUNK OF THE LEFT INTERNAL MAMMARY ARTERY.

POSITION.—Place the body in the supine position, and turn the face to the right.

I. SKIN INCISIONS.

Make the same skin incisions as in the preceding dissection. Remove skin, Superficial fascia, and Platysma, and structures contained in them, deep fascia, Sternomastoid, and subjacent deep fascia, and expose the several structures already enumerated.

1. From the anterior inferior angle of this dissection make a vertical incision downwards, down to the lower margin of the Seventh Chondro-sternal articulation. This incision will cross the positions of the Sterno-clavicular and the Seven Chondro-sternal articulations. Cut through all the soft parts down to the bone and cartilages, dividing in so doing skin, Superficial fascia, Deep fascia, Pectoralis major, branches of the Intercostal nerves and vessels, and of the Internal Mammary vessels, and Supra-sternal branches of the Superficial cervical plexus.

2. From a point one inch and a half behind the upper extremity of No. 1 make another vertical incision, reaching to the Cartilages and Clavicle downwards to the lower margin of the Seventh Costal cartilage. In doing this you divide, as well as the structures already enumerated, the Costo-coracoid membrane, the Rectus, and the

common Aponeurosis of origin of the Pectoralis Major and External Abdominal Oblique.

3. Join the lower extremities of No. 1 and No. 2, cutting through the superjacent soft parts down on the lower margin of the Seventh Costal cartilage. In this you divide skin, Superficial fascia, Deep fascia, Aponeurosis of External and Internal Oblique, and the Rectus.

II. Remove the skin and subjacent soft structures from the anterior surface of the Clavicle, Costal Cartilages, and Intercostal spaces, dividing the anterior branches of the Intercostal vessels and nerves and of the Internal Mammary vessels as they emerge from the several Intercostal spaces.

III. Cut through the ligaments that connect the inner extremity of the Clavicle to the Sternum, opposite Clavicle, and first Costal Cartilage.

Saw through the Clavicle in the line of the outer vertical skin incision.

Saw or cut through the first Costal Cartilage vertically from the bottom of the oval clavicular facet on the Sternum. For full details of the conditions and limits of the first Costal Cartilage and Sternum at different periods of life, I would refer the reader to a comprehensive paper¹ on the subject. In the Guy's Hospital Reports for 1886 he will find that the ordinary descriptions of the text books do not by any means explain the conditions which he will find to be present.

Cut or saw through the remaining true Costal Cartilages at their articulation with the Sternum.

¹ "The Physiology and Pathology of Pressure-changes in the Trunk and Shoulder Girdle."

Cut through the several Costal Cartilages along the line of the outer vertical incision, taking care not to cut into the Pleural cavity.

Divide the Intercostal fascia, muscles, vessels, and nerves between the Cartilages.

Cut through the attachments of the Sterno-hyoid and Sterno-thyroid muscles to the Sternum, Clavicle, and first Costal Cartilage, and raise the resected portion of the chest wall from the subjacent Pleura and Triangularis Sterni muscle, separating carefully the internal Mammary vessels from the posterior surface of the Cartilages, dividing in doing so the perforating and Intercostal branches of these vessels.

By cutting through the attachments of the Rectus, Internal Oblique, Transversalis, and Diaphragm to the Seventh Costal Cartilage, the resected Cartilages may be removed. You expose from below upwards—

1. The **Triangularis sterni**.
2. The **Pleura**.
3. The **Innominate vein** emerging from beneath the cut ends of the Sterno-thyroid and Sterno-hyoid muscles.
4. The whole of the calibre of the **Subclavian vein** within the limits of the dissection.
5. The **Internal Mammary artery**, emerging from under cover of the Innominate vein. It runs downwards first upon the Pleura, and then upon the Triangularis Sterni at a distance of about half an inch from the margin of the Sternum. It terminates by dividing into two branches—the **Musculo-phrenic** and **Superior Epigastric arteries**. This division takes place usually beneath or below the level of the Sixth Costal cartilage.

6. The **Two Internal Mammary veins** accompanying the artery, and in the upper part of the dissection uniting to form a single trunk which opens into the lower margin of the left Innominate vein.

IV. Cut through the Subclavian and Innominate veins obliquely over the course of the Internal Mammary artery, and by hooking inwards and outwards the divided ends of the vein, expose—

1. The origin of this vessel from the lower and anterior aspect of the first portion of the Subclavian artery, opposite the Thyroid axis. The vessel runs downwards, forwards, and inwards over the dome-shaped surface of pleura.
2. The **Phrenic nerve**, after running downwards over the first piece of the Subclavian artery, crossing the Internal Mammary artery from without inwards, passing under cover of the Innominate vein, and descending on the inner wall of the undivided pleural sac. The relation of the Phrenic nerve to the Internal Mammary artery is inconstant, the nerve sometimes lying external and sometimes internal to the artery. The Phrenic nerve may be here joined by a **branch** from the **Sympathetic**, and by another from the **nerve to the Subclavius**. The Internal Mammary artery gives off a branch which runs with the Phrenic nerve, the **Comes Nervi Phrenici**.

The trunk of the Internal Mammary artery is now completely exposed.

The succeeding dissection is one by which the trunk of the Internal Mammary artery and the distribution of its several branches can be exposed.

A DISSECTION OF THE INTERNAL MAMMARY ARTERY AND ITS BRANCHES.

POSITION.—The body lying supine.

1. SKIN INCISIONS—

1. From the centre of the **Supra-sternal notch** to mid-way between the **Umbilicus** and **Ensiform Cartilage**.

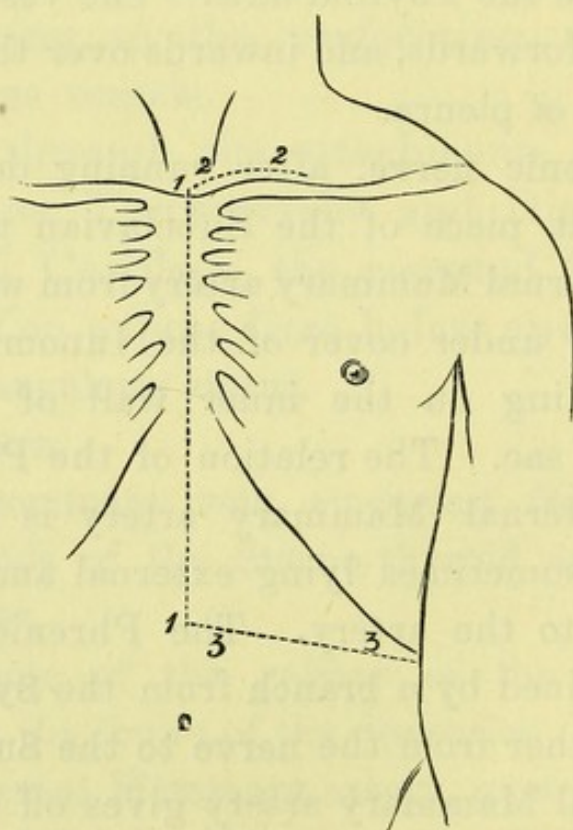


Fig. 9.

2. A transverse one parallel with, and half an inch above, the **Upper border of the Sternum and Clavicle**, to the junction of the inner with the middle third of the latter.
3. Another transversely from the lower border of No. 1 to the **tip of the Tenth rib**.

Reflect the flap outwards and expose the **Superficial fascia** containing—

1. The **Platysma Myoides** muscle over the **Clavicle**.
2. The **Supra-sternal** and **Supra-clavicular** nerves passing over the **Clavicle**, and branches of the **Supra-scapular** artery with them.
3. The upper eight **Anterior Cutaneous** branches of the **Intercostal** nerves along the median line. The corresponding vessels from the **Internal Mammary** and **Superior Epigastric** trunks accompanying them.
4. A communication between the **Supra-clavicular** and **Second Anterior Cutaneous** nerves.
- 5.¹ The **Anterior** branches of the **Third, Fourth, Fifth, and Sixth Lateral Cutaneous** nerves.
6. Small **Cutaneous** vessels are found in the wall of the abdomen, derived from the anterior portions of the **Intercostals**.

II. Remove the **Platysma** muscle and the **Deep Cervical fascia**, and expose—

1. The **Sterno-mastoid** muscle, arising from the **Manubrium Sterni** and inner end of the **Clavicle**.
2. The **Pectoralis Major** muscle, arising from the **Clavicle** and the **Cartilages** of the true ribs from the first to the sixth inclusive. The interlaced aponeurosis of the muscles of opposite sides is also seen over the **Sternum**.
3. The aponeurosis of the **Obliquus Externus** muscle, and the fleshy fibres attached to the **Ninth** and **Tenth** ribs.
4. **Anterior** branches of the **Internal Mammary** artery ramifying over the **Sternum**.

¹ The **Second Lateral Cutaneous** nerve usually wants the **Anterior** branch (Ellis). It is, however, figured by Henle.

III.

- a.* Cut through the exposed attachment of the **Sternomastoid muscle** and turn it upwards.
- b.* Remove the fleshy portion of the **Pectoralis Major muscle** within the limits of the skin incisions, preserving the Anterior Cutaneous arteries and nerves, and observing additional muscular branches of the **Internal Mammary artery** in the intercostal spaces from the second to the sixth inclusive.
- c.* Take away the **Anterior layer of the sheath of the Rectus muscle** made up of the aponeuroses of the **Oblique Externus** and **Internus** muscles, and further take away the aponeurosis and exposed fleshy portion of the **Obliquus Externus** muscle external to this.
- d.* Remove the upper part of the **Rectus muscle**, dissecting out the **Superior Epigastric branch** of the **Internal Mammary artery** which lies beneath it, with its vein. This artery is seen to enter the sheath of the muscle beneath the **Cartilage of the Seventh rib**.

There will now be exposed—

1. The inner portion of the **Clavicle**, the side of the **Sternum**, and the **Costal Cartilages** as far as the tenth.
2. The **Sterno-hyoid** and **Sterno-thyroid** muscles above the **Manubrium** and **Clavicle**.
3. The inner border of the **Scalenus Anticus** muscle external to the preceding muscles.
4. The **fascia over the Internal Intercostals**, these muscles showing plainly through it ; and the anterior portions of the **External Intercostal** muscles.
5. A portion of the **Obliquus Internus** muscle outside the sheath of the **Rectus** muscle.

6. The **Anterior Jugular vein** crossing transversely above the **Clavicle**.

The following structures between the **Sterno-thyroid** and **Scalenus Anticus** muscles :—

7. A small portion of the **first part of the Subclavian artery** and the following branches. The **Thyroid axis**, the commencement of its **Inferior Thyroid**, and the **Transverse Cervical** and **Supra-scapular** offsets.
8. The **Phrenic nerve** is seen on the **Scalenus anticus** muscle if the left artery is dissected ; on the right side this nerve may be too far out.
9. The **Vagus nerve** and the commencement of its **Recurrent Laryngeal** and **Inferior Cardiac** branches are to be seen upon the **Subclavian artery**, if the right side is dissected ; on the left side this nerve is too deep.
10. The **Ansæ Vieusenii** are seen crossing the first part of the right **Subclavian artery**.

IV.

- a. Cut through the **Sterno-hyoid** muscle, and hook inwards the **Sterno-thyroid** muscle.
- b. Saw through the **Clavicle** at the junction of the inner with the middle third, and disarticulate the inner end from the **Sternum** by dividing the **Anterior and Posterior Sterno-clavicular** and **Inter-clavicular** ligaments. The **Inter-articular Fibro-cartilage** will be removed, the **Rhomboid** ligament, the inner end of the **Costo-coracoid** membrane, and a small piece of the internal portion of the **Subclavius** muscle cut through. Remove the upper and outer projecting angle of the **Manubrium**.
- c. Remove the **fascia over the Internal Intercostal** muscles, the anterior portions of the **External** and of the **Internal Intercostal** muscles. When

this is done, the **Internal Mammary artery** will be seen in the intervals of the **Costal cartilages** about half an inch from the **Sternum**. It will be found to be giving off the **Anterior Intercostal branches** of the upper five or six spaces, two in each space, one running along the upper border of the rib, the other along the lower border of the rib above. These will be found to anastomose behind with the bifurcated **Intercostal branches** of the **Aorta**, similarly disposed as regards the rib. In the first or first two spaces, the **Superior Intercostal artery** will take the place of the **Aortic Intercostal**. In the lower spaces **Anterior Intercostal arteries** will be traced, but they will subsequently be found to arise from the **Musculo-phrenic branch** of the **Internal Mammary artery**, but this offset in its course outwards and downwards to the ninth cartilage is hidden by the approximation of the seventh, eighth, and ninth cartilages. The **Internal Mammary artery** will be seen to lie upon the **pleura** above and the **Triangularis Sterni muscle** below. The **Intercostal nerves** will also be seen in the spaces crossing superficial to it. **Veins** corresponding to all the arteries mentioned are seen.

- d. Having thus traced the artery between the cartilages, now remove the inner portions of the **upper nine** by cutting them through, externally in a line extending obliquely from the inner end of the divided **Clavicle** (one and a half inches from the **Sternum**) to the tip of the **Tenth rib**; and internally, disarticulate them from the

breast-bone, dividing the following: **Anterior and Posterior Costo-sternal, Capsular, Inter-articular** of second joint and of third when present, and **Costo-ziphoïd** ligaments. The last is between the **Ensiform** and seventh cartilages. The **Synovial membranes** will be of course destroyed.

- e. Now raise this portion of the chest-wall from above downwards, dividing on its under surface (1) the slips of the **Triangularis Sterni** muscle to the **Ensiform**, and second, third, fourth, fifth, sixth, and seventh **Cartilages**; (2) the attachments of the **Diaphragm** and **Transversalis** muscle from the sixth to the ninth, and still lower (3) the insertion of the **Obliquus Internus** muscle into the ninth rib, that part attached to the seventh and eighth being already removed. The upper part of the last muscle should now be reflected downwards. This dissection should be done carefully, keeping the knife close to the inner surface of the chest-wall, to avoid a division of the artery.

There will now be exposed, commencing from above—

1. The process of **Deep Cervical fascia** beneath the **Sternothyroid** muscle, which should be cleared away.

IF THE DISSECTION IS DONE ON THE LEFT SIDE.

2. The **Internal Jugular** and **Subclavian** veins joining and forming the **Innominate**, only the beginning of which is exposed. The **Vertebral** and **Internal Mammary** veins will be seen joining the **Innominate**, and the **Thoracic duct** entering at the junction of the **Jugular** and **Subclavian** veins.
3. The lower part of the **Common Carotid** artery beneath the preceding trunks.

4. The first part of the **Subclavian artery**, the **Thyroid axis**, and the commencement of its branches, and the origin of the **Internal Mammary branch**.
5. The **Phrenic nerve** crossing the **Internal Mammary artery**.

Owing to the veins overlapping the arteries the **Vagus nerve** is not seen.

IF THE DISSECTION IS MADE ON THE RIGHT SIDE.

2. The **veins** as on the left, but they are more external and separated from the artery by an angular interval. The **right Lymphatic duct** is seen instead of the **Thoracic**.
3. The bifurcation of the **Innominate artery** into **Subclavian** and **Carotid** branches.
4. The **right Vagus nerve**, its **Recurrent** and **Inferior Cardiac** branches.
5. The **Ansæ Vieusenii**.

The **Phrenic nerve** lies too far out to be displayed on this side.

6. **Lymphatic glands** are seen at the root of the neck above the **Manubrium**.

IN THE THORACIC REGION.

7. The **parietal Pleura** is seen above, and the **Triangularis Sterni** muscle below.
8. The **Diaphragm** is seen below.
9. The **Seventh, Eighth, and Ninth Intercostal nerves** are seen on the portion of the **Transversalis** muscle remaining, passing behind the **Musculo-phrenic** branch of the artery.
10. The whole of the **Internal Mammary artery** except the upper part is now seen, and this may be ex-

posed by dividing the **Subclavian vein** and hooking inwards the **Innominate** and **Internal Jugular veins**. This will expose in addition, if the dissection is done on the left side, the **Vagus nerve** and the **Ansæ Vieusenii**, which were not previously seen.

TO EXPOSE THE LEFT PHRENIC NERVE.

POSITION.—Place the body in the supine posture, and turn the head a little to the right.

I. SKIN INCISIONS.

1. Make an incision from the level of the **Hyoid bone** along the anterior margin of the **Sterno-mastoid** to the **Episternal notch**, and from that point run vertically down the middle line of the **Sternum** to the level of the lower margin of the **Sixth Chondro-sternal articulation**.
2. Make a transverse incision backwards from the upper extremity of No. 1 backwards to the posterior margin of the **Sterno-mastoid**.
3. From the posterior extremity of No. 2 make an incision along the posterior margin of the **Sternum** to the **Clavicle**, and from that point drop vertically downwards to the lower margin of the **sixth rib**.
4. Join the lower extremities of No. 1 and No. 3.

II. Reflect the skin and expose structures already fully described in the dissections for the **Vertebral artery** and the **Internal Mammary artery**.

III. Remove the portion of Sterno-mastoid within the limits of the dissection together with the subjacent deep fascia, and expose the structures beneath it. (See dissection for Vertebral artery.)

IV. Remove the Clavicle, Ribs, Costal Cartilages and Sternum within the limits of the dissection (as in dissection for the Internal Mammary artery), divide the Subclavian vein, and remove the Pleura which covers the Phrenic nerve.

The Phrenic nerve is now fully exposed.

I have sketched this dissection in outline in order to avoid very considerable repetition.

If the dissection were performed on the right side it would not be necessary to extend the vertical incisions below the level of the junction of the Fifth rib with the Sternum.

A DISSECTION TO EXPOSE FULLY THE FIRST DORSAL NERVE.

POSITION.—The body is to be supported by blocks placed under the opposite shoulder to that on which the dissection is to be made. The shoulder is to be well pulled down.

I. SKIN INCISIONS.

A semilunar flap of skin along the course of the First rib, is to be removed by the following incisions:—

1. From the Seventh Cervical Spinous process to the lower border of the Sterno-clavicular articulation.

2. From the **Second Dorsal Spinous process** to the upper border of the **Second Costo-chondral articulation**.
3. Vertical incisions joining the Anterior and Posterior ends of the preceding.

The area limited by these incisions will cross in front the middle third of the Clavicle.

II. Remove the skin and expose—

1. **Superficial fascia**, and
2. The **Platysma Myoides** muscle lying beneath it, and blending with it in the Clavicular area of the dissection.

III. Remove the **Superficial fascia** and **Platysma**, carefully preserving the several vessels and nerves which ramify in it.

You now expose—

1. **Deep Cervical fascia** above the level of the Clavicle, and attached to it.
2. The **deep fascia** of the **Thorax**, also attached above to the Clavicle.
3. The **External Jugular vein**, dilated and perforating the deep fascia of the neck immediately behind the posterior margin of the **Sterno-mastoid**, and
4. The **Supra-scapular** and **Transversalis Colli** veins occasionally entering it before it perforates the deep fascia.
5. A communicating branch from the **Cephalic vein** ascending over the Clavicle and opening into the **External Jugular vein**.
6. The **Internal branch** of the **Posterior division** of the **First Dorsal nerve**, with a branch from the **Superior Intercostal artery** and an accompanying vein perforating the deep fascia near the middle line posteriorly.

7. The anterior termination of the First Intercostal nerve with branches of the Superior Intercostal vessels as they emerge from the deep fascia in the anterior portion of the dissection. This branch of nerve does not always become cutaneous.

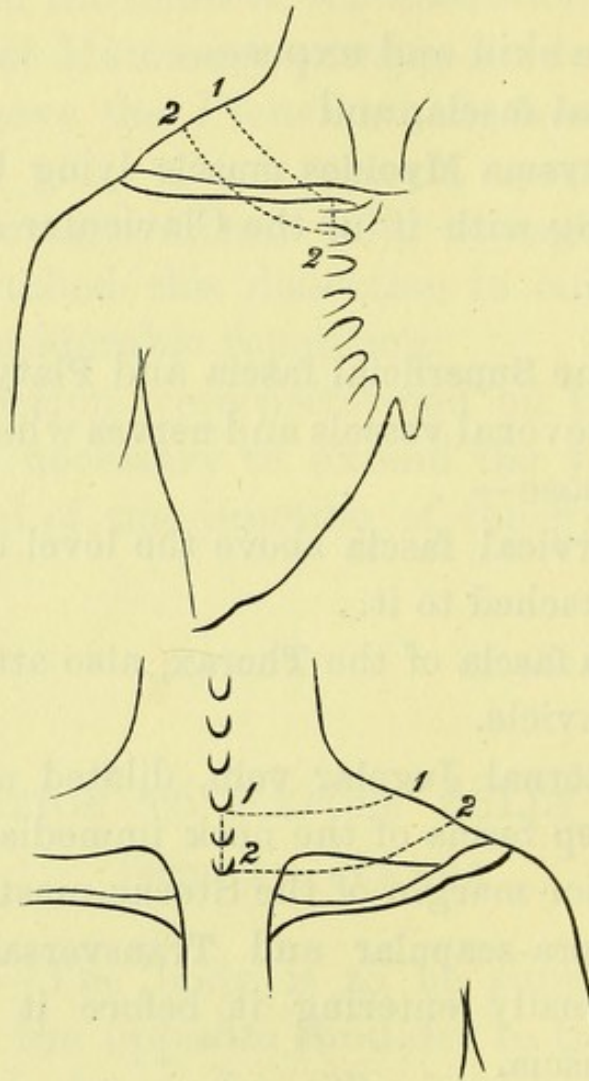


Fig. 10.

8. The Supra-acromial, Supra-clavicular, and Supra-sternal branches of the Superficial Cervical plexus emerging from the Deep Cervical fascia, and crossing the Clavicle.
9. Branches of the Supra-scapular,
10. Superficial Cervical,

11. **Acromio-thoracic**, and
12. **Superior Thoracic** arteries emerging from the deep fascia, and supplying **Platysma** and **Superficial** fascia.
13. The **Superficial Cervical Lymphatic** glands lying about the **External Jugular** vein, their ducts accompanying the vein through the tightly-fitting aperture in the deep fascia.

IV. Remove the structures superficial to the deep fascia with the exception of the branches of the **First Dorsal** nerve, which must be carefully preserved.

V. Remove the portion of deep **Cervical** fascia exposed, dividing its attachment to the **Clavicle**, and the deep processes which pass beneath the **Trapezius** and **Sternomastoid** at their connection with it, and observe also the deep process which binds the tendon of the **Omo-hyoid** muscle down to the **Clavicle** and first rib.

VI. Remove the deep fascia of the **Thorax** within the limits of the dissection, and expose—

1. A portion of the **Pectoralis Major**.
2. A triangular area of **Deltoid** muscle below the preceding muscle.
3. A small portion of the **Clavicular** origin of the **Sternomastoid**, and
4. A strip of **Trapezius** above the **Clavicle**.
5. Between the **Sternomastoid** and **Trapezius**, portions of the **Scalenus Medius**,
6. The **Scalenus Posticus**,
7. The **Serratus Magnus**,
8. The **Omo-hyoid**, and
9. The **Levator Anguli Scapulæ** muscles.
10. The **External Jugular** vein, receiving

11. The **Anterior Jugular vein**, and
12. Possibly the **Supra-scapular** and **Transversalis Colli** veins, and
13. The **Posterior External Jugular vein**, which has emerged from beneath the **Trapezius**.
14. The **Subclavian vein**.
15. The **Inferior Deep Cervical Lymphatic** glands surrounding
16. The **third** portion of the **Subclavian artery** lying upon the first rib, and giving off occasionally
17. The **Transversalis Colli** or the **Posterior Scapular artery**.
18. The **Supra-scapular artery**, emerging from beneath the **Sterno-mastoid**, running outwards under cover of the **Clavicle**, and passing beneath the **Trapezius**.
19. The **Transversalis Colli**, emerging higher up from beneath the **Sterno-mastoid**, crossing the **Scalene** muscles above the **Subclavian artery**, and dividing at the inner margin of the **Levator Anguli Scapulæ** into the **Posterior Scapular artery**, which runs beneath it, and the **Superficial Cervical artery**, which runs over it.
20. The **CORDS** of the **Brachial plexus**, lying upon the **Scalenus Medius**, and above and behind the **Subclavian artery**.
21. The **nerve to the Subclavius**, crossing the **Subclavian artery** superficially.
22. The **nerve to the Rhomboid**, emerging from the **Scalenus Medius**, and accompanying the **Posterior Scapular artery** beneath the **Levator Anguli Scapulæ**.
23. The **Respiratory of Bell**, emerging also from the **Scalenus Medius**, and running down upon the **Serratus Magnus**.

24. The **Supra-scapular** nerve, passing obliquely downwards and outwards beneath the Trapezius.
25. **Branches** of the **Third and Fourth Cervical** nerves entering the under surface of the Trapezius, with
26. **Branches** of the **Spinal Accessory** nerve.
27. The **Cephalic vein** between the Deltoid and Pectoralis Major, immediately below the Clavicle, accompanied by
28. **Branches** of the **Acromio-thoracic** artery.

VII. Remove the portion of Pectoralis Major exposed, carefully preserving the anterior termination of the First Intercostal nerve, as it runs through its substance. In taking away this muscle you divide branches of the External Anterior Thoracic nerve, of the Acromio and Superior Thoracic arteries, and expose a deep layer of subjacent fascia.

VIII. Remove the small portion of Deltoid exposed.

IX. Remove the portion of Trapezius exposed, dividing in so doing branches of the Spinal Accessory, of the Third and Fourth Cervical nerves, of the Superficial Cervical artery, and of the Posterior External Jugular vein. Preserve the Dorsal branch of the First Intercostal nerve as it runs through the Trapezius.

In the area left by the removal of the Trapezius you expose—

1. Further portions of the **Scalenus Medius**,
2. The **Scalenus Posticus**, and
3. The **Levator Anguli Scapulæ** muscles.
4. The **Cervicalis Ascendens**,
5. The **Transversalis Colli**, and
6. The **Splenius** muscles, overlapped below by

7. The **Serratus Posticus Superior**, and a little lower still by
8. The **Rhomboideus Minor**.
9. The posterior belly of the **Omo-hyoid**.
10. The upper angle of the **Scapula**, and
11. A portion of the **Supra-spinatus** muscle covered by fascia.

X. Remove the deep fascia beneath the **Pectoralis Major**, and expose—

1. The **Costo-coracoid** membrane and ligament.
2. The **Cephalic** vein,
3. The **External Anterior Thoracic** nerve,
4. The **Acromio-thoracic**, and
5. The **Superior Thoracic** arteries perforating the costo-coracoid membrane.

XI. Remove the exposed part of the **Rhomboideus Minor** muscle. The **Serratus Posticus Superior** muscle is seen beneath it, and the **Posterior Scapular** artery and vein between the two.

XII. Remove the **Levator Anguli Scapulæ** muscle within the limits of the dissection. The nerve to the **Rhomboidei** muscles, and the **Posterior Scapular** artery will be seen beneath it.

XIII. Take away the exposed part of the **Serratus Posticus Superior** muscle, and remove at the same time the **Posterior Scapular** vessels, and the nerve to the **Rhomboidei** muscles.

There will now be exposed, passing from the **Spinous** processes outwards—

1. The **Tubercle** of the first, and a considerable portion of the second rib.
2. Further portions of the **Splenius**,
3. The **Transversalis Colli**, and

4. The **Cervicalis Ascendens** muscles.
5. The **Second Levator Costæ** muscle passing from the transverse process of the first Dorsal vertebra downwards and outwards to the second rib, the **External**¹ branch of the posterior primary division of the first Dorsal nerve, passing out external to it, and the **internal division** internally.

Passing from below are—

6. The upper tendon of the **Musculus Accessorius** into the first rib.
7. The highest tendon of the **Longissimus Dorsi** muscle when attached to the first rib.

XIV. Remove the preceding muscles as far as they are exposed in the dissection. In detaching the **Transversalis Colli** muscle the **Trachelo-mastoid** will be found beneath it, and should be taken away at the same time. The **Second Levator Costæ** muscle may be retained in order to follow out more fully the nerves in relation with it.

There will now be exposed—

A portion of the **Complexus** muscle along the median line.

XV. Remove this and there will be seen—

The **Semi-spinalis** muscle.

XVI. Take away this and there will come into view—

1. The **Multifidus Spinæ** muscle.
2. Lying upon it the internal branches of the posterior primary divisions of the **Eighth Cervical** and **First Dorsal** nerves.

XVII. Clear away the **Multifidus Spinæ** muscle, and there will be seen—

1. The **first rib** at its inner part, the **transverse process**

¹ In two dissections I have found this to be the case. Both branches may, however, be internal to the **Levator Costæ** muscle.

of the **First Dorsal vertebra**, and part of the second rib.

2. The **Posterior Costo-transverse ligament**, between the **First Dorsal transverse process** and its rib.
3. The posterior part of the **External Intercostal muscle**.

XVIII. Divide the **First Dorsal Transverse process** at its root with the chisel. Cut through the first rib at its neck, and again external to its tubercle. Cut through the first **Anterior Costo-transverse ligament**, which runs downwards from the first Dorsal transverse process to the second rib. Remove the included portions of bone. The **Posterior and Middle Costo-transverse ligaments** of the first rib will be taken away at the same time. The **Superior Intercostal artery**, which lies upon the neck of the first rib, will be divided; but the **Inferior Cervical ganglion of the Sympathetic**, which is internal to it, will not come into view.

XIX. Remove now the exposed **External Intercostal muscle**, and

The trunk of the **First Dorsal nerve** and its division into **Anterior and Posterior primary branches** will come into view.

XX. Continue now the dissection forwards in order to trace out fully the **Anterior Primary branch**.

a. Divide and remove the exposed portions of the **Scalenus Posticus** and **Scalenus Medius** muscles. The latter muscle is taken away to trace the branch of the **First Dorsal nerve**, which joins the **Eighth Cervical**.

b. Remove the middle third of the **Clavicle** with the **Costo-coracoid membrane** and the **Subclavius muscle**.

- c. Divide the **Transversalis Colli** artery and vein, and the **Supra-scapular** artery and vein.
- d. Cut through the cords of the **Brachial** plexus, and the **Supra-scapular** and **Posterior Thoracic** branches.
- e. Remove the first digitation of the **Serratus Magnus** muscle, the fascia over the **External Intercostal** muscle, and the remaining portion of the muscle itself.

The anterior primary branch of the nerve may now be fully traced.

N.B.—The nerve in the posterior part of its course lies underneath the first rib, and this must be lifted up, or better, the outer border may be chipped away to the necessary extent.

A DISSECTION OF THE POSTERIOR SURFACE OF THE CORD IN THE CERVICAL REGION.

POSITION.—The body lying on its face, the shoulders supported by blocks, and the head hanging forwards.

I. SKIN INCISIONS.

1. A vertical one along the middle line, the upper limit of which is the central point of a line encircling the neck at the level of the apices of the **Mastoid** processes, and the lower the **First Dorsal Spinous** process.
2. Transverse incisions above and below for two inches on each side.

Reflect the flaps outwards and expose the **Superficial** fascia containing—

1. Small cutaneous branches from the **Superficial Cervical**

- artery on the outer side, and from the **Arteria Profunda Cervicis** with the nerves described under No. 4.
2. **Veins** corresponding to the preceding arteries, and others along the middle line, which are connected with the **Dorsi-spinal**.
 3. At the outer parts of the surface exposed cutaneous twigs from the third and fourth **Cervical** nerves supplying the skin over the **Trapezius** muscles.

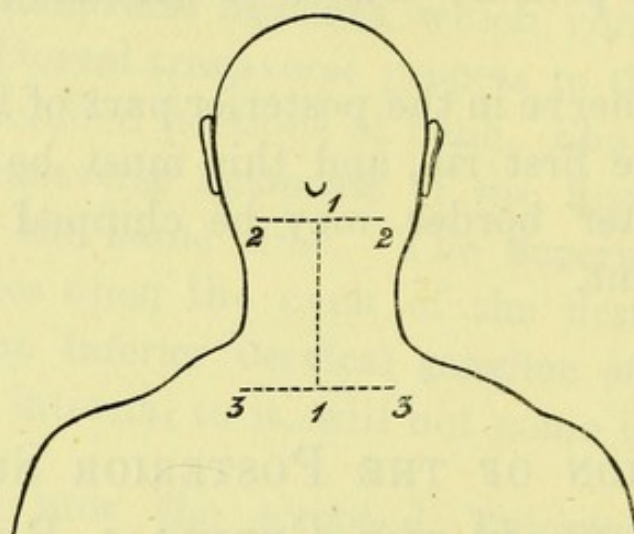


Fig. 11.

4. Near the middle line the inner branches of the posterior primary divisions of the third, fourth, and fifth **Cervical** nerves, the third sending a branch up to the **Occiput**.
- II. Remove the preceding and the **Deep Fascia**, and expose—
1. The **Trapezii** muscles running up above to the inner third of the superior curved lines, and attached to the **Ligamentum Nuchæ**, and spine of the Seventh **Cervical** vertebra.
 2. Small portions of the **Sterno-mastoidei** muscles at the extreme upper and outer parts.
 3. A small portion of the **Splenius Capitis** muscle between the two preceding on either side.

III. Cut through and remove the **Trapezius muscle** on each side as far as it is exposed. With it there will be removed the **Spinal-accessory nerve** and branches from the third and fourth **Cervical nerves**, together with offsets of the **Superficial Cervical artery**.

The following structures will now be seen on both sides :—

1. The **Complexus muscle**, highest of all, inserted into the space between the curved lines of the Occipital bone.
2. Below this, the **Splenius muscle**, arising as far as it is possible to make out in this dissection, from the spines of the first Dorsal and the seventh Cervical vertebræ and the ligamentum nuchæ up to the third vertebra, and splitting above into two portions, the upper one of which goes to the head (**S. Capitis**), and the lower to the posterior tubercles of the upper three or four Cervical transverse processes (**S. Colli**).
3. Below the Splenius the **Rhomboideus Minor muscle**, running downwards and outwards from the seventh Cervical and first Dorsal spines.
4. The **Serratus Posticus Superior muscle** has the same origin as the preceding, and lies beneath it; its superior border showing above it, however.
5. The origin of the **Levator Anguli Scapulæ muscle**, from the upper three or four posterior tubercles of the Cervical transverse processes, is seen on the outer side of the Splenius.
6. Between the Levator Anguli Scapulæ, the Rhomboideus Minor, and the Splenius is a triangular interval, in which some tendinous slips of the **Cervicalis Ascendens** and **Transversalis Colli muscles** appear, the latter being internal.

7. Lying upon the **Complexus** muscles at their extreme upper and outer parts are the **Occipital** artery and vein, and lower down on the **Splenius** muscle branches of the **Superficial Cervical** artery and vein, and the **Posterior External Jugular** vein.
8. Emerging from the **Complexus** above the **Splenius** muscle, the internal branches of the posterior primary divisions of the second and third **Cervical** nerves and their communications (**Great** and **Third Occipital** nerves).

IV.

- a. Detach the **Rhomboideus Minor** and the **Serratus Posticus Superior** muscles of both sides and take them away. Filaments of the nerves to the **Rhomboid**, and also of those supplying the **Serrati** muscles, will be divided.
- b. Hook well aside the following muscles of each side:—**Levator Anguli Scapulæ**, **Cervicalis Ascendens**, and **Transversalis Colli**.
- c. Remove the **Splenii** muscles as far as they are exposed in the space dissected. Their nerves from the external branches of the posterior primary divisions of the **Cervical** nerves will be seen and divided on their deep surface.

There will now be exposed—

1. The tubercle of the first rib, internal to the retracted **Transversalis** and **Cervicalis** muscles on each side.
2. The **Complexus** muscles lying in the vertebral groove, and reaching above from the Occiput to the lower extremity of the space. The inner division called **Biventer Cervicis** is apparent.
3. The **Transversales** and **Cervicales** muscles of both sides more fully.

4. The **Trachelo-mastoid muscles** on either side, inside the two immediately preceding muscles, arising from the Cervical articular processes from the fourth to the seventh inclusive, and inserted into the Mastoid processes. All their origin, however, is not seen.
5. The **Occipital vessels**, lying upon the **Complexus** muscle of each side at its extreme upper part, and offsets of the **Princeps Cervicis** branch running down superficial to the muscle.
6. The same branches of the second and third Cervical nerves already mentioned.
7. The nerves to the **Splenii** muscles from the posterior primary branches of the Cervical are seen entering their deep surface.

V.

- a. Cut through and remove the **Complexus** muscles from their origins and insertions. The former, as is displayed in this dissection, arises from the transverse processes of the first Dorsal and seventh Cervical vertebræ, the spine of the seventh, and the articular processes of the fourth, fifth, and sixth Cervical vertebræ; the latter; is into the space between the two curved lines of the Occipital bone. The nerves to the **Complexus** from the Sub-occipital, and internal branches of the posterior primary divisions of the second and third Cervical nerves, will be divided on removing the muscle.

There will now be exposed on either side—

1. The **Articular Processes** of the second, third, fourth, fifth, and sixth Cervical vertebræ.
2. The **Ligamentum Nuchæ** now displayed by the removal of the various muscles.

3. The **Sub-occipital triangle**, bounded internally by the **Rectus Capitis Posticus Major** muscle, below and externally by the **Inferior Oblique** muscle, and above and externally by the **Superior Oblique** muscle. In its floor is the **posterior arch of the Atlas**. The **Rectus Capitis Posticus Minor** is seen as it lies internal to and partly beneath the **Rectus Capitis Posticus Major**.
4. The **Semi-spinales** muscles, running from the first Dorsal transverse process to the spines as high as the second vertebra.
5. Above and external to the **Semi-spinalis Colli** muscle, passing to the spinous processes, is seen a small piece of the **Multifidus Spinæ** muscle arising from the four lower Cervical Articular processes.
6. Lying upon the arch of the Atlas in the floor of the triangle is seen the **Vertebral artery**.
7. Upon the **Semi-spinalis**, beneath the nerves to be mentioned, the **Profunda Cervicis** branch of the **Superior Intercostal artery** running up to join in a general anastomosis over the Sub-occipital triangle, with branches of the **Vertebral** and **Princeps Cervicis** arteries.
8. The origins of the **Vertebral vein**, and sometimes the **Posterior Condylloid vein** in the triangle. The **Profunda Cervicis** vein with the corresponding artery.
9. The **Sub-occipital nerve**, and the internal divisions of the posterior primary branches of the second, third, fourth, and fifth Cervical nerves. The internal branches of the first three Cervical nerves communicate beneath the **Complexus** and form **Cruveilhier's plexus**. The **Sub-occipital nerve** lies *beneath*

the **Vertebral artery** *upon* the arch of the **Atlas** and supplies both the **Recti Postici** and **Oblique** muscles and the **Complexus** muscle. The **great Occipital nerve** turns round the lower border of the **Inferior Oblique** muscle. The **third, fourth, and fifth** nerves course inward *over the* **Semi-spinalis** to become cutaneous by the **Spines**, and the internal branches from the three lowest **Cervical** nerves run upon the **Multifidus Spinæ** and *beneath* the **Semi-spinalis Colli**.

10. The **external branches of the second, third, fourth, fifth, sixth, seventh, and eighth** nerves, emerging externally to the line of the articular processes of the **Cervical vertebræ**. These enter the following muscles:—**Complexus, Transversalis Colli, Trachelomastoid**, and **Cervicalis Ascendens**.
11. **Branches from the Vertebral artery** are seen with the last-mentioned nerves.
12. The **laminæ** of the **Cervical vertebræ** above the upper margin of the **Multifidus Spinæ**.
13. The **Inter-spinales** muscles connecting the bifid extremities of the **Spinous Processes**.

VI.

- a. Remove now the **Semi-spinales** muscles, with the inner branches of the posterior primary divisions of the **third, fourth, and fifth Cervical** nerves lying upon them.

This brings into view—

1. A further portion of the **Multifidus Spinæ** muscle.
2. The inner branches of the posterior primary divisions of the **sixth, seventh, and eighth Cervical** nerves. In the dissection made, the corresponding branch of the **fifth nerve** passed beneath the **Semi-spinalis** muscle.

- b.* Clear away the **Multifidus Spinæ**, the **Rectus Capitis Posticus Major and Minor**, the **Superior and Inferior Oblique Muscles** of both sides.
- c.* The anastomosis of **Vertebral, Princeps, and Profunda Cervicis** arteries.
- d.* The origin of the **Vertebral veins**.
- e.* **Cruveilhier's plexus** and the nerves forming it.
- f.* The inner branches of the posterior primary divisions of the sixth, seventh, and eighth **Cervical nerves**.

This will expose—

- 1. The **laminæ**, with the **articular and spinous processes** of the **vertebræ** as far as the first **Dorsal**, and the **posterior arch of the Atlas**.
- 2. The posterior **Occipito-atloid** and **Atlo-axoid ligaments** and the **Capsular ligaments** of the **articular processes**.
- 3. The **Dorsi-spinal Venous plexus** lying upon the **vertebral laminæ**.

VII. Saw through the **posterior arch of the Atlas**, and the **laminæ** of the exposed **vertebræ** internal to the **articular processes** on each side, and remove the pieces of bone together with the following structures :—

- a.* The **Ligamentum Nuchæ**.
- b.* The **Inter-spinales muscles**.
- c.* The **Inter-spinous ligaments**. (Very slightly marked in the neck.)
- d.* The **Posterior Occipito-atloid** and **Atlo-axoid ligaments**, and the **Ligamenta Subflava** below the first two **vertebræ**.
- e.* The **Vertebral artery**, and the **Sub-occipital nerve**.
- f.* The **Venæ Dorsi-spinales**.

This opens up the **Spinal canal** and exposes—

- 1. The **Dura-mater** surrounded by loose areolar tissue.

2. The Posterior Longitudinal Venous plexus lying upon the Dura-mater.

VIII. Slit up the Dura-mater with the parietal layer of the Arachnoid along the median line.

This brings into view—

1. The visceral layer of Arachnoid with the Subjacent Sub-arachnoid space and Pia-mater, and the Ligamentum Dentatum.
2. The Posterior surface of the Spinal Cord, and the Posterior Roots of the Spinal Nerves.
3. The Posterior Spinal arteries, one on each side.
4. The Medulli Spinal veins, which are in the main two venous trunks, one on each side, united into a close plexus by intercommunicating branches.

TO EXPOSE THE LEFT SUPRA-SCAPULAR ARTERY FROM ITS ORIGIN TO THE SUPRA- STERNAL NOTCH.

POSITION.—Place the body on the back.

Define the extremities of the Clavicle and the anterior margin of the Sterno-mastoid.

I. SKIN INCISIONS.

1. Make an incision one inch long from the Sterno-clavicular articulation upwards along the anterior margin of the Sterno-mastoid.
2. Make an incision along the whole length of the upper border of the Clavicle.
3. From the outer extremity of the Clavicle make an incision vertically upwards for an inch.

4. Make an incision parallel to the Clavicle and joining the upper extremities of the vertical incision.

By this means an area one inch broad, and extending along the whole length of the Clavicle, will be included between the skin incisions.

II. Remove the skin, and expose—

1. **Superficial fascia**, and beneath it,
2. The **Platysma**, the direction of whose fibres is upwards or inwards.

III. Remove the superficial fascia and platysma, carefully preserving the distribution of the several vessels and nerves in and beneath them, and expose—

1. The **Deep Cervical fascia** attached to the whole length of the Clavicle.
2. The **Anterior Jugular vein** perforating the deep Cervical fascia at the anterior limit of the dissection.
3. The **External Jugular vein**, dilated at this point, and receiving from over the Clavicle a communicating vein from the Cephalic, and the Transversalis Colli and Supra-scapular veins should they lie superficial to the deep Cervical fascia.
4. The **Superficial Cervical Lymphatic glands** running with the External Jugular vein, their ducts perforating the deep fascia with the vein.
5. The **Supra-sternal, Supra-clavicular, and Supra-acromial** branches of the **Superficial Cervical plexus**, perforating the Deep fascia, and running downwards over the Clavicle.
6. Branches of the **Superficial Cervical nerve**.
7. Branches of the **Transversalis Colli and Supra-scapular arteries** emerging from the Deep fascia, and ramifying in the Superficial fascia and Platysma.

IV. Remove the Deep Cervical fascia within the limits of the dissection, dividing the attachment of deep processes to its under surface, and expose in the anterior and posterior portions of the dissection, the Sterno-mastoid and Trapezius.

V. Remove the portions of Sterno-mastoid and Trapezius with the subjacent processes of Deep Cervical fascia and expose from before backwards—

1. The **Sterno-hyoid** ;
2. The **Sterno-thyroid muscle**, projecting from beneath the outer margin of the Sterno-hyoid ;
3. The **Scalenus Anticus** ;
4. The **Scalenus Medius** ;
5. The **Scalenus Posticus** ;
6. The **Serratus Magnus** ;
7. The **Omo-hyoid**, crossing the space obliquely, and being inserted into the upper margin of the Scapula, and into the transverse ligaments. Its tendon was seen to be bound down to the Clavicle and first rib by a process of Deep Cervical fascia ;
8. The **Levator Anguli Scapulæ** ;
9. The **Internal Jugular vein**, joining
10. The **Subclavian vein**, to form
11. The **Left Innominate vein** ;
12. The **Anterior Jugular vein**, crossing superficially from before backwards the Sterno-hyoid, Sterno-thyroid, and Scalenus Anticus, to enter the Subclavian vein, or
13. The **External Jugular vein**. The External Jugular vein usually receives the Supra-scapular and Transversalis Colli vein in this portion of its course.
14. The **Thoracic duct**, emerging from beneath the In-

ternal Jugular vein, forming a loop upon the Anterior surface of the *Scalenus Anticus* and *Phrenic* nerve, and opening into the angular junction of the Internal Jugular and Subclavian veins.

15. The **Inferior Deep Cervical Lymphatic** glands, surrounding the Internal Jugular and Subclavian veins. Their ducts unite to form

16. The **Jugular Lymphatic** trunk, which opens into the Thoracic duct.

17. The **Common Carotid** may be just seen, it being much overlapped by the Internal Jugular vein.

18. The first portion of the **Subclavian** artery, internal to the inner margin of the *Scalenus Anticus* ;

19. The **Thyroid axis**, arising from this portion of the Subclavian artery. It gives off

20. The **Inferior Thyroid** artery, which runs upwards and then inwards, beneath the Internal Jugular vein ;

21. The **Transversalis Colli**, which runs outwards over the *Scalene* muscles, and divides at the inner margin of the *Levator Anguli Scapulæ* into the **Superficial Cervical** artery, which runs on the surface of the *Levator Anguli Scapulæ*, and the **Posterior Scapular** artery, which runs beneath it ; and

22. The **Supra-scapular** artery, which runs obliquely downwards and outwards, and then directly outwards under cover of the *Clavicle* to the notch in the *Scapula*. It then usually crosses over the transverse ligament, the nerve passing beneath it ;

23. The third portion of the **Subclavian** artery, lying upon the upper surface of the first rib, and occasionally giving off the **Transversalis Colli** or the **Posterior Scapular** artery, rarely the **Supra-scapular** ;

24. The **Phrenic nerve**, descending on the **Scalenus Anticus** and crossing the first portion of the **Subclavian artery** ;
25. The branches of the loop formed by the **Descendens** and **Communicans Noni**, which supply the **Sternohyoid**, **Sterno-thyroid**, and **Omo-hyoid** muscles ;
26. The **Brachial Plexus**, lying upon the **Scalenus Medius** and above the **Subclavian artery** ;
27. The **nerve to the Subclavius**, arising from the cord formed by the fifth and sixth nerves, and descending vertically over the **Subclavian vessels**. It usually sends a communicating branch to the **Phrenic nerve** ;
28. The **Supra-scapular nerve**, arising from the same cord, and passing obliquely outwards and downwards below the **Omo-hyoid** to enter the **Supra-scapular notch** ;
29. The **nerve to the Rhomboid**, emerging from the **Scalenus Medius**, and accompanying the **Posterior Scapular artery**.
30. The **Respiratory of Bell**, emerging from the **Scalenus Medius**, and running downwards upon the **Serratus Magnus** ;
31. **Branches of the Third and Fourth Cervical nerves**, and of
32. The **Spinal Accessory nerve**, supplying the portion of **Trapezius** removed ;
33. **Branches of the Third Cervical nerve**, supplying the **Levator Anguli Scapulæ**.

The **Supra-scapular artery** is now fully exposed.

A DISSECTION TO EXPOSE THE ANTERIOR SURFACE OF THE TRACHEA.

POSITION.—Body supine, a block under the shoulders, and the head hanging back.

I. SKIN INCISIONS.

1. Along the median line from the **Cricoid cartilage** to the level of the lower border of the **Third Costal cartilages** at their junction with the **Sternum**.

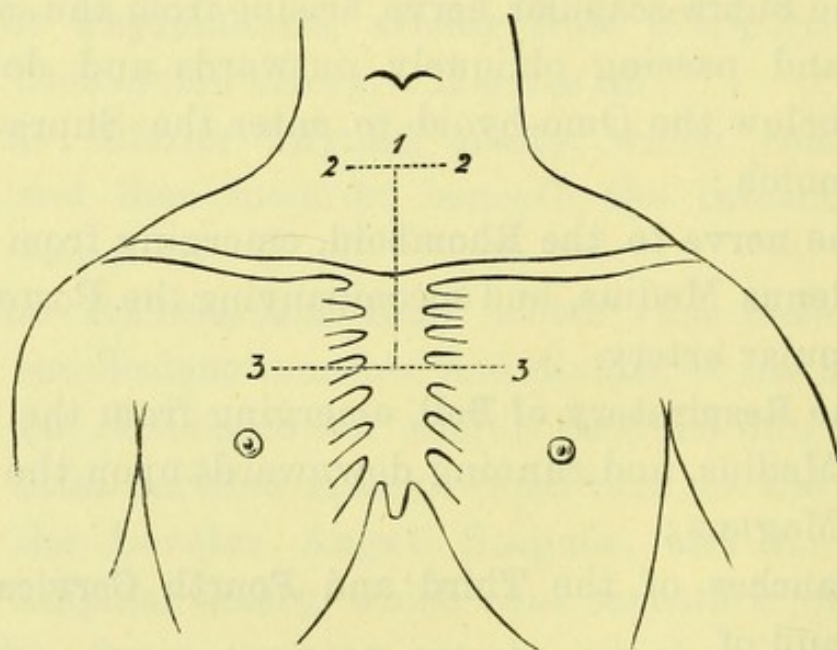


Fig. 12.

2. A transverse incision at the upper end for one inch on either side.
3. A transverse incision at the lower end for three inches on either side.

Reflect the flaps outwards and expose—

1. The **Superficial fascia**.

2. The **Platysma** muscles over the inner ends of the Clavicles.
3. Branches of the **Anterior Jugular veins** perforating at a variable distance down the neck.
4. The Inferior branch of the **Superficial Cervical nerve** at the lower part of the neck.
5. Twigs of the **Supra-sternal** and **Supra-clavicular** branches of the Cervical Plexus.
6. The **communication** of the Supra-clavicular with the second Anterior Cutaneous nerve.
7. Branches of the **Supra-scapular artery** passing over the Clavicle with them.
8. Cutaneous branches from the **Inferior Thyroid artery** at the lower part of the neck.
9. The **first Anterior Cutaneous artery** from the Internal Mammary sending small filaments to join them.
10. The **Anterior Cutaneous arteries, veins, and nerves** of the upper two spaces.
11. The **Anterior branch of the second Lateral Cutaneous nerve**, when present.
12. Its **corresponding artery**.

II. Remove all the preceding structures, and expose the **deep fascia** of the neck and chest.

In taking away the **Platysma**, the **Supra-clavicular** and **Supra-sternal nerves** will be found *beneath* it above the Clavicle.

III. Remove the **deep fascia**.

In the middle line in front this will be found to present **two layers**, one between the Anterior borders of the **Sternomastoid muscles**, and one between the corresponding borders of the **Sterno-hyoid muscles**. Some fat is found between these layers.

There will now be exposed—

1. The inner portions of the **Clavicles** on either side, and the first two pieces of the **Sternum**; the latter covered by the aponeurotic expansion of the **Pectoral muscles**.
2. The **Sterno-mastoid muscles** attached to the **Clavicles** and **Manubrium**.
3. The **Sterno-hyoid muscles**.
4. Small portions of the **Sterno-thyroid muscles** beyond the preceding above and internal to them below.
5. Small portions of the **Omo-hyoid muscles** at the upper and outer parts.
6. Small branches of the **Supra-scapular arteries** over the inner parts of the **Clavicles**.
7. Small branches of the **Inferior Thyroid arteries** above the **Sternal notch**.
8. Further portions of the **Anterior Jugular veins**, and a transverse branch of communication between the two, above the **Sternal notch**.
9. The **Great Pectoral muscles**.
10. **Lymphatics**.

IV. Remove now—

- a. The **Sterno-mastoid muscles** within the limits of the skin incisions.
- b. The **Sterno-hyoid muscles**.
- c. The **Sterno-thyroid muscles**.
- d. Deep processes of the **Deep Cervical fascia**.

In doing this there will be seen and divided beneath the first muscle on each side—

1. A further portion of the **Anterior Jugular vein**, crossing the **Sterno-hyoid** and **Sterno-thyroid muscles** superficially from before backwards.

2. The nerves to the **Sterno-hyoid** and **Sterno-thyroid** from the **Ansa Hypoglossi** entering their outer borders

e. Cut away the **Pectoral** muscles within the limits of the dissection.

There will now be exposed from above downwards—

1. Processes of **Deep Cervical** fascia beneath the **Sterno-thyroid** muscles running to the **Pericardium**.
2. The lobes and isthmus of the **Thyroid** body.
3. The **Trachea** in the Median line.
4. The **Œsophagus** at the root of the neck on the left side.
5. The **Inferior Thyroid Plexus** of veins.
6. Branches of the **Inferior Thyroid** arteries.
7. The **Arteria Thyroidea Ima** when present.
8. The inner margin of the **Scalenus Anticus** muscle on either side.
9. The **Omo-hyoid** muscles, crossing the **Anterior Scalene** muscles at the upper part.
10. The **Phrenic** nerve, on the left **Scalenus Anticus**.
11. Small portions of the first part of the **Subclavian** artery on both sides with the **Thyroid** axis, and the commencement of the **Inferior Thyroid**, **Transverse Cervical**, and **Supra-scapular** branches.
12. On the left side, the **Carotid** sheath, and this being opened, the **Internal Jugular** vein, covering this part of the **Common Carotid** artery. The **Vertebral** vein is also seen.
13. On the right side, the **Common Carotid** artery and **Internal Jugular** and **Vertebral** veins will be both exposed.
14. The **Thoracic** and right **Lymphatic** ducts, and the **Inferior Deep Cervical Lymphatic** glands and vessels.
15. The right **Vagus** nerve, between the **Carotid** artery

and Jugular vein, next crossing the Subclavian artery.

16. The right **Ansa Vieusennii**.
17. The first three ribs, and Costal cartilages.
18. The inner portions of the **Subclavii** muscles, between the first rib and the Clavicles, covered by the **Costo-coracoid** membranes.
19. The fascia of the **External Intercostals**.
20. The **Internal Intercostal** muscles showing through it.
21. The anterior portions of the **External Intercostals**.
22. The **Anterior Sterno-clavicular** and **Inter-clavicular** ligaments, and **Anterior Costo-sternal** ligaments.

V. Saw through the **Clavicles**, divide the upper three ribs at the outer limit of the skin incisions, and saw through the **Sternum** at the level of the lower margins of the third cartilages. Remove the included piece of chest-wall, with the following structures—

- a. The origins of the **Sterno-hyoid** and **Thyroid** muscles.
- b. The **External** and **Internal Intercostal** muscles.
- c. The **Triangulares Sterni** muscles.
- d. The **Internal Mammary** arteries and veins.
- e. The **Intercostal** nerves, arteries, and veins of the upper two spaces.
- f. The **Subclavii** muscles will be divided at their inner portions.
- g. The **Parietal** layers of the **Pleuræ**.
- h. A few **Lymphatic** glands between the **Pleuræ** and **Sternum**.

The Lungs will be found to be retracted on either side, and, after the superjacent pleura has been removed, there will be exposed—

1. **Areolar** tissue, fat, and **lymphatics** of the **Anterior Mediastinum**, which should be cleared away.

2. The **Trachea**, in the Median line.
3. The right and left **Internal Jugular veins**, forming the right and left **Innominate**s, and a small portion of the **Superior Vena Cava**, if distended. Entering the right and left **Innominate**s are the **Inferior Thyroid** and **Vertebral veins** coming from above. The **Superior Intercostal veins** from below, and the cut ends of the **Internal Mammary branches**.

These veins should now be removed, and there will then be exposed—

4. The arch of the **Aorta** giving off the **Innominate branch** on the right, which crosses over the **Trachea**, and bifurcates above into right **Subclavian**, and **Common Carotid** branches. The left **Common Carotid** and left **Subclavian** branches, passing upwards and to the left. The **Vertebral artery** will be seen leaving the latter on the removal of its vein.
5. Crossing the arch of the **Aorta** are, from within outwards—
 - a. The left **Phrenic nerve**.
 - b. The **Inferior Cardiac branch** of the left **Vagus**.
 - c. The **Cardiac branch** of the left **Superior Cervical Ganglion**.
 - d. The left **Vagus** giving off its **Recurrent branch**.
 - e. The left **Superior Intercostal vein**.
6. The left **Pulmonary artery**, and the **Ductus Arteriosus**.
7. The right **Vagus nerve** passing beneath the **Innominate artery**. Its **Recurrent branch** is seen turning round the **Subclavian artery**, and its **Inferior Cardiac branch** lying on the outer side, and then passing beneath the **Innominate**.
8. The left **Vagus** is seen above, between the **Common**

Carotid and Subclavian arteries, and below passing beneath the left branch of the **Pulmonary artery**.

9. The right and left **Ansæ Vieusenii** crossing the first parts of the Subclavian arteries.
10. Part of the **Superficial Cardiac Plexus**.
11. The right and left **Phrenic nerves** in front of the corresponding roots of the Lungs, and the **Comes Nervi Phrenici** arteries with them.
12. The Anterior surface of the **Pericardium**, with some small arteries from the Internal Mammary, and small veins running to the left Superior Intercostal and Innominate veins.

VI. Remove now—

- a. The isthmus and exposed parts of the lobes of the **Thyroid gland**. In doing this there will be taken away—
 1. The **Superior and Inferior Thyroid arteries**.
 2. The **Middle** and the remaining portions of the **Inferior Thyroid veins**.
 3. Branches of nerves from the **Middle Cervical Ganglion**.
- b. Open the **Pericardium**.
- c. Having divided the attachment of the pericardium to its lower margin, divide the **Aorta** between the Innominate and left Carotid branches, turn the ends right and left, and fix them in that position.

There will now be exposed—

The whole length of the **Trachea** from its origin to its bifurcation.

And the following additional structures—

1. Further portions of the **Common Carotid arteries** in the neck.

2. The **Œsophagus** more clearly at the root of the neck on the left side.
3. The whole of both **Recurrent Laryngeal nerves**.
4. A further portion of the **Aortic arch**.
5. The **Pulmonary artery** and its bifurcation.
6. The right **Auricle** and **Appendix**, the tip of the left **Auricular appendix**, the **Auriculo-ventricular groove**, the upper part of the right **Ventricle**, and the commencement of the right and left **Coronary arteries**.
7. A further portion of the **Superficial Cardiac Plexus of nerves**.
8. The **Deep Cardiac Plexus** lying upon the bifurcation of the **Trachea**, with its radicles entering it from above.

A DISSECTION TO EXPOSE THE VENA AZYGOS MAJOR.

POSITION.—The body lying on its back.

I. The **Thorax**¹ is opened, and the Anterior part of its bony wall taken away, with the soft parts attached, by the following dissection—

- a.* Cut through the **Manubrium**, just below the line of junction of the first **Costal cartilages** with it.
- b.* Divide the left **Costal cartilages** at their junctions with the **Sternum**, from the second to the seventh inclusive.
- c.* Cut through the **ribs on the right side**, in a line leading from a point four inches from the middle line above to the tip of the tenth rib below.
- d.* Open the **Abdomen** by a crucial incision, the trans-

¹ For an account of the structures divided, see the dissections of the **Trachea** and of the **Internal Mammary arteries** and their branches.

verse one of which should join the tips of the tenth ribs, and the vertical should continue the direction of the incision along the left margin of the sternum, and lie therefore to the left of the **Xiphoid cartilage**.

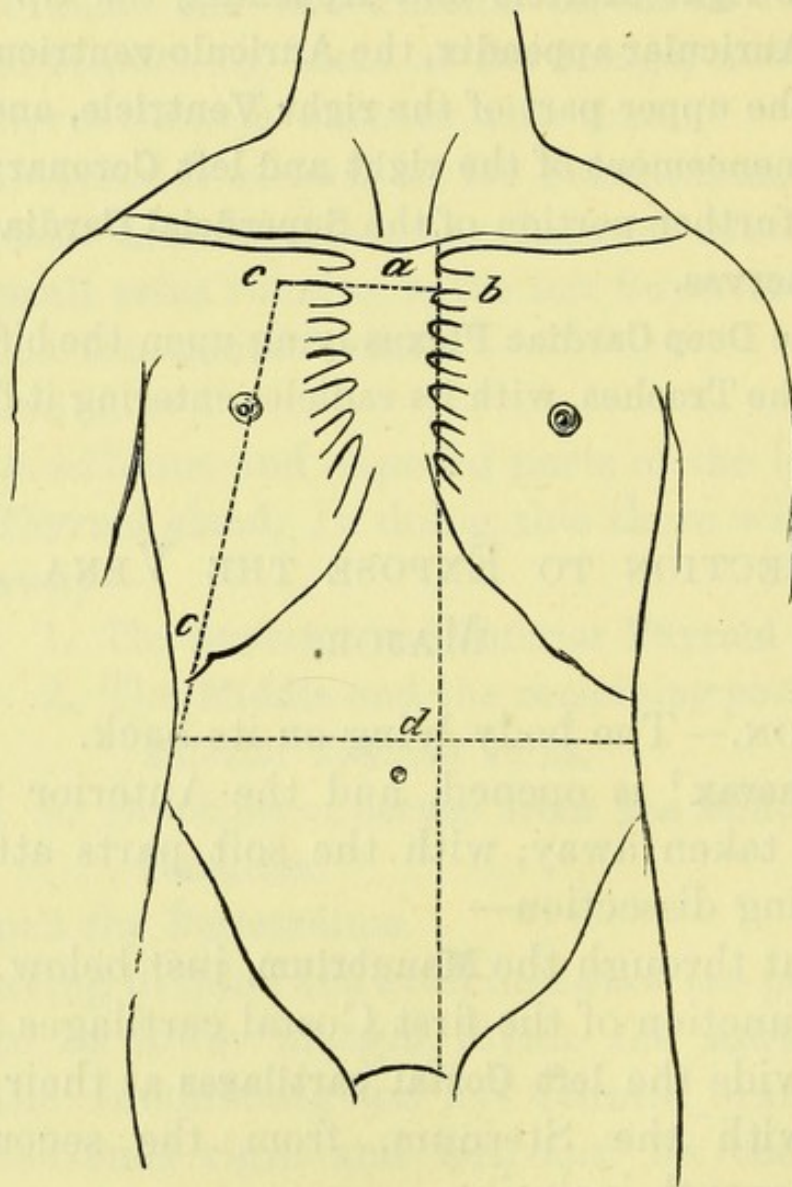


Fig. 13.

- e. Remove the piece of chest wall included between the above incisions and the right upper flap of the Abdominal wall, cutting through the attachments of the **Diaphragm** to the inner surface of the ribs, the reflections of the Peritoneum and

Pleura, with the **Round** and part of the **Suspensory ligaments** of the **Liver**.

The other flaps are to be turned outwards.

The following parts will now be exposed—

IN THE CHEST.

1. The collapsed **Right Lung**, its **root**, and the **Ligamentum Latum Pulmonis**.
2. The **Pericardium** in the **Median line**, covered by **Areolar tissue**, **fat**, and **Lymphatics**, and the **remains of the Thymus gland**. Laterally and to some extent anteriorly it is covered by **Pleura**.
3. The **Process of Deep Cervical fascia** coming from above to the arch of the **Aorta** and the **Pericardium**.

Remove the **Areolar tissue**, **Fascia**, **Lymphatics**, and **superjacent Pleura**, and expose—

4. The **right and left Innominate veins**, their **junction**, and the commencement of the **Superior Vena Cava**. The **Inferior Thyroid**, the **Superior Intercostal**, the **Internal Mammary branches** are seen joining their corresponding **Innominate trunks**.
5. The **arch of the Aorta**, giving off the **Innominate**, **left Carotid**, and **left Subclavian trunks**.
6. The **right Phrenic nerve**, in front of the **root of the Lung**, and the **left Phrenic** crossing the **Aortic arch**. The **Comes Nervi Phrenici artery** with each.
7. On the **Pericardium** small **arteries** from the **Internal Mammary**, and **veins** entering the **left Innominate trunk**.

II.

- a. Dissect out the **Vena Azygos Major** by removing the **superjacent Pleura**, as it arches forwards over the **root of the right Lung**, and enters the **Cava** at

its centre ; divide the **root** of the right lung, and remove that viscus, cutting the **Ligamentum Latum Pulmonis** at the same time. The following structures will be seen in section—

1. **Right Bronchus.**
2. **Right Pulmonary artery.**
3. **Right Pulmonary veins.**

In this order from before backwards, and above downwards.

4. **Right Bronchial artery and veins.**

At the back of the root.

5. **Parts of the Anterior and Posterior Pulmonary Plexuses of nerves.**

In front and behind respectively.

6. **Lymphatics and glands.**

- b. Hook the divided root well over to the left side, and with it the **Heart**, contained in the **Pericardium**.
- c. Remove the **Pleura**, as it is reflected from the posterior wall of the chest, over the bodies of the **Vertebræ**, to the back of the root of the **Lung**. The **Œsophagus** will be found to be drawn to the left by the traction on the root of the **Lung** and **Pericardium**.

There will now be exposed—

1. The **Vena Azygos Major**, as it lies on the right side of the bodies of the **vertebræ** ; the **right Intercostal veins**, except those of the first two spaces, will be found joining it, and the **right Bronchial vein** opening into it near its termination. The **Vena Azygos Minor Inferior** crosses the body of the seventh or Eighth **Dorsal** **vertebræ** to join it, and the **Vena Azygos Minor Superior**, when present, may be found

joining the Azygos Major above. Both these structures pass beneath the Aorta.

2. The **Thoracic Aorta** is seen lying to the left side of the Azygos Major and the **Intercostal arteries**, except those of the first and a part of the second spaces passing behind the vein.
3. The **Thoracic duct** in the interval between the Azygos Major and the Aorta.
4. The **Œsophagus** to the left, with the Vagi nerves in front and behind.
5. The **Right Gangliated Sympathetic cord** lies externally on the heads of the ribs, giving from the Second, Third, and Fourth Ganglia (Quain), or Third and Fourth (Ellis) branches to the Posterior Pulmonary plexus. The Ganglia are also seen giving off the **Splanchnic nerves** which run down outside the Vena Azygos. The **Great Splanchnic** arising by roots from the Fifth or Sixth to the Ninth or Tenth Ganglia inclusive. The **small** from the Tenth or Eleventh, and the **smallest** from the Twelfth. These are seen perforating the Diaphragm close to one another. Externally the Ganglia are seen to send two branches to each Intercostal nerve.
6. The posterior wall of the chest will be seen formed by the ribs and Intercostal muscles. The **Internal Intercostal muscles** extend inwards as far as the angles of the ribs, and a **thin fascia** is **prolonged inwards to the vertebræ** from them. On the removal of this fascia, the **Intercostal nerve, artery, and vein** will be seen having the following relations to each other in the lower spaces, *i.e.*, vein, artery, nerve, from above downwards; in the upper spaces the nerve is at first highest. The **External Intercostal**

muscles are seen underneath the vessels and nerves extending as far inwards as the tubercles of the ribs.

IN THE ABDOMEN.

On opening the Abdomen as described above, the following structures are exposed—

1. The **Liver** with the Round and Suspensory ligaments in the middle line, and the tip of the Gall bladder on the right.
2. The **Stomach** on the left.
3. The **Great Omentum**.
4. The **Cæcum** and **Ascending Colon**, if distended.

III.

- a. Raise the **Liver**, and dissect out in the **Small Omentum** the **Bile duct** on the right, the **Hepatic artery** and its branches on the left, and the **Portal vein** behind. Divide these structures.
- b. Raise the **Great Omentum** on to the ribs, and fix it there. Turn the **Small Intestine** over to the left, and dissect out the **Superior Mesenteric vessels** as they pass downwards and forwards over the third part of the **Duodenum**.
- c. Ligature and divide the **Hepatic Flexure of the Colon**, cut through the **Transverse Mesocolon** and **Great Omentum** from before backwards, dividing the **Middle Colic artery and vein**; turn the ends of the **Colon** to the right and left.
- d. Remove the **Peritoneum** between the **Duodenum**, and **Ascending Colon** above, and the median line and **Ascending Colon** below, and with it the **Ileo** and **Right Colic arteries, veins, and nerves**, and take away the ascending layer of the **Transverse Mesocolon**, in front of the **Duodenum** and **Pancreas**.

- e. The Stomach is already pulled up, and fixed to the left ribs by the portion of Great Omentum remaining. Divide now the **Duodenum** at its junction with the Pylorus, and again below on the right side of the Superior Mesenteric vein. Cut through the head of the **Pancreas**, and take it away with the piece of Duodenum included between the two incisions. The **Pancreatico-duodenalis** arteries, **Superior** and **Inferior**, will be divided and taken away, and the duct of the gland with the **Arteria Pancreatica Magna** cut through. The **Bile duct** will be removed, being already cut above. The **Portal vein** must be again divided just after the junction of the **Splenic** with the **Superior Mesenteric**, and taken away.

There will now be exposed—

1. The **Abdominal Aorta** and the following branches, the **Phrenics**, the **Cœliac axis**, the **Gastric**, **Splenic**, the divided **Hepatic** and its **Gastro-duodenal** branch, the right **Supra-renal**, **Renal**, **Spermatic**, and **Lumbar** branches.
2. The **Inferior Vena Cava** on its right side joined by the following veins, **Right Phrenic**, **Right Supra-renal**, which, however, may enter the **Renal** (also seen), the **Right Spermatic**, the **Lumbar** of both sides, and the **Ascending Lumbar** when present.¹
3. The **Right Crus** of the **Diaphragm** on the right of the **Aorta**.
4. The **Right Psoas** muscle, with the **Genito-crural nerve**, **Spermatic artery** and **Ureter** lying upon it.
5. The **Kidney**, the upper end concealed by the **Liver**.
6. The **Solar Plexus** and its prolongations along the ves-

¹ *Vide* Quain, vol. i. p. 473.

sels, viz. :—The **Coeliac, Renal, Supra-renal, Phrenic** plexuses.

7. The **Splanchnic nerves** perforating the **Right Crus** of the **Diaphragm**. The **endings of the Small and Lesser** in the **Coeliac** and **Renal plexuses** respectively. The **Semilunar Ganglion** and the **ending of the Greater**, are hidden by the **Inferior Cava** on this side.

IV.

- a. Cut through the **Coronary** and **Left Lateral ligaments** of the **Liver** as far as the **Inferior Cava**.
- b. Divide the **Diaphragm** from before backwards, passing between the **Foramen Quadratum** and opening for the **Œsophagus** down through the decussation of the **Crura** into the **Aortic opening**, cutting through the **Right Phrenic artery**; now pull the halves of the **Diaphragm** to the right and left.
- c. Divide the **Inferior Cava** at its entrance into the **Right Auricle**.
- d. Pull the **Liver** and with it the lower portion of the **Inferior Cava** well over to the right side, and fix them there.
- e. Divide the **Supra-renal, Renal, and Spermatic arteries**.
- f. Pull the upper part of the **Aorta** to the left.
- g. Remove the **Right Semilunar ganglion**, which will be displayed by the removal of the **Inferior Vena Cava**, and the right side of the **Solar plexus**.

There will now be exposed—

1. The whole length of the **Vena Azygos Major**.
2. The **Right Lumbar Sympathetic cord**.
3. The **Receptaculum Chyli** and the **Thoracic duct**.

TO EXPOSE THE OTIC GANGLION FROM THE INSIDE.

Given a skull in median section :

Define the posterior margin of the Internal Pterygoid plate.

I. INCISIONS.

1. Make an incision along the posterior margin of the Internal Pterygoid plate.
2. Make two horizontal incisions backwards for one inch from the extremities of the vertical incision.
3. Join the outer extremities of the two horizontal incisions.

II. Remove the Mucous membrane included between these incisions, and expose—

1. Submucous tissue, and ramifying in it branches of the
2. Descending Palatine nerves and arteries,
3. The Vidian nerve and artery,
4. The Pharyngeal nerve and artery,
5. The Glosso-pharyngeal nerve,
6. The Ascending Pharyngeal,
7. The Ascending Palatine, and
8. The Tonsillar arteries.

III. Remove the Submucous tissue and expose—

1. Portion of the posterior layer of the Palato-pharyngeus muscle ;
2. The Levator Palati, as it passes forwards and inwards, disappearing beneath the posterior layer of the Palato-pharyngeus ;
3. The Eustachian tube, as it runs downwards, forwards

and inwards, to terminate in a dilated anterior extremity, whose cartilaginous outer wall is attached to the Periosteum lining the inner surface of the Internal Pterygoid plate ;

4. The **Salpingo-pharyngeus**, as it arises by one or two slender bundles from the fore part of the inner Cartilaginous wall of the Eustachian tube, and passes downwards to blend with the posterior layer of the **Palato-pharyngeus** ;
5. The upper portion of the **Superior Constrictor**, as it passes backwards and upwards from under cover of the muscles already enumerated ;
6. Branches of the **Ascending Pharyngeal** or **Palatine arteries** accompanying the **Levator Palati**.

IV. Remove the Cartilaginous portion of the Eustachian tube, dividing its attachment to the Petrous bone posteriorly, and separating it from the Internal Pterygoid plate in front. In doing this you divide the attachment of the **Tensor Palati** to its outer wall, the origin of the **Levator Palati** from its membranous floor, and the attachment of the **Salpingo-pharyngeus** to its inner wall.

V. Remove the **Levator Palati** from its origin from the Petrous portion of the Temporal bone, and cut it through at the lower limit of the dissection and expose—

1. The upper portion of the **Superior Constrictor**, as it arises from the Lower Third of the Internal Pterygoid plate, from the Hamular process and the extreme upper portion of the **Pterygo-maxillary ligament**.
2. Above the free upper margin of this muscle a Semilunar interval is exposed, in which a portion of the **Tensor Palati muscle** is seen.

VI. Remove the area of Superior Constrictor which is seen in this dissection and expose—

1. The **Tensor Palati**, arising from the Scaphoid fossa and under surface of the great wing of the Sphenoid as far back as its Spine, and forming a triangular muscular sheet, ending below in a plaited tendon, which turns round the Hamular process.
2. The **Internal Pterygoid muscle**, passing downwards and backwards from beneath the Tensor Palati, and
3. The deep process of the **Parotid gland**, filling up the angular interval between the Tensor Palati and Internal Pterygoid muscles.

VII. Remove the Tensor Palati, dividing the branch of nerve from the Otic ganglion which enters its outer surface, and expose—

1. The **Otic ganglion**, situated immediately below the Foramen Ovale, and usually surrounding
2. The nerve to the **Internal Pterygoid muscle**. This nerve is seen to descend vertically, and to enter the posterior margin of the Internal Pterygoid muscle ;
3. The **Sympathetic root**, which may be traced backwards to the Sympathetic on the Middle Meningeal artery, the upper portion of which is exposed as it enters the Foramen Spinosum ;
4. The **Small Superficial Petrosal nerve**, as it runs from the Ganglion upwards and backwards to the small foramen in the Sphenoid, through which it makes its exit from the skull ;
5. The **Two Filaments** which pass outwards and backwards to join the roots of the **Auriculo-temporal nerve** ;
6. A branch to the **Tensor Tympani** which may be traced upwards and backwards to that muscle ;

7. A communication with the **Chorda Tympani** nerve ;
8. The deep aspect of the several large branches of the **Third division of the Fifth nerve**, as they pass in their various directions, and
9. A portion of the **Chorda Tympani** as it emerges from the canal of Huguier and passes downwards and forwards to join the Lingual Gustatory nerve.

The Otic ganglion and its branches of distribution and communication outside the skull have been fully exposed.

TO EXPOSE THE SPHENO-PALATINE GANGLION AND ITS BRANCHES OF DISTRIBUTION FROM THE INSIDE.

I. Make a vertical Antero-posterior section of the skull immediately to one side of the Nasal septum.

II. Take the larger section of the skull and find beneath the Mucous membrane covering the upper and back part of the Septum **filaments** of the **Upper Nasal branches** of the **Spheno-palatine ganglion** ; also the **Naso-palatine nerve**, which is directed downwards and forwards on the Periosteum of the Septum till it enters the Foramen of Scarpa, the **Right Naso-palatine nerve** usually lying on a plane posterior to the left.

On separating the bones bounding the Foramen, the two **Naso-palatine nerves** are seen to be connected with each other by a fine **Plexus**, from which branches may be traced to the Mucous membrane behind the Incisor teeth.

Accompanying the **Naso-palatine nerve** is the **artery** of the **same name**, which enters the incisive Foramen, and in

the roof of the mouth communicates with the **Descending Palatine artery**.

III. Now take the smaller section of the skull, and with a raspatory separate the Muco-periosteum from the upper surface of the hard palate, and with a chisel cut through the outer portion of the hard palate.

Grasp the loose portion of the hard palate with strong forceps and tear it away from the Muco-periosteum which lines its under surface.

IV. Dissect out in the Muco-periosteal flap the **Large or Anterior Palatine nerve**, and expose it from its exit from the Pterygo-maxillary canal to its terminal distribution as far forward as the Incisor teeth.

Its communication with the Naso-palatine nerve has been already observed.

V. By dividing Mucous membrane, trace the **Small or Posterior Palatine nerve** from the aperture of the Lesser Palatine canal to its distribution in the soft Palate, Tonsil, and Uvula, and in a similar manner expose the **External Palatine nerve** from its exit from the External Palatine canal to the Tonsil, and the outer portion of the soft Palate.

The **Descending or Superior Palatine artery** is exposed as it accompanies the Large Palatine nerve, and small branches of this vessel are seen accompanying the Posterior and External Palatine nerves.

VI. Remove the Mucous membrane from the outer wall of the Nasal cavity and expose—

1. The **Inferior Nasal branches of the Anterior Palatine nerve**, which emerge from bony Foramina, and ramify on the Middle and Lower Turbinated bones ;

2. The **Upper Nasal branches** emerging from the Spheno-palatine foramen, and ramifying on the two Upper Turbinated bones ;
3. The **outer set of branches** of the **Olfactory nerve**, as they ramify on the Upper and Middle Turbinated bones ;
4. The **Nasal nerve** entering the Nasal cavity through the Nasal slit in the horizontal plate of the Ethmoid, and giving off branches to the Septum, and to the outer wall of the nose. It grooves the Nasal bone, and passes forwards between its lower margin and the Upper Lateral cartilage of the nose ;
5. **Branches** of the **Anterior Ethmoidal artery** accompanying the Nasal nerve ;
6. **Branches** of the **Spheno-palatine artery** accompanying the Upper Nasal nerves, and
7. **Branches** of the **Descending Palatine artery** accompanying the Lower Nasal nerves.

VII. With a fine chisel open up the Pterygo-palatine canal, and trace through it the Pharyngeal nerve and artery. Follow this vessel and nerve to their terminations in the Submucous tissue behind the Eustachian tube.

VIII. Cut away with a chisel the vertical plate of the Palate, and trace the Anterior Palatine nerve upwards to the Spheno-palatine ganglion, when it is observed that the ganglion is seated in the posterior aspect of this nerve.

The **Vidian nerve** is exposed as it passes back from the Ganglion, and enters the Vidian foramen with the artery of the same name.

The two **Spheno-palatine branches** of the **Superior Maxillary nerve** are seen to enter the Ganglion from above.

These branches may be traced up to their origin from the Superior Maxillary nerve.

The Spheno-palatine ganglion with all its branches is now exposed.

A DISSECTION TO EXPOSE THE ANTERIOR AND POSTERIOR CIRCUMFLEX ARTERIES.

POSITION.—The body supported by blocks upon the opposite shoulder to that to be dissected. The arm is to be moved backwards and forwards, and rotated outwards and inwards according as the front or back is being dissected. In making the skin incisions the shoulder is to be drawn well down.

I. SKIN INCISIONS.

1. Along the outer third of the posterior border of the **Clavicle**, the inner border of the **Acromion** process, and the upper border of the **Spine of the Scapula**, for two-thirds of its extent.
2. A vertical incision from the centre of the inner border of the **Acromion** above, over the middle of the prominence of the shoulder to the insertion of the **Deltoid** muscle.
3. From the lower end of No. 2, obliquely upwards and forwards to the middle of the **anterior fold of the Axilla**, and upwards and backwards to the centre of the **posterior fold**.

Reflect the flaps forwards and backwards and expose the **Superficial fascia**, and—

1. The upper surface of the **outer third** of the **Clavicle**, and of the **Acromion** process.

2. The **Anastomosis on the Acromion** between the Suprascapular, Acromio-thoracic, and Posterior Circumflex arteries.
3. A Cutaneous branch of the **Posterior Circumflex** artery at the lower part of the posterior border of the Deltoid muscle, sending a twig downwards to the skin over the long head of the Triceps muscle.

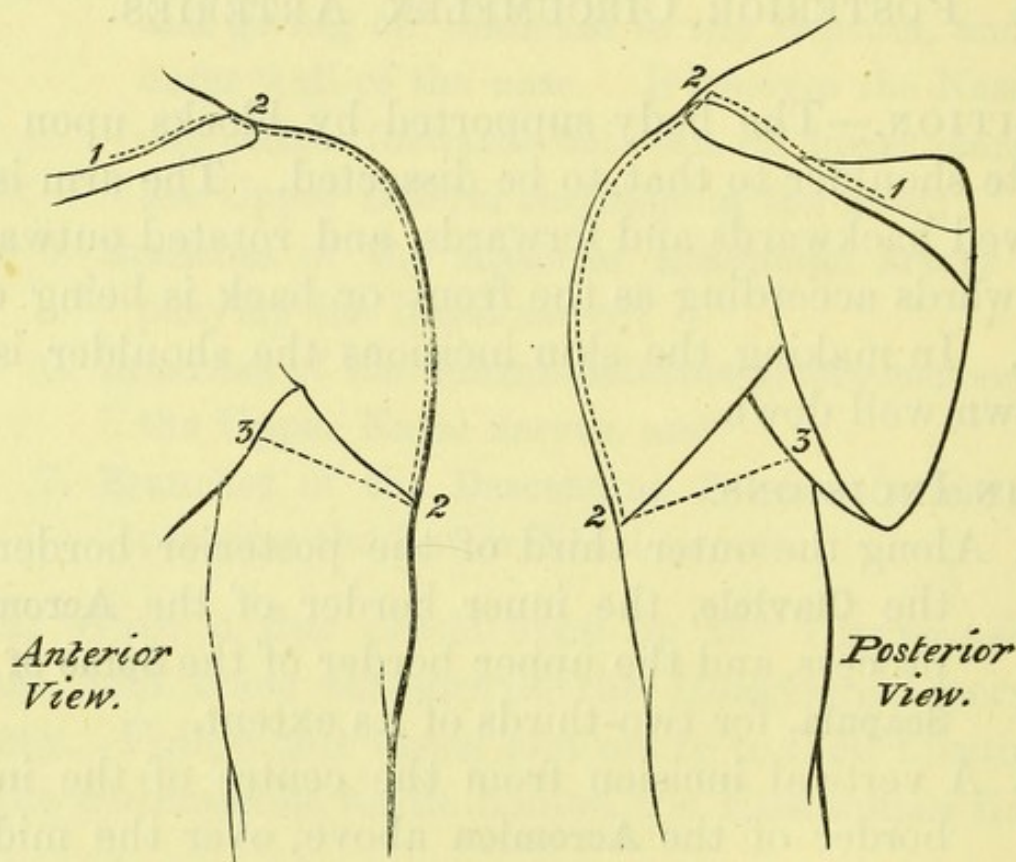


Fig. 14.

4. A descending branch of the **Acromio-thoracic** artery between the Pectoralis Major and the Deltoid muscles.
5. The **Cephalic vein** also between these two muscles. Its branch of communication over the Clavicle with the External Jugular vein may be seen at its upper part.
6. **Lymphatic vessels** along the Cephalic vein.

7. Passing over the Acromion process, the **Supra-acromial branches of the Descending Cutaneous nerves** of the Cervical plexus.
8. The lower branch of the **Circumflex nerve** passing round the posterior border of the Deltoid below the middle, and supplying the skin over the lower two-thirds of the muscle, and further giving off a twig to the skin over the long head of the Triceps muscle. Offsets of the upper branch of the nerve pass between the muscular fibres, and also turn down over the lower part of the muscle.
9. The bursa which is occasionally present over the Acromion process.

II. Remove these structures, and the deep fascia, and expose—

1. The **Deltoid muscle** forming the prominence of the shoulder.
2. In front of this the outer part and insertion of the **Pectoralis Major muscle**.
3. Below the Pectoralis Major muscle the **Biceps muscle** is seen at its upper part. The part exposed is mainly the short head, but a small portion of the long head comes into view.
4. Behind the Deltoid muscle the **Latissimus Dorsi** and **Teres Major** and **Minor** muscles are seen in part, and above them the **Infra-spinatus** muscle covered by its fascia.
5. The upper part of the **external head of the Triceps muscle** is exposed behind the Deltoid muscle at its lower part, running up beneath it.
6. A small twig of the **Dorsalis Scapulæ artery** is seen posteriorly between the Teres muscles.

III. Detach the **Deltoid** muscle from its origin and reflect

it downwards. The branches of the Posterior Circumflex artery and the accompanying nerve to its substance and on its cutaneous surface may be preserved.

There will now be seen—

1. A further portion of the **Acromion**, and the **Coracoid** process of the Scapula. The **head**, and the **Greater** and **Lesser Tuberosities** of the Humerus.
2. The **Coraco-acromial** ligament, and the **Coraco-humeral** portion of the Capsule.
3. The insertions of the **Supra-spinatus**, **Infra-spinatus**, and **Teres Minor** muscles from before backwards into the Greater Tuberosity.
4. A small portion of the insertion of the **Subscapularis** muscle into the Lesser Tuberosity, especially seen in the adducted position of the arm.
5. The origin of the **Coraco-brachialis** and short head of the **Biceps** muscles from the Coracoid process, and the tendon of the long head of the latter perforating the Capsular ligament.
6. A further part of the tendon of the **Pectoralis Major** muscle passing in front of the Coraco-brachialis and short head of the Biceps muscles, and inserted into the outer Bicipital ridge, and sending off an aponeurotic sheath to cover and bind down the long head of the biceps in the bicipital groove.
7. A further portion of the **Teres Major** muscle is seen behind, covering in this position the **Latissimus Dorsi** muscle.
8. The long head of the **Triceps** muscle is seen posteriorly passing between the **Teres Major** and **Minor** muscles, the former being in front of it. The **Teres Major** and **Minor** muscles diverge from one another as they pass to the Humerus so as to form a triangle, of

which the bone forms the base, the Teres Minor muscle the upper and internal, and the Teres Major muscle the lower and external boundaries. The long head of the Triceps muscle passing to the Scapula divides this triangle into two parts, an upper or external part quadrilateral in shape, and a lower or internal triangular.

9. The **Posterior Circumflex** artery and vein, passing through the quadrilateral space.
10. The **Anterior Circumflex** artery with its vein, passing beneath the Coraco-brachialis and Biceps muscles, winding round the neck of the Humerus and anastomosing with the posterior artery.
11. The **Circumflex** nerve accompanying the Posterior Circumflex artery.
12. The bursa between the Subscapularis muscle and the Acromion may possibly be exposed if it is very extensive.

IV.

- a. Cut through the **Pectoralis Major** in front at the point of its appearance from beneath the reflected skin, and turn it outwards.
- b. Divide the **Coraco-brachialis** and short head of the **Biceps** muscles, and turn them downwards. The **Musculo-cutaneous** nerve will be carried with the former muscle.
- c. Divide the long tendon of the **Biceps** muscle, and with it the **Aponeurotic** process from the tendon of the **Pectoralis Major** muscle to the Great Tuberosity. Open up the sheath of the tendon.
- d. Remove the fascia and fat and glands from the upper part of the Axillary space, dissecting out the various structures met with.

There will now be exposed—

1. The **Pectoralis Minor** muscle in front, attached to the Coracoid process.
2. The **Subscapularis** muscle more fully. It is seen to hide the **Teres Minor** muscle when looked at from the front, and to take the place of this muscle in the boundaries of the quadrilateral and triangular spaces of the anterior aspect.
3. The insertions of the **Latissimus Dorsi** and **Teres Major** muscles, the former attached to the floor and the latter to the inner ridge of the Bicipital groove.
4. The upper part of the **Internal head of the Triceps** muscle below the **Teres Major** muscle.
5. The **third portion of the Axillary artery**, and its branches—viz., the **Subscapular**, which is seen running downwards on the **Subscapular** muscle, giving the **Dorsalis Scapulæ** branch through the triangular space. The **Anterior Circumflex** is hidden by the **Median nerve** at its origin, and also by the **Musculo-cutaneous nerve**, but this has been pulled down with the **Coraco-brachialis** muscle; the artery is seen in all the rest of its course, and a branch running up the Bicipital groove to the joint, may be traced. The **Posterior Circumflex** branch is hidden at its origin by the nerves on the inner side of the artery to be mentioned immediately, and by the **Axillary vein**, but it may be seen passing backwards through the quadrilateral space. The **Long Thoracic** branch of the second portion of the **Axillary trunk** may be seen descending along the outer border of the **Pectoralis Minor** muscle. An **External Mammary** branch may be seen sometimes crossing the centre of the space, arising from the third part of the main trunk.

6. The **Axillary vein** is seen internal to the artery, receiving radicles corresponding to the above-named branches of the latter.
7. The **Median** and **Musculo-cutaneous nerves** are outside the artery, the latter giving branches to the **Coracobrachialis** muscle before piercing it.
8. The **Internal Cutaneous nerve** is superficial to it.
9. The **Ulnar**, inner head of **Median**, and lesser **Internal Cutaneous** nerves are internal to the artery.
10. The **Intercosto-humeral nerve** passes out from the second intercostal space lower down, and communicates by a cross branch with the lesser **Internal Cutaneous** nerve.
11. The **Musculo-spiral nerve** is behind the artery. The origin of its **Internal Cutaneous** branch is seen.
12. The **Circumflex nerve** is also behind the artery, accompanying the **Posterior Circumflex artery**.
13. The **Subscapular nerves** to the **Teres Major** and **Latis-simus Dorsi** muscles may be seen passing down to their respective muscles.

V.

- a. Divide the **Axillary vein**, and turn the ends inwards and outwards.
- b. Hook upwards the **Median nerve**. This exposes the origin of the **Anterior Circumflex artery**.
- c. Hook downwards the **Ulnar**, both **Internal Cutaneous** and the **Musculo-spiral nerves**. The origin of the **Posterior Circumflex artery** will now be uncovered.

Both the **Circumflex arteries** may now be seen in their entire distribution.

A DISSECTION TO EXPOSE THE MUSCULO-SPIRAL NERVE.

POSITION.—The body lying upon its face, the arm extended at right angles to the trunk, and rotated inwards.

1. SKIN INCISIONS.

1. From the tip of the **Acromion** process down the outer border of the arm for about half its extent, and then forwards to the centre of the **bend of the elbow** half an inch below the **External Condyle**.

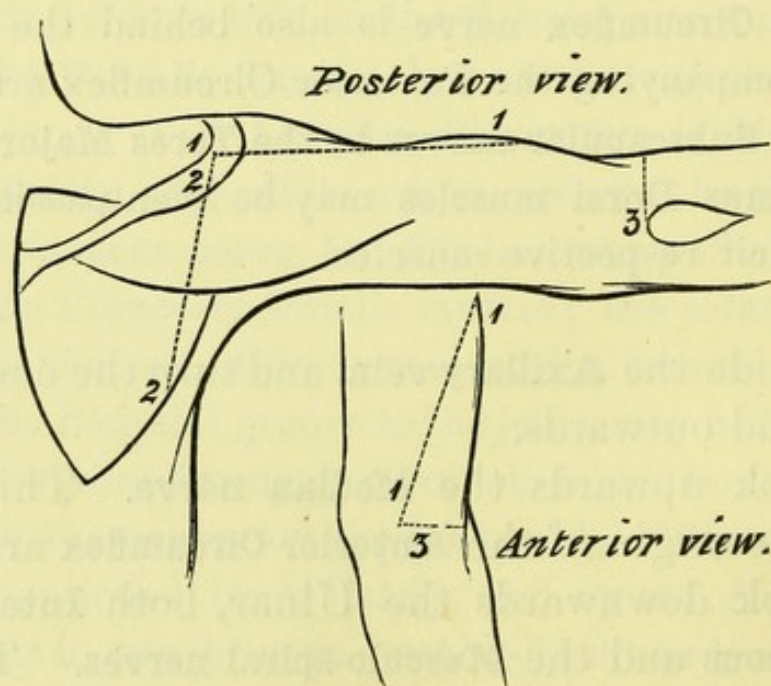


Fig. 15.

2. From the upper end of No. 1 downwards and backwards to the centre of the Axillary border of the **Scapula**.
3. From the lower end of No. 1, transversely out-

wards from its termination below the External Condyle to the Olecranon process.

Reflect the flap downwards and expose the **Superficial fascia** and the following cutaneous structures—

1. Branches of the **Posterior Circumflex artery**, turning round the posterior border of the Deltoid muscle below the middle, and supplying the skin over it. An offset is also given to the integument over the Triceps muscle.
2. Twigs of the **Superior Profunda artery** in front of and behind the External Condyle.
3. The **Median-cephalic vein**, in front of the elbow, joined below by the **Radial**; the **Cephalic vein** is also seen in the lower half of the arm.
4. The **Supra-acromial branches of the Cervical plexus** over the upper part of the Deltoid muscle.
5. Branches of the **Circumflex nerve** turning round the posterior border of the Deltoid at the lower part, and having a similar distribution to the **Posterior Circumflex artery**. Other branches of the nerve perforate the muscle.
6. The **Intercosto-humeral nerve** supplying the skin of the upper half of the inner aspect of the arm; a few filaments passing over the Posterior Axillary fold.
7. The posterior branch of the third **Lateral Cutaneous nerve** often reaching the upper part of the arm.
8. The **Internal Cutaneous branch of the Musculo-spiral nerve** passing back beneath the Intercosto-humeral and supplying the skin nearly as far as the Olecranon.
9. The **Superior External Cutaneous branch of the Musculo-spiral nerve** lying with the Cephalic vein. The

Inferior **External Cutaneous** branch over the posterior aspect of the arm.

10. The **Musculo-cutaneous** nerve in front of the elbow and lying beneath the Median-cephalic vein.

11. The upper part of the **Olecranon** bursa.

II. Remove the preceding and expose the **Deep Fascia**.

Remove the **Deep Fascia**: above the elbow it will be found to give off the **External Intermuscular Septum**.

The following structures will be displayed—

1. The posterior portion of the **Deltoid** muscle.

2. The **Latissimus Dorsi** muscle passing beneath it at the lower part, but separated from it by the long head of the **Triceps** muscle.

3. The **Teres Major** muscle, taking a similar course to the **Latissimus**, but above it.

4. A small portion of the lower border of the **Teres Minor** above the **Major** muscle. It may, however, not come into view.

5. The long head of the **Triceps** muscle below the posterior border of the **Deltoid** and superficial to the **Latissimus Dorsi** and **Teres Major** muscles. The outer head of the **Triceps** lower down the arm, and above the long head in the abducted position. Still lower, the outer portion of the inner head and the tendon of insertion of this muscle.

6. In front of the elbow the outer border of the **Biceps** muscle, and beneath it the

7. **Brachialis Anticus** muscle.

8. Descending from the **External Condylloid** ridge the **Supinator Longus**, and **Extensor Carpi Radialis Longior** muscles.

9. Still lower down the upper part of the **Anconeus** muscle, behind and below the **External Condyle**.

10. Between the **Brachialis Anticus** and **Supinator Longus** muscles a further portion of the **External Cutaneous nerve** will be seen.
11. On pulling outwards the **Supinator Longus** and **Extensor Carpi Radialis Longior** muscles, the **Musculo-spiral nerve** may be seen perforating the **External Intermuscular septum**, running down between these muscles and the **Brachialis Anticus**, and dividing at the level of the **External Condyle** into **Radial** and **Posterior Interosseous branches**. The offsets to these muscles and the **Brachialis Anticus** may also be traced.
12. The **Anterior branch** of the **Superior Profunda artery** as it runs down with the **Musculo-spiral nerve**. It will be seen inosculating below with the **Radial Recurrent branch**.

III.

- a. Hook the posterior border of the **Deltoid muscle** well forwards.
- b. Cut through the long, and outer heads of the **Triceps muscle**.
- c. Divide the **Latissimus dorsi** and **Teres Major** muscles.
- d. Divide the **Supinator Longus** and **Extensor Carpi Radialis Longior** muscles.

There will now be exposed—

1. The head of the **Humerus** and the upper part of the shaft.
2. The **Subscapularis muscle** along the **Axillary border** of the **Scapula**.
3. The **Teres Minor muscle** parallel with and behind the preceding.
4. Lower down at the elbow the **Supinator Brevis muscle**.

5. Most of the **second**, and all the **third part** of the **Axillary artery**, and the commencement of the **Brachial**, in front of the **Subscapularis** and along the inner border of the arm.
6. The **Subscapular branch**, running down the **Axillary border** of the **Scapula**, crossing behind the **Musculo-spiral nerve**, and giving off its **Dorsalis Scapulæ branch** below the **Teres Minor muscle**, this branch then passes beneath that muscle.
7. The **Posterior Circumflex artery** is seen at its origin and in the rest of its course.
8. The origin and upper part of the **Superior Profunda branch** of the **Brachial artery**.
9. The **Axillary vein**, internal to and in front of its artery, the **venæ comites** of the **Brachial artery**, and veins corresponding to all the arterial branches above enumerated.
10. The **Circumflex nerve** is seen with the **Posterior Circumflex artery**.
11. The **Musculo-spiral nerve** above and below, and the origin of its **Internal Cutaneous branch** at its upper part.
12. Deep down in the dissection above, the **Musculo-cutaneous nerve** may be seen entering the **Coracobrachialis muscle**, and also the **Ulnar nerve**, but it is not necessary to expose them, for the nerve in course of dissection is superficial to them in this position.

IV.

- a. Remove a portion of the lower border of the **Subscapularis muscle** near the **Humerus**. Then the **Bifurcation of the Posterior Cord** of the **Brachial plexus** into the **Circumflex** and **Musculo-spiral nerves** can be seen. This division takes place

internal to the Axillary border of the Scapula, and if necessary a portion of the bone may be chipped away; nevertheless this usually is not requisite.

b. Divide the **Subscapular vessels**.

c. Trace the **Musculo-spiral nerve** through the substance of that portion of the Triceps not yet divided, along the Musculo-spiral groove. In this situation the **Superior Profunda artery** will be found lying upon it, and must be removed. The upper part of the **External Intermuscular septum** must also be taken away.

The nerve may now be completely traced to its bifurcation. You may also expose the **Internal branches**, viz., to the inner and middle heads of the Triceps, the Ulnar Collateral, and the Internal Cutaneous; the **Posterior branches**, viz., to the outer head, and the Anconeus muscle; the latter a long slender offset passing through the substance of the muscle with a branch of the Superior Profunda artery; the **External branches**, viz., the two External Cutaneous branches, and branches to the Supinator Longus and Extensor Carpi Radialis Longior; some of them, however, have been previously dissected. A branch to the Brachialis Anticus muscle from the outer set may be sometimes traced.

A DISSECTION OF THE ANASTOMOSES ABOUT THE ELBOW-JOINT.

POSITION.—It will be necessary to alter the position of the arm at the various stages of the dissection. It should at first lie on its posterior, and next on its anterior surface.

I. SKIN INCISIONS.

1. A circular one around the arm two inches above the **Condyles** of the Humerus.
2. A circular one around the forearm, two inches below the same points.
3. A longitudinal one along the **median line** in front, between the two circular incisions.

Reflect and remove the included portion of skin, and expose the **Superficial fascia** containing—

IN FRONT—

1. The **Cutaneous veins**. The **Radial**, on the outer side. The **Anterior** and **Posterior Ulnar**, the latter coming from the posterior surface of the forearm, and the two uniting into one trunk. The **Median**, along the centre of the forearm, dividing into two branches, **Median-cephalic** externally and **Median-basilic** internally. It receives at its bifurcation a **deep vein** from the *venæ comites* of the Brachial artery. The Radial vein joins the Median-cephalic, and the two form the **Cephalic vein** which runs up on the outer side of the arm. The united trunk of the Ulnar veins joins the Median-basilic, and the result is the **Basilic vein** passing upwards on the inner side of the arm.

2. With the Cephalic vein is the Superior **External Cutaneous** branch of the **Musculo-spiral** nerve.
3. Behind the Median-cephalic vein the **External Cutaneous** nerve running down to the forearm.
4. The **Internal Cutaneous** nerve at the inner side of the arm dividing into numerous branches. One of these passes to the back of the forearm over the **Internal Condyle**; the others pass some superficial to, and some beneath the **Median-basilic** vein, to the front of the forearm.
5. Cutaneous branches of the **Radial Recurrent** artery are found in front of the outer **Condyle**.
6. Two or more small **Lymphatic** glands, occasionally found at the bend of the elbow, and receiving superficial **Lymphatics**; also more commonly one or two, near the commencement of the **Basilic** vein, above and in front of the **Internal Condyle** of the **Humerus**.

BEHIND will be found—

7. The **Olecranon** process covered by a **bursa**.
8. The nerve of **Wrisberg** between the **Internal Condyle** and **Olecranon**, sending filaments inwards over the lower part of the arm, the inner **Condyle**, and the **Olecranon**. A **communication** may be traced with the **Internal Cutaneous** nerve.
9. The **Inferior External Cutaneous** branch of the **Musculo-spiral** nerve giving twigs over the posterior surface of the arm and forearm.
10. **Cutaneous** twigs of the following arteries are seen: of the **Interosseous Recurrent** behind the outer **Condyle**; of the **Posterior Ulnar Recurrent** and **Inferior Profunda** behind the inner **Condyle**.

II. Remove these structures and expose the **Deep Fascia** which sends processes to the **External** and **Internal Condyle**.

loid ridges to form the corresponding **Intermuscular septa**; it is joined in front by the **Semilunar process of fascia** derived from the tendon of the **Biceps** muscle.

III. Remove the **Deep Fascia**, leaving intact the **Internal and External Intermuscular septa**, and there will be now exposed—

IN FRONT—

1. The **Supinator Longus** and **Extensor Carpi Radialis Longior** muscles running down from the **External Condylloid ridge**.
2. The **Brachialis Anticus** muscle, and the lower part of the fleshy belly and tendon of the **Biceps** muscle in the centre, lying superficial to it. These pass from the arm, the former to the **Coronoid process** of the **Ulna**, the latter to the **Tuberosity of the Radius**.
3. The origin of the **Pronator Radii Teres** muscle from the **Internal Condylloid ridge**, and from the **Internal Condyle** by means of the **Common tendon** of the **Pronator Radii Teres**, **Palmaris Longus**, **Flexor Sublimis Digitorum**, and **Flexor Carpi Ulnaris** muscles.
4. A small piece of the **Supinator Brevis** muscle in the floor of the triangular space.

BEHIND—

5. The tendon of the **Triceps** muscle inserted into the **Olecranon process**.
6. The **Anconeus** muscle passing from the **Outer Condyle** to the outer surface of the **Olecranon process**.
7. The origin of the following muscles from the **External Condyle** by the **Common tendon**: **Extensor Carpi Radialis Brevior**, **Extensor Communis Digitorum**, **Extensor Minimi Digiti**, and **Extensor Carpi Ulnaris**. The origin of the **Supinator Brevis** muscle from the same bony point.

8. The origin of the **Flexor Carpi Ulnaris** muscle from the inner surface of the Olecranon process, and the posterior margin of the Ulna.

9. The External and Internal **Intermuscular Septa**.

IN FRONT—

10. A further portion of the **External Cutaneous nerve**, emerging on the outer side between the Biceps and Brachialis Anticus muscles.

11. The **Musculo-spiral nerve** lying deeply between the Supinator Longus and Brachialis Anticus muscles, and dividing on a level with the External Condyle into **Radial** and **Posterior Interosseous** branches. **Offsets** from the trunk are traceable to the Supinator Longus and Extensor Carpi Radialis Longior muscles, and occasionally one supplying the Brachialis Anticus muscle. With the nerve a branch of the **Superior Profunda artery** is seen.

12. The **Brachial artery** with its **Venæ Comites** is seen internal to the Biceps tendon dividing opposite the head of the Radius into **Radial** and **Ulnar** branches. The **Anastomotica Magna** branch is found above the elbow, sending a small branch down beneath the Pronator Radii Teres muscle, and perforating the Internal Intermuscular septum.

13. The **Median nerve** lying internal to the Brachial artery, and giving off a branch above the elbow to the Pronator Radii Teres muscle.

BEHIND—

14. The **Anastomotica Magna** and **Inferior Profunda** arteries are found in the space between the Internal Condyle and Olecranon process.

15. The **Ulnar nerve** with the preceding.

IV. Divide now—

- a. The origin of the **Pronator Radii Teres** muscle from the upper part of the inner Condyle of the Humerus, and from the Common Tendon already mentioned and its inner tendinous head (which overlaps the Anterior Ulnar Recurrent artery) from the inner margin of the Coronoid process.
- b. The **Common Flexor** tendon from the Internal Condyle.
- c. The outer head of the **Flexor Carpi Ulnaris** muscle from the Olecranon process and posterior border of the Ulna.

Turn all the preceding muscles downwards.

- d. Detach the **Supinator Longus** and **Extensor Carpi Radialis Longior** muscles from the External Condylloid ridge and pull them down.
- e. Remove the **Anconeus** muscle.
- f. Take away the **Triceps** muscle. Do this piecemeal, dissecting out in its substance the branch of the **Superior Profunda** artery, which runs down on the back of the Humerus with the nerve to the **Anconeus**; also the posterior branch of the **Superior Profunda** artery, which will be found running on the posterior surface of the External intermuscular septum, to the back of the External Condyle between the muscle and the bone. These vessels form with the **Anastomotica Magna** artery an arch across the back of the bone immediately above the Olecranon fossa.

There will now be exposed—

IN FRONT of the Outer Condyle—

The **Radial Recurrent** artery, joining with the Anterior branch of the **Superior Profunda**.

BEHIND the Outer Condyle—

The **Interosseous Recurrent** artery anastomosing with the posterior branch of the **Superior Profunda**, and a branch from the **Anastomotica Magna** coming from the inner side. It sends a branch over the **Olecranon** to join the **Posterior Ulnar Recurrent** artery.

IN FRONT of the Internal Condyle—

A slender branch from the **Anastomotica Magna** artery, uniting with the **Anterior Recurrent** branch of the **Ulnar** artery.

BEHIND the Internal Condyle—

The general Anastomosis of the **Superior** and **Inferior Profunda** and **Anastomotica** branches of the **Brachial** artery with one another, and with the **Posterior Recurrent** branch of the **Ulnar** artery running up from the forearm.

A DISSECTION TO EXPOSE THE SUPINATOR BREVIS MUSCLE.

POSITION.—During the dissection the forearm should be pronated and supinated as occasion arises. The muscle will be best displayed with the forearm strongly pronated and resting upon its inner border.

I. SKIN INCISIONS.

1. Transversely from the upper border of the **Olecranon** process of the **Ulna** outwards over the **External Condyle** of the **Humerus** to the centre of the bend of the elbow in front.
2. Transversely from the posterior border of the **Ulna** at its centre round the outer border of the forearm to the **Median line** in front.

3. Join the anterior extremities of the preceding by a longitudinal incision along the Median line.

Reflect the flap backwards and outwards, and expose the **Superficial Fascia** containing—

1. The **Median vein**, its deep communicating branch with the *Venæ Comites* of the **Brachial artery** at its point of bifurcation, and the lower part of the **Median-cephalic branch**. The **Radial vein** joining the latter.
2. Cutaneous offsets of the **Radial** and **Interosseous Recurrent arteries** in front of and behind the **External Condyle** respectively. A transverse branch of the latter is found behind the **Olecranon**, and cutaneous twigs of the **Superior Profunda** artery behind the **External Condyle**.
3. A few of the lowest twigs of the **Superior External Cutaneous branch** of the **Musculo-spiral nerve** in front of the elbow, and the **Inferior External Cutaneous branch** of the same nerve behind the elbow and the forearm.
4. The **External Cutaneous nerve** running down the front of the forearm, beneath the **Median-Cephalic vein**, giving off its posterior branch at the lower part of the dissection.
5. Part of the **Olecranon** process, and the **External Condyle**. The former covered by its bursa.

II. Remove the preceding cutaneous structures and expose the **Deep Fascia**. Clean this away, and the following structures will be displayed, commencing from the front and passing backwards—

1. The outer part of the insertion of the **Brachialis Anticus** muscle.
2. The tendon of the **Biceps** muscle running down to the **Tuberosity** of the **Radius**, and its **Fascial inser-**

tion, also the Bursa between the tuberosity and tendon.

3. The lower part of the **Pronator Radii Teres** muscle in its whole width below, but only its outer border above.
4. The **Supinator Longus** muscle descending from the upper arm, on the outer side of the forearm. This should be hooked outwards.
5. A small portion of the **Supinator Brevis** muscle deep down between the two immediately preceding muscles, namely 3 and 4.
6. The **Extensor Carpi Radialis Longior** muscle outside the **Supinator Longus** muscle.
7. The **Common tendon** and upper fleshy portions of the following muscles in their order from without inwards—viz., **Extensor Carpi Radialis Brevior**, **Extensor Communis Digitorum**, **Extensor Minimi Digiti**, **Extensor Carpi Ulnaris**, and a portion of the origin of the latter from the posterior border of the Ulna.
8. The **Anconeus** muscle running from the outer Condyle to the outer side of the Olecranon.
9. In front, internal to the tendon of the **Supinator Longus**, portions of the **Flexor Sublimis Digitorum**, and **Flexor Carpi Radialis** muscles.
10. The lower part of the **Brachial artery** and its division into **Radial** and **Ulnar** branches, the former descending on the Biceps, **Supinator Brevis**, **Pronator Radii Teres** and **Flexor Sublimis Digitorum** muscles. The **Radial Recurrent branch** passing up beneath the **Supinator Longus** muscle. These arteries are accompanied by their veins.
11. The Anterior Terminal branch of the **Superior Profunda artery** above, beneath the **Supinator Longus** muscle, anastomosing with the **Radial Recurrent**.

12. The **Median nerve** internal to the Brachial artery, and its branch to the **Pronator Radii Teres muscle**.
13. Beneath the Supinator Longus muscle, but seen by pulling it outwards, the **Musculo-spiral nerve** dividing opposite the external Condyle into **Radial** and **Posterior Interosseous** branches. The former nerve descends on the Supinator Brevis and comes into an external relationship with the Radial artery, at the junction of its Upper and Middle Thirds, and the latter runs down on the Supinator Brevis, and perforates it obliquely.
14. **Lymphatic glands** are frequently present about the lower termination of the Brachial artery.

III. Divide now—

- a.* The **Supinator Longus** and **Extensor Carpi Radialis Longior** muscles, and throw the ends upwards and downwards; in doing this you cut through branches of the Musculo-spiral nerve to these muscles.
- b.* The origins of the several Extensor muscles from the External Condyle, with the exception of the Anconeus, and pull the fleshy bellies of the muscles taking origin from it downwards. Their nerves from the Posterior Interosseous will be cut, with branches of the Posterior Interosseous artery supplying them.
- c.* Hook inwards the **Pronator Teres**, the **Flexor Carpi Radialis** and **Biceps** muscles.

There will now be exposed—

1. The upper and outer portion of the **Flexor Sublimis Digitorum** muscle.
2. The **External Lateral** of the elbow joint, and the **Orbicular ligaments**.

3. The upper portions of the **Extensor Ossis Metacarpi Pollicis** and the **Extensor Secundi Internodii Pollicis** muscles.
4. The **Supinator Brevis**, arising from the External Lateral ligament of the elbow joint, from the Orbicular ligament, and from an oblique line and depression below the Lesser Sigmoid cavity. It is also attached to the External Condyle by means of a tendinous expansion. It encircles the upper third of the radius except on its inner aspect, the insertion of the **Pronator Radii Teres** limiting its attachment to that bone below.
5. The **Radial artery**, its **Recurrent branch**, and the anterior branch of the **Superior Profunda artery** more fully.
6. Posteriorly, the upper part of the **Posterior Interosseous artery** at its point of emergence between the **Supinator Brevis** and the **Extensor Ossis Metacarpi** muscles. The **Recurrent branch** will be seen passing up upon this muscle, and beneath the **Anconeus**. Sometimes this offset pierces the **Supinator Brevis**. Above it anastomoses with branches of the **Anastomotica Magna** and **Superior Profunda** arteries.
7. The **Posterior Interosseous nerve**, emerging from the **Supinator Brevis**, is seen, giving branches to the **Extensor** muscle, which, however, are divided now, and should have been traced when these muscles were reflected.

IV.

- a. Remove now the **Radial vessels** and **nerve**, the **Interosseous Recurrent artery**, and the **Posterior Interosseous nerve**, both where it lies in front of and behind the **Supinator Brevis** muscles.

- b. Pull inwards or remove some of the outer fibres of the **Anconeus** muscle which slightly overlap the **Supinator Brevis** muscle.

The **Supinator Brevis** muscle will now be fully exposed.

A DISSECTION TO EXPOSE THE FLEXOR LONGUS POLLICIS MANUS MUSCLES.

POSITION.—The forearm supinated, the wrist and thumb extended.

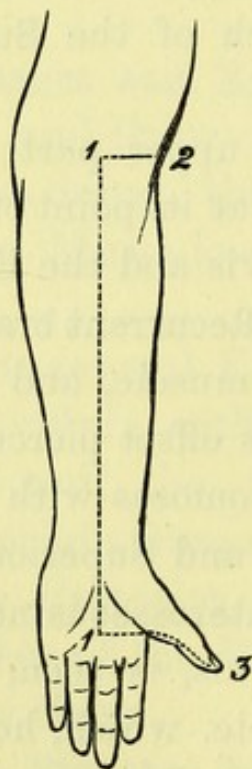


Fig. 16.¹

I. SKIN INCISIONS.

1. Longitudinally along the median line, commencing above at the centre of the forearm opposite to the head of the Radius, and ending below at

¹ The dotted line is carried a little too far upwards.

the middle of the **palm of the hand** on a level with the upper border of the abducted thumb.

2. Transversely above from the **upper end** of No. 1 to the **outer border of the forearm**.
3. Transversely from the **lower end** of No. 1, along the **inner border of the thumb to the tip**.

Reflect the flap outwards, and expose the **Superficial Fascia** containing—

1. Branches of the **Princeps Pollicis artery** on either side of the thumb.
2. The **Radial vein** along the outer border of the forearm.
3. The **Median vein** along the centre, with the **deep communicating branch** above.
4. The anterior branch of the **External Cutaneous nerve** along the outer border of the forearm.
5. Twigs from the anterior branch of the **Internal Cutaneous nerve**.
6. The **Cutaneous Palmar branch of the Median nerve** in the middle line just above the **Annular ligament** and passing over it into the palm.
7. **Digital branches of the Median nerve** to either side of the thumb.

II. Remove the preceding structures, and expose the **Deep Fascia**. At the wrist this is seen to be strengthened by transverse fibres, and to constitute in that situation the **Anterior Annular ligament**,¹ which is attached internally to the **Unciform** and **Pisiform bones**, and externally to the **Scaphoid** and **Os Trapezium**. On the palm of the hand is seen the upper portions of the middle and outer divisions of the **Palmar Fascia**, thick in the centre of the hand, but thin over the **Thenar eminence**.

¹ Only the outer part is uncovered.

III. Remove now the **Deep Fascia** except that part forming the **Anterior Annular ligament**, dividing in doing so the attachments of several intermuscular septa. Detach the lateral part of the **Palmar Fascia** from the ball of the thumb. There will now be exposed—

1. The **Extensor Carpi Radialis Longior** muscle most externally.
2. Internal to the preceding the **Supinator Longus** muscle.
3. Next the **Pronator Radii Teres** muscle and a portion of the **Supinator Brevis** muscle and **Biceps** tendon in the interval between this muscle and the **Supinator Longus**.
4. Then the **Flexor Carpi Radialis** muscle.
5. Still more internally the **Palmaris Longus**, its tendon passing over the **Annular ligament**, to be inserted into the middle division of the **Palmar fascia**.
6. The oblique fleshy fibres of the **Flexor Sublimis Digitorum** in the interval between the **Supinator Longus** and the **Flexor Carpi Radialis**. Its **outermost tendon** will probably be seen at the lower part, surrounded by a **synovial sac** extending for one inch above the **annular ligament**.
7. A small piece of the **Pronator Quadratus** muscle internal to the **Supinator Longus** tendon, and outside the **Flexor Longus Pollicis**, on the lower two inches of the **Radius**.
8. Forming the ball of the thumb are the following muscles: the **Abductor Pollicis**, the most superficial, running from the lower border of the **Annular ligament** to the outer side of the base of the proximal **Phalanx**. The **Opponens** muscle is beneath it, but a small portion is seen at its outer border. The **outer head** of the **Flexor Brevis Pollicis** is seen inserted,

with the Abductor muscle, into the outer side of the base of the proximal Phalanx. The insertion of the **Adductor** and inner head of the **Flexor Brevis Pollicis** muscles is seen at the inner side of the base of the proximal Phalanx.

9. Some of the fleshy fibres of the **Flexor Longus Pollicis** muscle are seen between the tendons of the **Supinator Longus** and **Flexor Carpi Radialis** muscles, and its tendon is surrounded by a synovial sheath which extends for one inch above the annular ligament. Its tendon emerging from between the two heads of the **Flexor Brevis Pollicis** is covered by a prolongation of the same synovial sheath, which extends to its insertion into the **Ungual Phalanx** of the thumb.
10. The **Radial artery** is seen to be overlapped above by the **Supinator Longus**, and to be superficial below between the tendon of that muscle and that of the **Flexor Carpi Radialis**. It lies from above downwards upon the **Biceps**, **Supinator Brevis**, **Pronator Teres**, **Flexor Sublimis**, **Flexor Longus Pollicis**, **Pronator Quadratus** and anterior margin of **Radius**. Below this it disappears beneath the **Extensor** tendons of the thumb, two of which are exposed in the outer limits of the dissection. It is found to give off **muscular offsets**, and the **Superficialis Volæ** branch over or between the muscles of the **Thenar eminence**, and to be accompanied by two **Venæ Comites**.
11. The **Radial nerve** is seen to lie on the outer side of the artery from a point three inches below the elbow, as far as about three inches above the wrist.
12. A small piece of the **Median nerve** is seen just above the wrist, between the **Flexor Carpi Radialis** and

outermost **Flexor Sublimis** tendons, accompanied by the **Comes Nervi Mediani**.

IV.

- a. Remove the outer part of the **Anterior Annular ligament**, and take away the central thick portion of the **Palmar fascia** as far as it is exposed, having previously divided the insertion of the **Palmaris Longus** muscle into it.
- b. Remove the exposed portion of the **Pronator Radii Teres** muscle.
- c. Cut through the **Flexor Carpi Radialis** above and below, and remove it. Its nerve from the Median will be divided.
- d. Cut the **Palmaris Longus** above, and remove it.

There will now be exposed—

1. The outer portion of the **Flexor Sublimis Digitorum** muscle, its origin from the oblique line and upper three-fourths of the anterior border of the Radius ; its four tendons passing over the Carpal bones in pairs (the tendons of the middle and ring fingers being in front), and spreading out in the palm to the fingers. The two innermost are not seen. The synovial sheath enclosing them and the subjacent tendons of the **Flexor Profundus Digitorum**, is also observed to extend downwards upon these tendons for one inch below the lower margin of the Annular ligament.
2. A further portion of the **Flexor Longus Pollicis** muscle above the wrist.
3. The **Pronator Quadratus** muscle more fully.
4. In the palm, the tendons of the **Flexor Profundus** muscle¹ beneath those of the **Flexor Sublimis**, and the two

¹ The two outermost only are seen.

outer **Lumbricales** muscles arising from the outer side of those going to the index and middle fingers.

5. The outer portion of the **Superficial Palmar arch** is seen, and just the commencement of the digital branch to the contiguous sides of the index and middle fingers.
6. The **Median nerve** is seen in the palm, somewhat enlarged, and divided into two parts. The outer division supplies branches to the **Abductor, Opponens**, and outer head of **Flexor Brevis Pollicis** muscles, and two **Digital** branches to the outer and inner borders of the thumb, and a single branch to the outer side of the index finger. This last branch is only seen at its origin. The commencement of the branch of the inner division, which divides for the contiguous sides of the index and middle fingers, also comes into view. The twigs to the exposed **Lumbricales** muscles from the two last-mentioned branches may be traced. The nerves here lie beneath the artery.

V.

- a. Divide now the outer division of the **Median nerve**, and the **Superficial Palmar arch**.
- b. Clean away the **Synovial membrane** from the **Flexor tendons**.
- c. Divide the **Flexor Sublimis** muscle longitudinally along its whole length. Cut through the tendons to the index and middle fingers, and reflect the Radial origin of the muscle outwards.

The **Flexor Longus Pollicis** muscle will now be fully exposed by opening up the Vaginal and Synovial sheaths of its tendon ; and the occasional slip from the inner part of the Coronoid process of the Ulna may be traced.

In addition there will be seen—

1. The outer part of the **Flexor Profundus Digitorum** muscle in the forearm.
2. The **Median nerve** in the forearm with its branches to the **Flexor Sublimis** muscle.

A DISSECTION TO EXPOSE THE INTEROSSEOUS ARTERY, ITS BRANCHES AND THEIR ANASTOMOSES.

POSITION.—Both surfaces of the forearm will be dissected, so that it must be pronated or supinated as occasion arises.

I. SKIN INCISIONS.

1. A circular incision round the arm, at the level of the **external Condyle** of the **Humerus**.
2. An incision more or less circular, which corresponds in front to the line between the forearm and palm, but posteriorly runs a little lower down along the bases of the **Metacarpal bones**.
3. A median incision, joining the two preceding above and below, running down the anterior surface of the forearm.

Remove the whole of the skin of the forearm between these limits, and expose the **Superficial Fascia**, containing—

IN FRONT—

1. The **Median vein**, its bifurcation into **Median-cephalic** and **Median-basilic** branches, and its junction at the division with the **Deep Median** branch communi-

cating with the Venæ Comites of the Brachial artery.

2. The **Radial vein** commencing below at the back of the forearm, but soon winding round the outer border and joining above the **Median-cephalic vein**.
3. The **Anterior Ulnar vein** running up the inner border of the forearm, receiving above the **Posterior Ulnar vein**, which lower down is placed on the posterior surface, but above winds round to the front to join the **Anterior Ulnar vessel**. The vein resulting from this junction is seen entering the **Median-basilic**.
4. The anterior branches of the **Internal Cutaneous nerve**, some of which usually pass over, and some beneath the Median-basilic vein to supply the skin of the inner border of the forearm as far as the wrist.
5. The anterior branch of the **External Cutaneous nerve**, usually passing beneath the Median-cephalic vein and supplying the skin of the outer part of the forearm, within the whole limits of the surface exposed.
6. Twigs of the upper **External Cutaneous branch of the Musculo-spiral nerve** reaching the upper and outer part of the anterior surface of the bend of the elbow.
7. The **Palmar Cutaneous branch of the Median nerve** piercing the fascia about the centre of the forearm just above the wrist.
8. The **Palmar Cutaneous branch of the Ulnar nerve** lying over the line of the Ulnar artery, and piercing the deep fascia just above the wrist. Sometimes a second branch is cutaneous higher up, and joins

the anterior branch of the **Internal Cutaneous nerve**.

BEHIND—

9. The lower portions of the **Radial and Posterior Ulnar veins**, as mentioned above.
10. The posterior branch of the **Internal Cutaneous nerve**, supplying about the upper half of the internal portion of the forearm.
11. The posterior branch of the **External Cutaneous nerve** supplying about the lower third of the outer border of the forearm.
12. Twigs of the **Lesser Internal Cutaneous nerve**, between the internal Condyle and the Olecranon process, and a junction with the posterior branch of the **Internal Cutaneous nerve**.
13. The lower **External Cutaneous branch of the Musculo-spiral nerve**, supplying the skin of the back of the forearm, between the **Internal and External Cutaneous nerves** as far as the wrist, and communicating with the latter.
14. The **Radial nerve**, cutaneous between from two to three inches above the wrist, and its points of division into branches for the thumb, the next two, and half the ring fingers.
15. The **Dorsal branch of the Ulnar nerve**, perforating on the inner side at a lower point than the **Radial**, and its points of division into branches for the remaining finger and a half.

II.

- a. Remove the preceding, and expose the **Deep Fascia**, joined above, in front of the bend of the elbow, by the **Semilunar Process from the Tendon of the Biceps muscle**. Behind the wrist it is seen to be

strengthened by transverse fibres, and to constitute the **Posterior Annular ligament**.

b. Clear away the Deep and Bicipital Fasciæ, and expose—

IN FRONT—

1. Above, the lower part of the triangular space of the bend of the elbow, bounded: *externally*, by the **Supinator Longus** muscle; *internally*, by the **Pronator Radii Teres** muscle; and having the *floor* formed by the lower part of the **Brachialis Anticus** muscle and a small portion of the **Supinator Brevis** muscle. It contains—
2. The tendon of the **Biceps** muscle running down to the Tuberosity of the Radius, most externally.
3. The **Brachial** artery, surrounded by its **Venæ Comites**, placed internal to the Biceps tendon. The division of the artery into **Radial** and **Ulnar** branches is seen, and the commencement of the **Radial Recurrent** branch.
4. The **Median** nerve is exposed internal to the artery, and its branch to the **Pronator Radii Teres** muscle may be traced.
5. Internal to the **Pronator Radii Teres** muscle is seen the **Flexor Carpi Radialis** muscle, as far as the wrist.
6. The **Palmaris Longus** muscle, next internally, and
7. The **Flexor Carpi Ulnaris** muscle, innermost of all.
8. At the wrist between the tendons of the two preceding muscles, those of the **Flexor Sublimis Digitorum** muscle come into view.
9. Small portions of the **Pronator Quadratus** muscle are seen below on the Radius and Ulna.
10. The **Radial** artery and its **Venæ Comites** are exposed

farther than has been indicated above, viz., as low down as the wrist. At first it lies in the triangular space, then crosses over the insertion of the Pronator Teres muscle, and finally lies between the Supinator Longus and Flexor Carpi Radialis tendons.

11. The **Ulnar artery** with its **veins** are seen for about their lower third, below and internally, passing from beneath the fleshy portion of the Flexor Carpi Ulnaris muscle, and running on the outer side of its tendon as far as the wrist.

12. The **Radial nerve** is seen external to its artery, as far as about three inches above the wrist. It is overlapped above by the fleshy part of the Supinator Longus muscle.

13. The **Ulnar nerve** lies on the inner side of the lower exposed portion of the corresponding artery, as far as the wrist.

14. A further small portion of the **Median nerve** is seen, just above the wrist, between the Flexor Carpi Radialis and the outermost tendon of the Flexor Sublimis Digitorum.

BEHIND—

15. The **Anconeus muscle**, passing between the external Condyle, and the outer surfaces of the Olecranon process and the upper part of the shaft of the Ulna.

The following muscles from without inwards—

16. The **Supinator Longus**.

17. The **Extensor Carpi Radialis Longior**.

18. The **Extensor Carpi Radialis Brevior**.

19. The **Extensor Communis Digitorum**.

20. The **Extensor Minimi Digiti**.

21. The **Extensor Carpi Ulnaris**.

At the lower part, passing out between the Extensor Communis Digitorum and Extensor Carpi Radialis Brevior tendons, are—

22. The **Extensor Ossis Metacarpi** and **Primi Internodii Pollicis** muscles.

23. The **Posterior Interosseous** artery is seen on the outer side of the Extensor Carpi Ulnaris tendon for about the lower third of the forearm, accompanied by its vein.

III.

IN FRONT—

a. Divide the **Pronator Radii Teres** muscle at its insertion, and at its origin from the Coronoid process, and pull it upwards, cutting through at the same time the **Anterior Ulnar Recurrent** artery and the **Median** nerve.

b. Cut through the tendons of the **Palmaris Longus** and **Flexor Carpi Radialis** muscles at the wrist, and pull these muscles upwards. Their nerves from the **Median** will be divided, and arterial twigs from the **Radial** and **Ulnar**.

There will now be exposed—

1. The **Flexor Sublimis Digitorum** muscle, its origin above from the internal Condyle, the inner side of the Coronoid process, the oblique line and part of the anterior border of the Radius; and its tendons below as far as the wrist.

2. A small portion of the tendon of the **Flexor Longus Pollicis** muscle below, lying upon the lower part of the Radius.

IV. Divide the fleshy belly of the **Flexor Sublimis Digitorum** muscle by a longitudinal incision along the middle line, and

hook the halves inwards and outwards. The **Median nerve** has already been cut, but **branches from it to this muscle and arterial twigs from the Ulnar** will be divided.

There will now be exposed—

1. The **Flexor Profundus Digitorum** muscle, lying upon the **Ulna** and the corresponding half of the **Interosseous membrane**.
2. The **Flexor Longus Pollicis** muscle, concealing the anterior surface of the **Radius** and the outer part of the **Interosseous membrane**. Its occasional head from the inner part of the **Coronoid process** will be seen if present.
3. A further portion of the **Ulnar artery** is now seen lying upon the **Brachialis Anticus** and **Flexor Profundus Digitorum** muscles, and the following branches: the **Anterior and Posterior Ulnar Recurrent** branches, the former being cut, the **Common Interosseous** trunk giving off **Anterior and Posterior Interosseous** branches, the former seen passing between the **Flexor Profundus** and **Longus Pollicis** muscles, and the latter going to the back of the forearm.
4. All these arteries have **corresponding veins**.
5. The **Median nerve** lying upon the **Flexor Profundus** muscle, accompanied by the
6. **Comes Nervi Mediani** artery at the lower part.

V. Separate now the **Flexor Longus Pollicis** muscle from the **Flexor Profundus Digitorum** muscle, dissect off their origins from the **Interosseous membrane**, and pull the former well outwards and the latter inwards. The occasional head of origin of the **Flexor Longus Pollicis** must be cut through if present.

There will now be exposed—

1. The **Interosseous Membrane**.
2. The **Pronator Quadratus** muscle in the greater part of its extent.
3. The **Anterior Interosseous artery** lying upon the membrane, and disappearing below beneath the **Pronator Quadratus** muscle. Its twigs to the muscles between which it lies, the origin of the **Comes Nervi Mediani** artery, and the **Nutrient** arteries to the **Radius** and **Ulna** may now be traced from it. The **Posterior Interosseous artery** may be traced above, passing to the back of the forearm between the **Oblique ligament** and the upper margin of the **Interosseous membrane**.
4. The **Anterior Interosseous nerve** is found with the artery of the same name, and its several branches to the **Flexor Profundus** and **Longus Pollicis** muscles are traceable, if they have not been torn through in separating these muscles.

VI. To expose the artery beneath the **Pronator Quadratus** muscle, one of two courses may be taken, viz., A or B.

(A) *a.* Separate the tendons of the **Flexor Profundus** muscle well from that of the **Flexor Longus Pollicis** muscle as far as the upper border of the **Anterior Annular ligament**, and draw them by hooks on either side.

b. Divide the **Pronator Quadratus** muscle longitudinally, and reflect the halves inwards and outwards.

In this way there will be exposed—

1. The **anterior surface of the wrist-joint** and its ligaments.
2. The **Anterior Carpal arch**, derived from the **Radial** and **Ulnar** arteries.

3. The **Anterior Interosseous artery** passing to the back of the forearm beneath the Interosseous membrane, but sending down a branch to **anastomose** with the **Anterior Carpal arch**.

- (B) *a.* Divide the tendons of the **Superficial and Deep Flexor muscles** of the fingers at the **Annular ligament**, dissect them up for some distance, and hook them inwards.

The same parts enumerated under A will be exposed, but more completely.

The **Anterior Interosseous artery** is now fully exposed except at its termination. To see this, and to trace the **Posterior artery**, the forearm should now be supinated. The structures exposed by the removal of the deep fascia have been enumerated under Section II.

BEHIND—

VII.

- a.* Remove the **Posterior Annular ligament**.
b. Separate the **Extensor Communis Digitorum** muscle from the **Extensor Carpi Radialis Brevior** muscle as high as the external Condyle, cut through its condyloid origin and reflect the muscle downwards as far as the bases of the Metacarpal bones.
c. Cut through the origin of the **Extensor Minimi Digiti**, and reflect it down to the same extent.
d. Divide the origin of the **Extensor Carpi Ulnaris** from the External Condyle and the deep fascia as low down as its attachment to the posterior margin of the Ulna, and hook the muscle inwards. **Branches** of the **Posterior Interosseous nerve** will be cut through in the division of these muscles, together with twigs from the artery of the same name.

- e. Remove the **Anconeus** muscle, taking care of the artery which will be found beneath it.

There will now be exposed—

1. The Posterior surface of the **Supinator Brevis** muscle, highest of all.
2. Next below, the **Extensor Ossis Metacarpi Pollicis** muscle, arising from the Radius and Ulna.
3. Next, the **Extensor Primi Internodii Pollicis** muscle, arising from the Radius.
4. Still lower, the **Extensor Secundi Internodii Pollicis** muscle, arising from the Ulna.
5. Lowest of all, the **Extensor Indicis** muscle, from the Ulna.
6. The **Posterior Interosseous** artery, passing from the front, between the **Supinator Brevis** and **Extensor Ossis Metacarpi Pollicis** muscles, and running down the forearm along the outer side of the tendon of the **Extensor Carpi Ulnaris**, lying upon the other **Extensors** of the thumb, and that of the index finger. The **Recurrent** branch uncovered by the removal of the **Anconeus** muscle is seen passing upwards, lying first upon the **Supinator Brevis** muscle and then upon the Ulna, anastomosing above with the posterior branch of the **Superior Profunda** artery, and communicating across the **Olecranon** with the **Posterior Ulnar Recurrent** artery. The corresponding veins are seen.
7. The **Posterior Interosseous** nerve is displayed, coming through the **Supinator Brevis** muscle, dividing into branches for the **Extensor** muscles, and disappearing below beneath the **Extensor Secundi Internodii Pollicis**.

VIII. Divide now the **Extensor Secundi Internodii Pollicis**

and **Extensor Indicis** muscles. Remove the fleshy portions and pull the tendons outwards. This will expose—

1. The termination of the **Anterior Interosseous** artery.
2. The **Posterior Carpal** arch.
3. The communication between the two preceding, and the branch from the **Posterior Interosseous** artery, which joins the **Anterior**, and the **Carpal** arch.
4. The further portion of the **Posterior Interosseous** nerve, and its gangliform enlargement.

IX. To see the origin of the **Posterior Interosseous** artery from the common trunk, remove, if necessary, a portion of the lower margin of the **Supinator Brevis** muscle.

A DISSECTION TO EXPOSE THE PRONATOR QUADRATUS MUSCLE.

POSITION.—Place the forearm in the supine position.

I. SKIN INCISIONS.

1. Make a transverse incision from the **Styloid** process of the **Ulna** to the **Styloid** process of the **Radius**.
2. Make two vertical incisions upwards, each two and a half inches long, from the extremities of the **Styloid** processes of the **Ulna** and **Radius**.
3. Join the upper extremities of these vertical incisions by a transverse incision crossing the anterior surface of the forearm.

II. Remove the skin and expose—

1. **Superficial Fascia**, containing from without inwards,
2. **Branches** of the **External Cutaneous** nerve,

3. The **Palmar Cutaneous** branch of **Median** nerve ;
4. The **Palmar Cutaneous** branches of the **Ulnar** nerve ;
5. Branches of the **Internal Cutaneous** nerve ;
6. Branches of the **Radial**,
7. **Median**, and
8. **Ulnar** veins, with
9. **Lymphatics** accompanying them ;
10. **Cutaneous** branches of arteries which will be enumerated at a subsequent stage of the dissection.

III. Remove the **Superficial Fascia** and contained structures, and expose—

1. **Deep Fascia**, continuous below with
2. The upper margin of the **Anterior Annular** ligament ;
3. The **Palmar Cutaneous** branches of the **Ulnar**, and
4. **Median** nerves perforating **Deep Fascia**.

IV. Remove that portion of the **Deep Fascia** seen in the dissection, and expose from without inwards.

1. Portion of the margin of the **Radius** ;
2. The **Pronator Quadratus** ;
3. The **Flexor Longus Pollicis** ;
4. The **Flexor Carpi Radialis** ;
5. The **Palmaris Longus** ;
6. The **Flexor Sublimis Digitorum** ;
7. The **Flexor Profundus Digitorum** ;
8. The **Flexor Carpi Ulnaris** ;
9. The **Radial** artery and **Venæ Comites** lying upon the **Flexor Longus Pollicis**, **Pronator Quadratus**, and lower margin of the **Radius**, and giving off the **Anterior Carpal** artery and **Superficialis Volæ**.
10. The **Ulnar** artery and **Venæ Comites** lying upon the **Flexor Profundus Digitorum**, and giving off the **Anterior and Posterior Carpal** branches ;

11. The **Median nerve**, and
12. The **Comes Nervi Mediani** artery in the angular interval between the tendon of the **Palmaris Longus** and the **Flexor Sublimis Digitorum** muscles.
13. The **Ulnar nerve** lying to the inner side of its artery.
14. A **synovial sheath**, extending upwards for one inch over the tendon of the **Flexor Longus Pollicis**, and
15. A **similar sheath**, enclosing for the same distance the tendons of the **Flexor Sublimis** and **Flexor Profundus Digitorum** muscles.

V. Remove the tendons of the **Flexor Carpi Radialis** and **Palmaris Longus**, and expose those portions of the **Flexor Longus Pollicis** and **Flexor Sublimis Digitorum** which lie beneath them.

VI. Remove the radial artery and its **Venæ Comites**.

VII. Remove the **Ulnar artery**, its **Venæ Comites**, and the **Ulnar nerve**.

VIII. Cut transversely through the **Flexor Sublimis Digitorum** at the upper and lower limits of the dissection, noticing the arrangement of the tendons in two layers as they pass beneath the **Annular Ligament**, the anterior pair consisting of those for the middle and ring fingers, and expose—

1. Further portions of the **Flexor Longus Pollicis**,
2. **Flexor Profundus Digitorum**,
3. **Median nerve**, and the
4. **Comes Nervi Mediani** artery.

IX. Hook inwards the **Flexor Carpi Ulnaris**, and expose—

The inner portion of the **Pronator Quadratus**.

X. Remove the portions of **Flexor Longus Pollicis**,

Flexor Profundus Digitorum, their synovial sheaths, the Median nerve and the Comes Nervi Mediani artery seen in this dissection, observing that though there are four tendons of the Flexor Profundus Digitorum, that for the index finger alone is distinct, the others being connected together.

1. The **Pronator Quadratus** muscle is now completely exposed.
2. The **Anterior Interosseous** vessels and nerve are seen to disappear in and beneath the upper margin of the **Pronator Quadratus**, and terminal branches of the **Anterior Interosseous** vessels are seen to emerge from beneath its lower border, and to anastomose with branches of the **Anterior Carpal** arteries of the **Radial** and **Ulnar** vessels, and with branches of the deep **Palmar** arch.

TO EXPOSE THE POSTERIOR INTEROSSEOUS NERVE.

POSITION.—Place the arm and forearm in the prone position.

I. SKIN INCISIONS.

1. Make a vertical incision from the centre of the upper limit of the Olecranon along the posterior border of the Ulna to the base of the fifth Metacarpal bone.
2. Make a transverse incision outwards from the upper extremity of No. 1, to the junction of the anterior and posterior surfaces of the forearm.
3. From the lower extremity of No. 1 make a trans-

verse incision outwards to the base of the first Metacarpal bone.

II. Reflect the skin outwards and expose—

1. **Superficial Fascia**, containing branches of
2. The **Posterior Division** of the **Internal Cutaneous nerves**,
3. The **Upper and Lower External Cutaneous** branches of the **Musculo-spiral nerve**,
4. The **External Cutaneous nerve**,
5. The **Ulnar**, and
6. The **Radial veins**, and of
7. **Lymphatics** accompanying these veins.
8. The **Radial nerve** as it perforates deep fascia above the wrist, and breaks up into its several branches.
9. The **posterior branch** of the **Ulnar nerve**, also perforating deep fascia on a lower level.
10. **Cutaneous branches** of **arteries**, which will be enumerated at a subsequent stage of the dissection.

III. Remove these structures, and expose—

1. **Deep Fascia**, attached to the posterior margin of the **Ulna**, and continuous in the lower part of the dissection with
2. The **Posterior Annular Ligament** ;
3. The **Triangular Subcutaneous surface** of the **Olecranon**, and
4. The **Bursa** covering it.

IV. Remove the Deep Fascia and Annular Ligament, dividing the several Intermuscular Septa, and the origins of the several muscles from the under surface of the deep fascia, and expose from within outwards—

1. The **Anconeus** ;
2. The **Extensor Carpi Ulnaris** ;
3. The **Extensor Minimi Digiti** ;

4. The **Extensor Communis Digitorum** ;
5. The **Extensor Carpi Radialis Brevior** ;
6. The **Extensor Carpi Radialis Longior** ;
7. The **Supinator Longus** ;
8. The **Extensor Secundi Internodii Pollicis** ;
9. The **Posterior Surface of the Radius** ;
10. The **Extensor Ossis and Primi Internodii Pollicis**.

These three muscles emerge from beneath the **Extensor Communis Digitorum**, and cross superficially the tendons of the **Radial Extensors**.

As the several Tendons lie in their compartments in the **Posterior Annular ligament**, they are surrounded by synovial sheaths, which extend over them for a variable distance.

11. The **Radial artery and Venæ Comites** as they cross the outer aspect of the **Carpus** obliquely, passing on to the adjoining bases of the first and second **Metacarpal bones** ;
12. The **Posterior Carpal branch**, as it arises from the **Radial artery**, and passes inwards over the back of the **Carpus** beneath the **Extensor tendons** to form the **Posterior Carpal arch** by uniting with the **Posterior Ulnar Carpal**.
13. The origin of the **Metacarpal, Dorsalis Indicis, and Dorsalis Pollicis** arteries from the **Radial** ;
14. The termination of the **Posterior Interosseous artery** upon the **Ulna** ;
15. The termination of the **Anterior Interosseous artery** on the back of the lower extremity of the **Radius** ;
16. **Branches of the Interosseous Recurrent artery** communicating with
17. **Branches of the Superior Profunda artery** at the upper margin of the **Anconeus**.

V. Remove the whole of the Extensor Carpi Ulnaris.

Cut away the Extensor Communis and Minimi Digiti from their origin from the External Condyle, and transversely along the lower limit of the dissection.

Divide transversely the Extensor Carpi Radialis Longior at the upper limit of the dissection, and remove the Extensor Carpi Radialis Brevior from its origin and from the External Condyle, and turn down these two muscles.

In doing this you divide branches of the **Posterior Interosseous nerve and artery**, which supply all these muscles with the exception of the Extensor Carpi Radialis Longior, which is supplied by branches of the Musculo-spiral nerve.

You expose from above downwards—

1. The **Orbicular** and the **External Lateral Ligaments** ;
2. The **Supinator Brevis** ;
3. The **Extensor Ossis Metacarpi Pollicis** ;
4. The **Extensor Primi Internodii Pollicis** ;
5. The **Extensor Secundi Internodii Pollicis** ;
6. The **Extensor Indicis** ;
7. The **Posterior Interosseous artery**, as it emerges from between the Supinator Brevis and the Extensor Ossis Metacarpi Pollicis, and runs downwards upon the Extensor Ossis Metacarpi Pollicis, the Extensor Secundi Internodii Pollicis, the Extensor Indicis and Ulna, and communicates with the Posterior Carpal arch.

The **Posterior Interosseous Recurrent branch** runs upwards beneath the Anconeus ;

8. The **Posterior Interosseous nerve**, as it emerges from the posterior surface of the Supinator Brevis, and runs downwards upon the Extensor Ossis Meta-

carpi, and disappears beneath the Extensor Secundi Internodii Pollicis.

VI. Divide the Extensor Secundi Internodii Pollicis and the Extensor Indicis, and trace the Posterior Interosseous nerve to the back of the Carpus, where it becomes gangliform, and distributes branches to the several portions of the wrist-joint.

Hook the Supinator Longus well outwards, and trace the Posterior Interosseous nerve through its substance.

Supinate the forearm, and trace this nerve upwards to its origin from the Musculo-spiral. The Radial nerve is seen lying in front and internal to the Posterior Interosseous nerve, and branches of the Radial Recurrent artery and of the Superior Profunda artery are seen in relation with it.

TO EXPOSE THE EXTENSOR SECUNDI INTERNODII POLLICIS.

POSITION.—Place the forearm in a prone posture, and fix the thumb in a position of considerable abduction.

I. SKIN INCISIONS.

1. Make an incision from the inner aspect of the extremity of the thumb to the tip of the Styloid process of the Ulna.
2. Make an incision from the Styloid process of the Ulna, along the posterior margin of that bone to its centre.

II. Reflect the skin outwards to a line joining the lower extremity of the first incision, and the centre of the posterior margin of the Ulna, and expose—

1. Superficial Fascia, containing
2. Branches of the Internal Cutaneous and
3. External Cutaneous nerves, and of the

4. **Lower External Cutaneous** branch of the **Musculo-spiral** nerve ;
5. The **Dorsal** branch of the **Ulnar** nerve ;
6. The **Radial** nerve as it breaks up into its several branches to the thumb, index, middle, and occasionally to the outer aspect of the ring fingers ;
7. Filaments of the **Posterior Ulnar** and
8. **Radial** veins, and
9. **Lymphatics** accompanying them.
10. **Cutaneous** branches of **arteries**, which will be described at a later stage of the dissection.

III. Remove the **Superficial Fascia** and contained structures, and expose—

1. **Deep Fascia** of the forearm continuous with
2. The **Posterior Annular Ligament** on the back of the wrist, and this again is continuous with
3. The **Deep Fascia** of the back of the hand.

IV. Remove the **Deep Fascia** and **Annular Ligament** from their attachments to the posterior margin of the **Ulna**, and to the ridges on the posterior surface of the lower extremity of the **Radius**, and expose from within outwards—

1. The **posterior border** of the **Ulna** ;
2. The **Extensor Carpi Ulnaris**, with its fascial attachment to the posterior border of the **Ulna** above. Its tendon lies in the groove between the head and **Styloid process** of the **Ulna**.
3. The **Extensor Minimi Digiti**, whose tendon lies in a groove formed in part by **Ulna** and in part by **Radius** ;
4. The **Extensor Communis Digitorum** ;
5. The **Extensor Indicis**, which emerges from under cover of the **Common Extensor** immediately below the **Carpus** ;

6. The tendon of the **Extensor Secundi Internodii Pollicis**, as it emerges from beneath the outer margin of the **Extensor Communis Digitorum**, runs in the oblique groove on the back of the **Radius**, crosses the tendons of the **Extensor Carpi Radialis Brevior** and **Longior**, and then runs directly to the base of the second **Phalanx** into which it is inserted ;
7. The **Extensor Primi Internodii Pollicis**, and
8. The **Extensor Ossis Metacarpi Pollicis**, as they emerge higher up from beneath the **Extensor Communis Digitorum**, crossing superficially and obliquely the tendons of the two **Radial Extensors**, then running in a vertical groove in the **Radius**, and passing to be inserted into the bases of the first **Phalanx** and the first **Metacarpal** bone respectively. Occasionally the latter muscle has an insertion into the **Trapezium** also.
9. The tendons of the **Extensor Carpi Radialis Brevior** and **Longior**, emerging from beneath the **Extensor Ossis** and **Primi Internodii Pollicis**, and lying in a common groove on the back of the **Radius**. They pass beneath the tendon of the **Extensor Secundi Internodii Pollicis**, and are inserted into the **Radial** side of the bases of the third and second **Metacarpal** bones respectively.
10. Small **Bursæ** existing beneath these tendons at their insertions.
11. **Synovial Membranes** of variable extent, covering all the tendons enumerated.
12. The bases of the three outer **Metacarpal** bones ;
13. The **First Dorsal Interosseous** muscle, or the **Abductor Indicis** ;

14. Portions of the **Second and Third Dorsal Interossei muscles** ;
15. The **Adductor Pollicis**, and
16. **Deep head of the Flexor Brevis Pollicis** ;
17. The **Posterior Interosseous artery**, as it emerges from beneath the inner margin of the **Extensor Carpi Ulnaris**, and descends along its inner border ;
18. The **Anterior Interosseous artery**, as it emerges from beneath the outer margin of the **Extensor Communis Digitorum**, and runs down on the exposed surface of radius to anastomose with the **Posterior Carpal branch of the Radial artery**.
19. The **Radial artery**, as it passes obliquely downwards and backwards from beneath the tendons of the **Extensor Ossis and Primi Internodii Pollicis**.

It lies on the **External Lateral ligament** of the wrist, the **Scaphoid and Trapezium** ; then passing beneath the tendon of the **Extensor Secundi Internodii Pollicis**, it lies upon the bases of the **First and Second Metacarpal bones**, and upon the tendon of the **Extensor Carpi Radialis Longior**, and from that it passes forwards between the two heads of the **First Dorsal Interosseous muscle** into the palm. It gives off in this dissection

20. The **Posterior Radial Carpal**, which runs inwards on the back of the **Carpus** and anastomoses with the **Posterior Ulnar Carpal branch**. The **Dorsal Interosseous arteries** of the third and fourth space may be seen to arise from this arch.
21. The **First Dorsal Interosseous artery**, which passes to the second **Interosseous space**, and communicates

with the first superior perforating branch of the deep Palmar arch ;

22. The **Dorsal arteries of the Thumb**, which run one on its Radial, and the other on its Ulnar border ;

23. The **Dorsal artery of the index finger**, which runs downwards towards the radial side of the index finger.

V. Remove the Extensor Carpi Ulnaris, the Extensor Minimi Digiti, and the Extensor Communis Digitorum within the limits of the dissection, dividing the branches of the Posterior Interosseous nerve and vessels which supply them, and expose—

1. The **Extensor Indicis**, as it arises from the Ulna and from the Interosseous membrane, and lies in the groove on the radius common to it and the Extensor Communis Digitorum ;

2. The **Extensor Ossis Metacarpi Pollicis**, with the exception of the upper limit of its origin from the Radius and Ulna ;

3. The whole of the **Extensor Primi Internodii Pollicis** ;

4. The remainder of the **Extensor Secundi Internodii Pollicis**, which muscle is now completely exposed ;

5. The **Posterior Interosseous artery**, running down upon the Extensor Ossis Metacarpi Pollicis, the Extensor Secundi Internodii Pollicis, and the Extensor Indicis ;

6. The **Posterior Interosseous nerve**, running down on the Extensor Ossis Metacarpi Pollicis, and the Extensor Primi Internodii Pollicis, and disappearing beneath the Extensor Secundi Internodii Pollicis. It emerges from beneath that tendon, becoming gangliform on the back of the Carpus, and supplying branches of distribution to the several articulations of the wrist joint.

A DISSECTION TO EXPOSE THE ANTERIOR SURFACE OF THE ADDUCTOR POLLICIS MUSCLE.

POSITION.—The hand lying upon its dorsal surface, the thumb strongly abducted and rotated outwards.

I. SKIN INCISIONS.

1. From the inner border of the base of the **Proximal Phalanx of the thumb** to the inner border of the root of the middle finger.

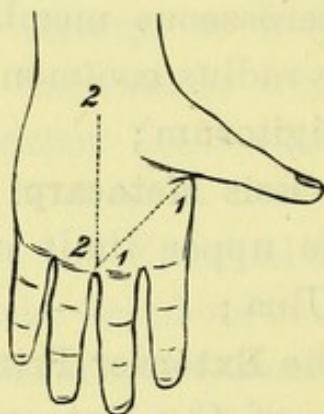


Fig. 17.

2. Along the median line from the inner end of the preceding to the lower margin of the **Anterior Annular ligament**.

Reflect the flap upwards and outwards, and expose the **Superficial Fascia** containing granular fat, and—

1. A fine plexus of veins, from which two veins ascend to form the commencement of the Median vein ;
2. The branches of bifurcation of the **Fourth Digital artery**, and the **Radialis Indicis**, and
3. The corresponding branches of the **Median nerve** emerging from between the processes of the **Palmar Fascia**, with

4. The **First and Second Lumbrical tendons** ;
5. Cutaneous branches of the **Superficialis Volæ** artery ;
6. Branches of the **Musculo-cutaneous** nerve ;
7. The **Palmar Cutaneous** branch of the **Median** nerve.

II. Remove the **Superficial Fascia**, and contained structures, and expose—

1. The outer part of the middle division of the **Palmar Fascia**, receiving from over the **Annular** ligament the insertion of
2. The **Palmaris Longus**, and splitting below into two of its
3. **Four processes**. The second splits into two within the area of the dissection, and encloses
4. The **Vaginal sheath** of the **middle finger** ;
5. These processes of the **Palmar Fascia** are connected by the **Superficial Transverse** ligament of the fingers ;
6. Portion of the comparatively thin outer division of the **Palmar Fascia**, covering the muscles of the thumb.

III. Remove the portions of the middle and outer divisions of the **Palmar Fascia** which are exposed, together with the **Superficial Transverse** ligaments of the fingers, and expose—

1. The lower margin of the **Anterior Annular** ligament ;
2. Portions of the **Abductor Indicis**, and of
3. The **Superficial** head of the **Flexor Brevis Pollicis** ;
4. The tendon of the **Flexor Longus Pollicis**, covered by a **synovial membrane**, prolonged from beneath the **Anterior Annular** ligament ;
5. The deep head of the **Flexor Brevis Pollicis**, uniting with

6. The **Adductor Pollicis**, to be inserted into the Ulnar side of the base of the first phalanx of the thumb ;
7. The **Abductor Indicis**, exposed below the lower margin of the **Adductor Pollicis** ;
8. The tendons of the **Flexor Sublimis Digitorum**, with
9. The subjacent tendons of the **Flexor Profundus Digitorum**, going to the index and middle fingers.

They are covered above by a **Common Synovial membrane**, prolonged for an inch downwards from beneath the Anterior Annular ligament, and below each pair is covered by a **separate Synovial membrane**, prolonged from the **Vaginal sheath** upwards for an inch above the web of the fingers.

10. The two outer **Lumbricales**, arising from the Radial sides of the **Flexor Profundus** tendons, going to the index and middle fingers.
11. The **Superficialis Volæ** artery, passing downwards over the Annular ligament, and uniting usually with the superficial division of the Ulnar artery, to form the **Superficial Palmar arch**. The **Fourth Digital** branch of this arch is exposed, and it is seen to receive the corresponding **Interosseous** artery immediately above its point of bifurcation.

Not uncommonly the superficial branch of the Ulnar artery joins with

12. The **Radialis Indicis** artery. This artery appears from beneath the lower margin of the **Adductor Pollicis**, and descends on the **Abductor Indicis**.
13. The **Arteria Princeps Pollicis**, also appearing from beneath the **Adductor Pollicis**, and passing to the interval between the heads of the **Flexor Brevis Pollicis**, where it divides beneath the tendon of the

Flexor Longus Pollicis into its two terminal branches.

14. The **Median nerve**, accompanied by the **Comes Nervi Mediani** artery, enters the palm from beneath the Anterior Annular ligament. It is somewhat enlarged, and rests upon the Flexor tendons. It divides into two branches, the inner of which gives branches to the opposing surfaces of the index and middle fingers, and then passes beyond the limits of the dissection. The outer supplies branches to the Opponens, Abductor and superficial head of the Flexor Brevis Pollicis, and Digital branches to the thumb and index finger.

The branches of the Median nerve lie beneath the Superficial Palmar arch. The branch to the outer side of the index finger supplies the ontermost Lumbrical, and the branch to the adjacent sides of the index and middle fingers supplies the neighbouring Lumbrical.

IV. Divide the Fourth Digital artery, the Digital nerves, the Flexor tendons, with the synovial prolongations from the Vaginal sheaths, and the Lumbrical muscles along the lower limit of the dissection.

V. Divide the Flexor tendons with their synovial prolongation from beneath the Annular ligament, the Superficialis Volæ artery, and branches of the Median nerve at the upper limit of the dissection. Remove the divided structures, and expose—

1. The whole of the **Adductor Pollicis**, arising from the lower two thirds of the anterior surface of the Middle Metacarpal bone, and being inserted with the deep head of the Flexor Brevis Pollicis into the

- inner side of the base of the proximal phalanx of the thumb.
2. The whole of the **deep head of the Flexor Brevis Pollicis** is exposed. The deep portion of this muscle is seen to send a **slip** beneath the long Flexor tendon of the thumb to join the outer head.
 3. Portions of the **Interosseous muscles** of the interspace between the index and middle fingers. They are covered by a layer of **fascia**, which is attached below to that slip of
 4. The **deep Transverse ligament** of the fingers which extends between these two Digits ;
 5. Branches of the **deep division of the Ulnar nerve**, supplying the Adductor Pollicis, and the deep head of the Flexor Brevis Pollicis.
 6. The **Third Interosseous artery**, emerging from beneath the lower margin of the Adductor Pollicis. It has been divided where it joined the Fourth Digital branch of the superficial arch.

A DISSECTION TO EXPOSE THE DEEP PALMAR ARCH AND ITS BRANCHES.

POSITION.—The hand lying upon its dorsal aspect with the thumb strongly abducted, and the fingers extended.

I. SKIN INCISIONS.

1. Along the Median line of the palm from the line marking the junction of the wrist with the forearm, to the centre of the root of the middle finger.

2. Transverse incisions from the upper end of No. 1, to the inner and outer borders of the forearm respectively.
3. Transverse incisions from the lower end of No. 1, along the roots of the fingers to the inner and outer borders of the hand.

Reflect the flaps inwards and outwards, dividing the insertion of the *Palmaris Brevis* into the skin, and expose the **Superficial Fascia**, containing granular fat, and—

1. Fibres of the **Superficial Transverse ligament** as it crosses the roots of the fingers.
2. The **Palmaris Brevis muscle**, along the inner and upper part of the palm of the hand, and arising from the **Anterior Annular ligament**.
3. The filaments of the **Musculo-cutaneous nerve** over the ball of the thumb.
4. The **Palmar Cutaneous branch of the Median nerve**, passing down over the centre of the **Annular ligament**, along the middle of the palm, and communicating with
5. The **Palmar Cutaneous branch of the Ulnar nerve**, which lies over the **Ulnar artery** and supplies the skin over the inner border of the hand.
6. Terminal branches of the **Internal Cutaneous nerve**.
7. Unnamed twigs of the **Median and Ulnar nerves** to the skin of the palm, and small branches of artery from the **Superficial Palmar arch**.
8. A delicate **plexus of veins**.

II. Remove the **Superficial Fascia**, the **Cutaneous nerves and vessels**, and the **Palmaris Brevis muscle**. The branch of nerve to this muscle from the **Ulnar** will be divided.

There will now be exposed—

1. The **Anterior Annular ligament**, attached internally to the Pisiform bone, and to the Unciform process of the Unciform bone, and externally to the Scaphoid and Trapezium.
2. The **Palmar Fascia**. This will be seen to be made up of three divisions, a central thick triangular portion, and two lateral parts covering the Thenar and Hypothenar eminences. The central portion has its apex at the Annular ligament, and its base is cut into four processes, one for each of the fingers. These are connected together by the Superficial Transverse ligament which crosses them at the roots of the fingers. Each of these splits into two, which enclose the Vaginal sheath between them.
3. The commencements of the sheaths of the **Flexor tendons**.
4. The tendon of the **Palmaris Longus** muscle passing over the Annular ligament to join the apex of the central triangular division of the Palmar fascia.
5. In the intervals of the four Digital processes of the Palmar Fascia, the following structures are seen :—
 - a. Small portions of the **Lumbricales** muscles.
 - b. The **Digital vessels and nerves**. Those supplying the outer side of the index and the inner side of the little fingers emerge from beneath the Palmar Fascia higher up than the others. The nerves are superficial to the arteries at the clefts of the fingers. The origins of the vessels and nerves are not traceable at this stage.
6. The **Ulnar artery and nerve** are found beneath the

Palmaris Brevis muscle, lying at first upon the Annular ligament, and then passing beneath the Palmar Fascia. The nerve is on the ulnar side of the artery.

III. Remove now the three portions of the Palmar Fascia and the Superficial Transverse ligament. This must be done carefully, so as to avoid cutting the various vessels and nerves, which are to be traced to their several origins. There will be exposed—

1. The small muscles of the thumb. The Abductor most superficial; the outer head of the Flexor Brevis along its inner border; a small piece of the Opponens along its outer border, close to the Annular ligament. A small portion of the Adductor running transversely in the cleft between the thumb and index finger, internal to the Flexor Brevis Pollicis.
2. The small muscles of the little finger, of which the Abductor is the most internal. The Flexor Brevis, and the Opponens Minimi Digiti, along the outer side of the preceding.
3. A small piece of the Abductor Indicis muscle along the Radial side of the index finger, emerging from beneath the Adductor Pollicis muscle.
4. The tendons of the Flexor Sublimis Digitorum muscle, and the subjacent tendons of the Flexor Profundus Digitorum, entering their sheaths on the four fingers.

These tendons are surrounded above by a Common Synovial membrane which is prolonged for an inch from beneath the Anterior Annular ligament. Below each pair of tendons is surrounded by a synovial membrane, prolonged upwards from the Vaginal sheath for about an

inch. That covering the tendons of the little finger frequently communicates with the Synovial sheath beneath the Annular ligament.

5. The four **Lumbricales** muscles, the first on the Radial side of the index tendon of the **Flexor Sublimis Digitorum** muscle, and the others in the intervals between the tendons.

The two inner arise from adjacent tendons, each of the two outer from the Radial aspect of a single tendon of the **Flexor Profundus Digitorum**.

6. The **Superficial Palmar arch**, and its **Venæ Comites** crossing transversely the **Flexor** tendons on a level with the upper border of the Abducted thumb. It is formed for the most part by the **Ulnar artery**, and is completed internally by the **Superficialis Volæ** branch of the **Radial artery**, or by a communication with the **Radialis Indicis** artery. The first of these two last vessels is usually small; when present it passes over or through the short muscles of the thumb. From the convexity of the arch, which is directed towards the fingers, the **Digital branches** arise. These are four in number, a single one to the inner side of the little finger, and three others which bifurcate for the contiguous sides of the ring and little, and two next digits. Immediately before bifurcating each **Digital artery** is joined by the **Interosseous** branch of the deep arch. From the concavity of the arch small branches to the palm arise, which have been divided. Close to the lower border of the Annular ligament the **Profunda** branch of the **Ulnar artery** arises. This deep branch runs between the **Flexor**

Brevis and Opponens muscles and the Abductor Minimi Digiti.

7. The **Radialis Indicis** branch of the **Radial** artery, issuing from beneath the **Flexor Brevis** and **Adductor Pollicis** muscles, and lying upon the **Abductor Indicis** muscle, and running along the outer side of the first finger. The commencement of the **Princeps Pollicis** branch of the same artery may be seen just at the cleft of the thumb and index finger, emerging also from beneath the **Adductor Pollicis**. It passes beneath the tendon of the **Flexor Longus Pollicis**, and divides into its two **Digital** branches.
8. The **Ulnar** nerve dividing close to the lower border of the **Annular** ligament into a **Superficial** and **Deep** branch. The **Deep** branch passes, with the corresponding branch of the **Ulnar** artery, between the **Flexor Brevis** and **Opponens Minimi Digiti** muscles, and the **Abductor Minimi Digiti** muscle. The **Superficial** branch supplies an undivided offset to the inner side of the little finger, and a bifurcated branch to the contiguous sides of this digit, and the next. This last branch also sends an offset of communication beneath the **Ulnar** artery to the **Median** nerve. The branches from the **Superficial** division of the **Ulnar** nerve to the **Palmaris Brevis** and integument of the inner border of the palm have been already divided.
9. The **Median** nerve with the **Comes Nervi Mediani** artery passing from beneath the lower border of the **Annular** ligament and lying upon the **Flexor** tendons. Just at this point it is found to be flattened out, and divided into two parts of nearly equal size. From the outer part filaments

are traceable to the **Abductor**, **Opponens**, and outer head of the **Flexor Brevis Pollicis** muscles, and the following **Digital** branches,—viz., two undivided, one for each border of the thumb, and a third also single, for the **Radial** border of the index finger. This last also supplies the outermost **Lumbrical** muscle. The inner division supplies two branches which bifurcate to supply the contiguous sides of the index and middle, and the middle and ring fingers; the outermost of these two supplies the next **Lumbrical** muscle, the innermost communicates with the **Ulnar** nerve, as mentioned above.

The branches of the **Median** nerve lie beneath the **Superficial Palmar arch**.

IV.

- a. Divide now the **Superficial Palmar arch**, both internally and externally, and cut each **Digital** branch immediately above the junction of the **Interosseous** artery with it.
- b. Cut through the **Superficial** branch of the **Ulnar** nerve, and throw it towards the fingers.
- c. Divide the **Median** nerve at the lower border of the **Annular** ligament, and bring it also over the fingers, cutting through its branches to the muscles of the thumb and to the two outer **Lumbrical** muscles.
- d. Cut through the origins of the **Flexor Brevis Minimi Digiti** and the **Opponens Minimi Digiti** muscles from the **Annular** ligament and **Unciform** process, and throw them downwards. Their nerves from the deep branch of the **Ulnar** will be divided.
- e. Remove the central portion of the **Anterior Annular** ligament with the portion of the tendon of the **Palmaris Longus** muscle which passes over it, and

expose the tendons of the **Flexor Sublimis**, the **Flexor Profundus Digitorum**, and the **Flexor Longus Pollicis** enclosed in two synovial sheaths. Notice the arrangement of the tendons of the **Flexor Sublimis** in two layers, the two to the middle and ring fingers being superficial to the other two.

There will now be exposed—

1. The tendons of the **Flexor Profundus Digitorum** muscle, passing into the Digital sheaths beneath the **Flexor Sublimis** tendons.
2. The **Lumbricales** muscles more fully. The two innermost will be found arising from the contiguous sides of the tendons of the little, ring, and middle fingers. The two outermost from the Radial sides of the tendons of the middle and index fingers respectively.
3. Further portions of the **Deep branches of the Ulnar artery and nerve**. Two slender twigs from this portion of the nerve are traceable to the two innermost **Lumbricales** muscles.

V. Divide the tendons of the **Flexor Profundus Digitorum** muscle, and throw them towards the fingers with the **Lumbricales** muscles attached. The nerves to the two innermost of these latter muscles from the Deep branch of the Ulnar will be divided.

There will now be exposed—

1. The **Interossei** muscles of the third and fourth spaces, a Palmar and Dorsal in each, the former on the Radial side of the latter. These muscles are covered by a layer of fascia.
2. The **Adductor Pollicis** muscle more fully, arising from the lower two thirds of the Metacarpal bone of

the middle finger, and passing outwards to the thumb. It hides the Palmar and Dorsal Interossei of the second space, except in their lower portions.

3. The inner head of the **Flexor Brevis Pollicis** muscle, arising from the Trapezoid bone, the Os Magnum, the base of the third Metacarpal bone, and the sheath of the **Flexor Carpi Radialis** tendon. It passes outwards to the thumb parallel with the upper border of the immediately preceding muscle. It sends a muscular process beneath the tendon of the **Flexor Longus Pollicis** to join the outer head.

4. The tendon of the **Flexor Longus Pollicis** muscle between the two heads of the short **Flexor**, and surrounded by a prolongation of the Synovial sheath from beneath the Anterior Annular ligament.

5. The deep division of the **Ulnar artery**, resting on the Interosseous muscles and upon the Metacarpal bones immediately below their Carpal extremities, and disappearing externally beneath the deep head of the **Flexor Brevis Pollicis**. The recurrent branches, the two inner perforating branches, the two inner Palmar Interossei arteries in the whole of their extent, and the outermost branch as it appears from beneath the **Adductor** are exposed.

6. The deep branch of the **Ulnar nerve** is seen accompanying superficially the corresponding branch of the artery, and ending in branches to the **Adductor Pollicis** and the inner head of the **Flexor Brevis Pollicis**. Offsets to all the Interossei muscles may be found.

VI. To complete the dissection—

Remove the inner head of the **Flexor Brevis Pollicis** and the **Adductor Pollicis** muscles from their

origin, and throw them towards the thumb. Their nerves will be divided.

This will expose—

1. The upper portions of the **Palmar and Dorsal Interossei** of the second space.
2. A further portion of the **Abductor Indicis** muscle, previously covered by the inner head of the **Flexor Brevis Pollicis** muscle and by the **Adductor Pollicis**.
3. The whole of the **Deep Palmar arch**, which will be found to be formed in the following manner. The **Radial artery** is seen entering the palm at the upper part of the first Interosseous space, between the two heads of origin of the **Abductor Indicis** muscle. Here it is joined by the termination of the deep division of the **Ulnar artery**, which runs transversely across the palm, lying upon the bases of the **Metacarpal bones** and the **Interossei** muscles. It forms an arch about half an inch nearer the wrist than the superficial one. From its concavity **Recurrent branches** are traceable up to the wrist to join the **Anterior Carpal arch**. From its convexity proceed **three arteries** which lie upon the three inner Interosseous spaces, and run forwards to the clefts of the fingers to join the **Digital branches** of the superficial arch. From **these Interosseous branches** or from the deep arch, three **Perforating offsets** are traceable to the Interosseous arteries of the back of the hand.
4. The **Radialis Indicis** and **Princeps Pollicis** arteries, arising from the termination of the **Radial artery**, and running down upon the **First Dorsal Interosseous** muscles.

DISSECTIONS TO EXPOSE

THE CREMASTER MUSCLE AND FASCIA.

THE INFUNDIBULIFORM PROCESS OF TRANSVERSALIS FASCIA IN THE WHOLE OF ITS EXTENT.

THE TUNICA VAGINALIS AND PROCESSUS VAGINALIS.

THE SPERMATIC CORD.

AND PORTIONS OF

THE SPERMATIC ARTERIES,

THE SPERMATIC VEINS, AND

THE VAS DEFERENS.

POSITION.—Place the subject in the supine position, hook the Penis to the opposite side, and render the Scrotum tense.

I. SKIN INCISIONS.

1. Make an incision from a point half an inch external to the centre of Poupart's ligament along that ligament to the Spine of the Pubis.
2. From the Spine of the Pubis make a vertical incision to the bottom of the Scrotum.
3. From the extremities of No. 1 make vertical incisions upwards for one inch.
4. From the lower extremity of No. 2 make a horizontal incision inwards of the same length.

II. Reflect the skin and expose—

1. The **Dartos**, intimately united to the skin of the Scrotum, and continuous above with the
2. **Two layers of Superficial Fascia of the Abdomen.** The superficial layer is thick, and contains a variable

amount of fat, and the deep layer is thin and membranous and contains no fat.

Between these layers

3. The oblique chain of **Inguinal glands**, receiving usually the **Lymphatics** from the **Scrotum** and **Penis** and some from the **Abdomen**. In some cases the Penile and Scrotal lymphatics open into the Lymphatic glands below Poupart's ligament.
4. The **Superficial External Pudic artery and vein**, and branches of the deep **External Pudic vessels**. These send branches downwards to supply the **Dartos**.
5. The **Superficial Epigastric artery and vein**.
6. **Branches** of the **Ilio-inguinal nerve** after it has emerged from the external ring, and
7. **Branches** of the **Hypogastric branch** of the **Ilio-hypogastric nerve** after it has perforated the **External Oblique** just above the **External Abdominal ring**.
8. Joining with the above-mentioned vessels and nerves are branches of the three long **Scrotal nerves**, and of the **Superficial Perineal vessels**.

III. Remove the **Dartos**, and the two layers of superficial fascia with which it is continuous above.

The **Dartos** is observed to be but loosely connected to the coverings of the **Testis**.

There will now be exposed—

1. The **Aponeurosis** of the **External Abdominal Oblique**, inserted into Poupart's ligament, and into the spine and crest of the pubes, and splitting to form the external ring.
2. The **Intercolumnar fibres** arching across the **Aponeurosis** of the **External Oblique**, and forming a fascia, which extends between the pillars of the external

ring, and, descending over the cord and testicle, forms their outer covering.

3. The **Deep External Pudic vessels** crossing inwards beneath the cord, and giving off branches to the coverings of the cord.

IV. Remove that portion of the **Aponeurosis of the External Oblique** seen in the dissection, together with the **Intercolumnar Fascia**. The latter is found to be intimately united to the subjacent coverings of the **Testis**.
Expose—

1. The anterior portion of the **Internal Oblique** arising from **Poupart's ligament**, passing upwards, in front of, over, and then behind the cord, and uniting with the **Aponeurosis of the Transversalis muscle** to form the **conjoined tendon**.

2. The **Cremaster**, attached externally to the inner part of **Poupart's ligament**, where it is continuous with the **Internal Oblique**, and internally by a tendinous band to the spine and crest of the pubes. The upper portion of the muscle forms loops which cross the front of the cord as low down as the testicle, while from either attachments vertical fibres descend, and are inserted into a **Fascial Aponeurosis**, which slings the testicle, and is intimately united to the superjacent and subjacent coverings of the testis. This fascial expansion is described as the **Cremasteric Fascia**.

3. The **Cremasteric branch of the Deep Epigastric artery**, and

4. The **Genital branch of the Genito-crural nerve**, as they ramify in the substance of the **Cremaster muscle**.

V. Remove that portion of the **Internal Oblique** which lies in front of the cord, as well as the **Cremaster muscle**

and fascia, with the artery and nerve in its substance. Much difficulty is experienced in separating the Cremaster muscle and fascia from the subjacent covering of the cord and testis. You expose—

1. The anterior limit of origin of the **Transversalis** muscle from Poupart's ligament, its free lower margin as it bounds the internal ring externally and superiorly, and its union with the Aponeurosis of insertion of the Internal Oblique to form the conjoined tendon.
2. Portion of the **Transversalis Fascia** forming the outer part of the posterior wall of the inguinal canal external to the conjoined tendon.
3. A prolongation of the **Transversalis Fascia**, called the **Infundibuliform process**, which extends from the internal ring over the several structures which together constitute the cord, and over the testis.
4. The portion of the **Ilio-inguinal nerve**, which lay beneath the Internal Oblique, and which is seen to pass outwards on the outer surface of the **Transversalis** muscle.

(The whole of the Infundibuliform Process of the **Transversalis Fascia** is exposed at this stage of the dissection.)

VI. Carefully remove this **Fascia** from the Cord and Testicle. Much difficulty is experienced in separating it from the **Tunica Vaginalis**. You expose—

1. In the loose **Areolar tissue** of the cord, which is seen to be continuous above with the Subperitoneal fat,
2. The **Vas Deferens**, commencing at the tail of the Epididymis, and presenting there a tortuous irregular outline. It soon diminishes in calibre, its

outline becoming uniform. Above it disappears in the internal ring.

3. The **artery to the Vas Deferens** supplying the upper portion of the Vas Deferens, and communicating below with branches to the Vas from the Spermatic.
4. The **Spermatic artery**, as it emerges from the internal ring, and runs down in the cord to the back part of the Testis, where it breaks up into branches which supply the Testis, Epididymis, and lower portion of the Vas Deferens.
5. The **Spermatic veins** passing upwards in the cord from the Testis and Epididymis, forming a dense plexus of veins, the **Pampiniform Plexus**. The branches from this Plexus accompany the Spermatic artery and Vas Deferens through the internal ring.
6. The **Parietal layer of the Tunica Vaginalis**, as it covers the Testis and the outer portion of the Epididymis, forming with the inner or Visceral layer a conical prolongation, which extends for a varying distance above the upper extremity of the Testis. Prolonging this serous sac upwards is a fibrous cord, the obliterated **Processus Funicularis**, which is continuous above at the internal ring with the general Peritoneal lining of the Abdominal cavity.
7. Branches of **Sympathetic nerves**, and
8. **Lymphatics** running with the vessels in the loose Areolar tissue of the cord.

We have now exposed the whole of the **Tunica Vaginalis** and **Processus Vaginalis**, and those portions of the **Spermatic artery and veins** and of the **Vas Deferens** which lie outside the Abdomen.

TO COMPLETE THE DISSECTION OF THE VAS DEFERENS.

I. The subject being placed in the supine position, open the Abdomen by the crucial incision, the details concerning which are described in the Dissection to expose the Inferior Vena Cava, and hook aside the flaps of the abdominal wall. Having exposed the Vas Deferens from its commencement in the tail of the Epididymis up to the Internal Abdominal ring, raise the triangular flap of the Abdominal wall in connection with this dissection, and entering the knife at the Internal ring, cut upwards vertically through it, dividing **Skin, Superficial Fascia, Deep Fascia, External Oblique, Internal Oblique, Transversalis muscle and fascia, Subperitoneal fat and Peritoneum**, with branches of the Ilio-hypogastric and Ilio-inguinal nerves, and Lower Intercostal vessels and nerves.

II. Expose the Vas Deferens as it turns around the outer aspect of the **Deep Epigastric artery and veins**. Pull the Great Omentum and Stomach upwards over the margin of the Thorax, and the Small Intestines and Mesentery upwards and to the right.

III. Remove the Peritoneum where it covers the surface of the Vas Deferens, and expose the duct as it runs downwards and inwards over the **External Iliac artery and vein**, then as it passes on to the side of the Bladder, where it crosses the obliterated **Hypogastric and Superior Vesical arteries**, lying above and then internal to them. From the Superior Vesical it receives the artery to the Vas Deferens. The Vas then crosses the lower and outer angle of the Superior surface of the Bladder, reaching its base.

IV. Hook the Bladder and the Rectum upwards, and by continuing to remove its Peritoneal covering expose the Vas Deferens to the bottom of the pouch of Douglas, tracing this structure as it runs between the **Ureter** and the surface of the **Bladder**.

V. Divide the Ureter, and hooking the Bladder and Rectum still more forcibly upwards and apart, separate these two structures by dividing the **Transverse Process** of **Recto-vesical Fascia** which runs between them, enclosing the lower extremities of the Vasa Deferentia and the Vesiculæ Seminales between its layers. By opening this fascia where it covers the base of the Bladder the dilated and irregular **Vas Deferens** is exposed, and outside it the similarly pouched **Vesicula Seminalis**, and each of these is seen to form a narrow duct. These ducts join and run into the Prostate between its central and lateral lobes. The common duct so formed is called the **Common Ejaculatory duct**. Besides cutting through the Ureter, and the process of Recto-vesical Fascia, you divide branches of the **Middle** and **Inferior Vesical** and **Prostatic vessels**, and branches of the **Inferior Hypogastric** or **Pelvic plexus** of the **Sympathetic**.

TO COMPLETE THE DISSECTION TO EXPOSE THE LEFT SPERMATIC ARTERY.

I. Split the Left Inguinal flap as in the previous dissection, and expose the **Spermatic vessels** as they lie external to the Deep Epigastric artery.

II. Also displace and fix the Great Omentum, Stomach, Small Intestines and Mesentery. Hook upwards the Sigmoid flexure.

III. Remove the Peritoneum from the anterior surface of the Spermatic vessels as high up as the reflection of the Meso-colon, and expose these vessels with their Lymphatics as they lie upon the External Iliac artery and Psoas Fascia.

IV. Cut through the Sigmoid flexure, the Meso-sigmoid, the Sigmoid vessels, and the Lymphatic glands and vessels, over the course of the Spermatic vessels, and ligature the divided portions of gut.

V. Displace the divided ends of the Sigmoid flexure downwards and outwards, and the descending Colon outwards, and continue to remove the Peritoneum from the Anterior surface of the Spermatic artery. Divide the **Left Colic artery** and the trunk of the **Inferior Mesenteric vein** where they cross the Spermatic artery. The **Spermatic vein** leaves the artery upon the Psoas muscle, and ascends vertically.

VI. To trace up the Spermatic artery to its origin from the front of the Aorta a little below the origins of the Renals, cut through the reflection of Peritoneum from the lower and left margin of the extremity of the third part of the Duodenum, displacing this portion of gut to the right, and exposing the front of the Aorta with the origin of the right and left Spermatic arteries from it. The Aorta is surrounded by a **dense plexus of Sympathetic nerves**. The Left Spermatic artery is now exposed in the whole of its course. As it crosses the Ureter obliquely and superficially, it gives off a branch to supply it. The **Spermatic Lymphatics** are seen to join the **Lumbar Lymphatic glands**.

TO EXPOSE THE LEFT SPERMATIC VEIN.

I. Continue the preceding dissection up to the point of divergence of the Spermatic artery and vein.

II. Follow the Spermatic vein upwards by removing the Peritoneum from its Anterior surface as high up as the reflection of the Descending Layer of the Transverse Meso-colon.

III. Then make a transverse incision two inches long through the reflection of the inferior layer of the Transverse Meso-colon, its centre corresponding to the position of the Spermatic vein.

IV. Displace upwards the Transverse Colon and Pancreas sufficiently to expose the Spermatic vein up to its termination in the left Renal vein. The **Left Kidney** is partly exposed, and the **Inferior Mesenteric vein** as it ascends over its anterior surface. The **Left Ureter** is seen as it lies internal to and beneath the Left Spermatic vein, and branches of the **Left Renal artery** and **Sympathetic Plexus** are also exposed.

Fig. 18 will assist the student in understanding some of the details of this dissection.

TO COMPLETE THE EXPOSING OF THE RIGHT SPERMATIC VESSELS.

I. Instead of dividing the Sigmoid flexure, the Meso-sigmoid, &c., on this side, you cut through the **Mesentery** with the **Ilio-colic vessels**, **Lymphatic glands** and **ducts**, **Sympathetic nerves**, and the **Ileum** near its termination, and ligature its divided ends.

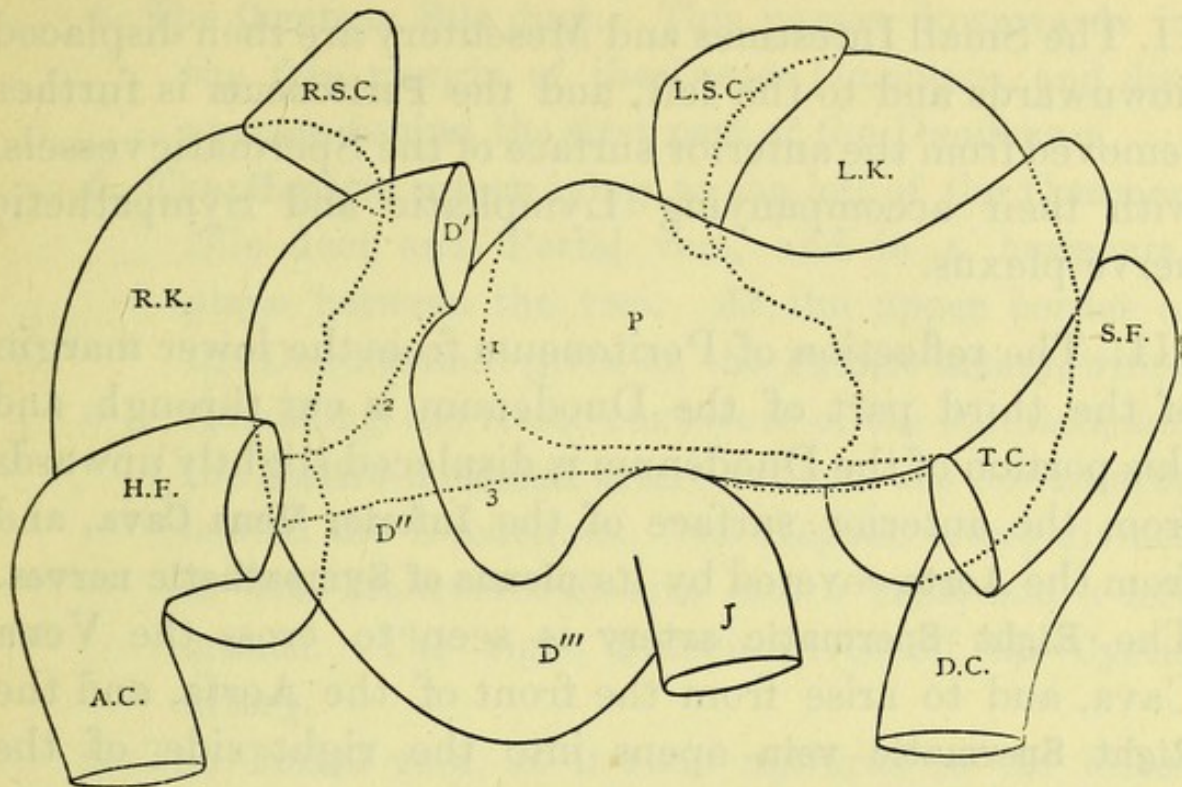


Fig. 18.

Fig. 18 shows the relations of the kidneys, supra-renal capsules, duodenum, colon, and pancreas to one another.

The several viscera are indicated by their initial letters.

The dotted outline indicates that portion of each viscus which is covered by the adjoining viscera.

The dotted line 1 represents the limits of the lesser bag, and where it extends horizontally to the left, it represents the ascending layer of the transverse meso-colon.

2 indicates that portion of the ascending layer of the transverse meso-colon which is formed by the peritoneum of the greater bag.

3 shows the line of reflection of the descending layer of the transverse meso-colon.

D' is the first portion of the duodenum.

D'' „ second „ „

D''' „ third „ „

J. „ commencement of the jejunum.

A.C. „ ascending colon.

H.F. „ hepatic flexure.

T.C. „ transverse colon.

S.F. „ splenic flexure.

D.C. „ descending colon.

P. „ pancreas.

II. The Small Intestines and Mesentery are then displaced downwards and to the left, and the **Peritoneum** is further removed from the anterior surface of the **Spermatic vessels**, with their accompanying **Lymphatic** and **Sympathetic nerve plexus**.

III. The reflection of **Peritoneum** from the lower margin of the third part of the **Duodenum** is cut through, and this portion of the **Duodenum** is displaced slightly upwards from the anterior surface of the **Inferior Vena Cava**, and from the **Aorta** covered by its **plexus of Sympathetic nerves**. The **Right Spermatic artery** is seen to cross the **Vena Cava**, and to arise from the front of the **Aorta**, and the **Right Spermatic vein** opens into the right side of the **Inferior Cava**.

TO EXPOSE THE BILIARY APPARATUS OUTSIDE THE LIVER.

I. The subject being placed in the supine position, open the **Abdomen** by the crucial incision described in the dissection to expose the **Inferior Vena Cava**, and hook aside the flaps of the **Abdominal wall**.

Pull the **Stomach** and **Great Omentum** downwards, and the **Liver** upwards, and fix it in that position, in order to expose its under surface as much as possible.

II. Remove the **Anterior layer of Peritoneum** from the right portion of the **Lesser Omentum**, and expose—

1. The **Right and Left Hepatic ducts** joining to form
2. The **Common Hepatic duct**.
3. The **Cystic duct** joining the **Common Hepatic duct** and forming

4. The **Common Bile duct**. This passes downwards in the free margin of the Lesser Omentum, and disappears behind the first part of the Duodenum.
5. The **Hepatic artery** lying to the left of the Common Bile duct and Portal vein, and in a horizontal plane between the two. At the upper border of the Duodenum it gives off the **Pyloric artery**, which runs along the lesser curvature of the stomach, and the **Gastro-duodenal artery**, which runs downwards behind the Duodenum. The Hepatic artery divides in the Transverse fissure into a **right** and a **left branch**. The right branch gives off the **Cystic artery**.
6. The **Portal vein**, as it runs upwards in the lesser omentum behind the duct and artery, and between them. It is dilated into a **sinus** above at its bifurcation into two branches, which enter the Transverse fissures. It receives the **Gastric vein** immediately above the Duodenum.
7. A dense plexus of **Sympathetic nerves**, and
8. **Branches of both Vagi nerves**.
9. **Lymphatic vessels and glands**.

III. Remove the Peritoneal covering and the Superficial branch of the Cystic artery from the surface of the Gall Bladder, and expose it with its abruptly flexed duct as they lie in the groove, in the under surface of the liver.

IV. Divide the Duodenum and its Peritoneal covering vertically about three-quarters of an inch from the Pylorus over the Common Bile duct, and separate somewhat the divided portions of the gut, and expose from right to left—

1. The **Common Bile duct** disappearing beneath the Pancreas.
2. The **Portal vein** also passing beneath that gland.
3. The **Gastro-duodenal artery** dividing at the lower border of the Duodenum into the **Superior Pancreatico-duodenal artery** and the **Right Gastro-epiploic artery**.

V. Pull down the transverse Colon, cut through the Superior Pancreatico-duodenal artery, separate the Pancreas from the distal portion of the first piece of the Duodenum and from the upper part of the descending portion, raise the head of the Pancreas slightly, and expose—

The **Common Bile duct**, as it passes obliquely behind the right and upper extremity of the Pancreas. After emerging from beneath it, it runs obliquely between the Pancreas and the second part of the Duodenum, and perforates the inner aspect of the Duodenum with the duct of the Pancreas. The two ducts run together obliquely through the muscle wall, and open by a common orifice.

The whole of the biliary apparatus outside the liver is now exposed.

TO EXPOSE THE CÆLIAC AXIS AND ITS BRANCHES.

I. The body being placed in the supine position, open the Abdomen by the crucial incision described in the Dissection to expose the Inferior Vena Cava.

Hook outwards the Abdominal flaps.

Pull down the Great Omentum and Stomach, and hook the Liver upwards.

Remove the Anterior layer of Peritoneum from the Great Omentum along the convexity of the Stomach, and expose—

1. The **Right** Gastro-epiploic artery and veins.
2. The **Left** Gastro-epiploic artery and veins.
3. The **Vasa Brevia**.

The **Right** Gastro-epiploic artery may be traced to its origin from the **Gastro-duodenal** artery, and the **Left** Gastro-epiploic and the **Vasa Brevia** vessels through the **Gastro-splenic** Omentum to the **Splenic** artery and vein.

4. **Sympathetic** nerve plexuses, and branches of the **Vagi**.
5. **Lymphatic** glands and vessels.

II. Remove the Anterior layer of Peritoneum from the Lesser Omentum along the concavity of the Stomach, and expose—

1. The **Pyloric** artery extending to the left from the **Hepatic** artery.
2. The **Gastric** running to the right from the **Œsophageal** opening.
3. **Corresponding** branches of veins.
4. **Lymphatic** vessels and glands.
5. **Sympathetic** nerves and branches of the **Vagi**.

III. Remove the Anterior layer of Peritoneum from that portion of the Lesser Omentum in which the vessels and ducts of the liver are contained, and expose—

1. The **Right** and **Left** **Hepatic** ducts joining to form
2. The **Common** **Hepatic** duct. This is joined by
3. The **Cystic** duct, which forms with it
4. The **Common** **Bile** duct. This runs along the free margin of the Lesser Omentum, disappearing below behind the **Duodenum**.
5. The **Portal** vein ascending under cover of the **Common**

Bile duct and Hepatic artery, and between the two. It terminates above in **Right** and **Left Hepatic branches**, which enter the transverse fissure. Before its bifurcation the Portal vein becomes enlarged, forming the **Sinus**. The **Cystic vein** opens into the **Right Hepatic vein**.

The **Left Hepatic vein** is joined by the **round ligament of the Liver** anteriorly, and by the **obliterated Ductus Venosus** posteriorly.

The **Portal vein** passes below under cover of the first part of the **Duodenum**, receiving before doing so the **Gastric vein**.

6. The **Hepatic artery** running upwards to the left of the **Common Bile duct** and **Portal vein**, and dividing into two branches which enter the transverse fissure, and there subdivide into several branches. The **Right Hepatic branch** gives off the **Cystic**, which runs upon the neck of the **Gall Bladder**, and divides into two divisions, one running on the free surface of the **Gall Bladder**, and the other between the **Gall Bladder** and **Liver**.

IV. To expose the former branch of the **Cystic artery** it is only necessary to remove the **Peritoneum** covering it, while it is necessary to separate the **Gall Bladder** from the **Liver** to trace out the latter. Immediately above the **Duodenum** the **Hepatic artery** gives off the **Gastro-duodenal artery**, which descends beneath the **Duodenum**.

7. An abundant **Sympathetic plexus**.

8. **Branches of both Vagi**.

9. **Lymphatic vessels and glands**.

V. Define the origin of the **Superior Pancreatico-duodenal artery** from the **Gastro-duodenal artery**, and by the removal of the **Peritoneum** covering it trace it as it passes

between the Pancreas and the first and second portions of the Duodenum.

VI. Divide the first portion of the Duodenum (with its

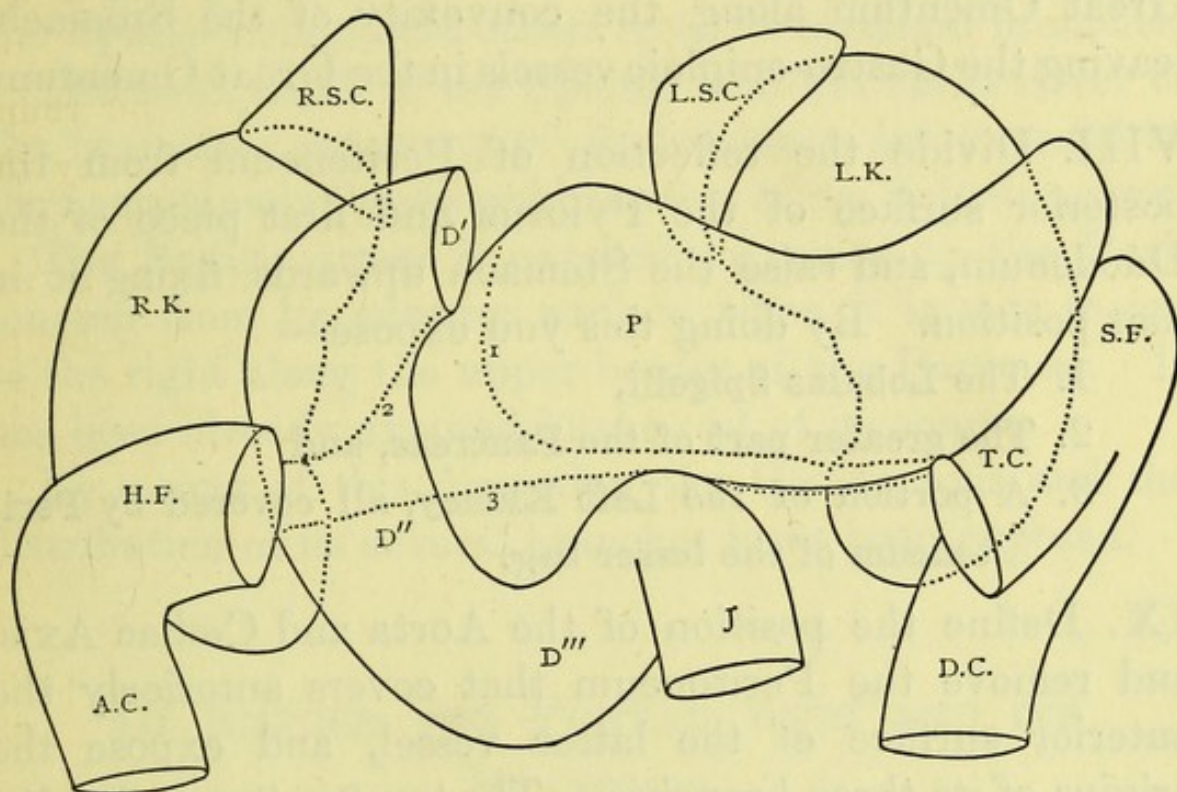


Fig. 19.

Fig. 19 shows in outline the relation of the Kidneys, Supra-renal Capsules, Pancreas, Duodenum, and Colon to one another, and the extent of their Peritoneal covering.

The reflection of the Peritoneum of the lesser bag is indicated by the dotted line 1, and of that portion of the ascending layer of the transverse Meso-colon formed by the great bag by the dotted line 2.

The dotted line 3 indicates the reflection of the descending layer of the transverse Meso-colon.

This diagram will prove of service in several of the other dissections of this region.

covering of Peritoneum) over the Gastro-duodenal artery, and expose—

1. A portion of the Pancreas.
2. The Common Bile duct,

3. The **Portal vein**, and
4. The **Gastro-duodenal artery** disappearing beneath the **Pancreas**.

VII. Divide the remaining layer of **Peritoneum** of the **Great Omentum** along the convexity of the **Stomach**, leaving the **Gastro-epiploic vessels** in the **Great Omentum**.

VIII. Divide the reflection of **Peritoneum** from the posterior surface of the **Pylorus** and first piece of the **Duodenum**, and raise the **Stomach** upwards, fixing it in that position. By doing this you expose—

1. The **Lobulus Spigellii**,
2. The greater part of the **Pancreas**, and
3. A portion of the **Left Kidney**, all covered by **Peritoneum** of the lesser bag.

IX. Define the position of the **Aorta** and **Cœliac Axis**, and remove the **Peritoneum** that covers anteriorly the anterior surface of the latter vessel, and expose the origins of its three branches. The two **Semilunar Ganglia**, the dense plexus of **Sympathetic nerves** which surround the **Cœliac Axis**, and its three branches are also seen.

The **Coronary artery** is exposed by the removal of the **Peritoneum** covering its anterior surface. It runs upwards and to the left, reaching the **Cardiac Orifice** of the **Stomach** where it has been already exposed. It gives ascending branches to the **Œsophagus**.

The **Splenic artery**, which is larger than the **Coronary** or the **Hepatic**, is exposed by removing the **Peritoneum** from the upper border of the **Pancreas**. It is seen to take a wavy, tortuous course along the upper margin of the **Pancreas**, and to divide near the **Spleen** into several branches which enter its hilum.

In its course it gives off **Pancreatic branches**, one of

which the **Pancreatica Magna** is larger than the rest, and runs to the right with the Pancreatic duct; the **Left Gastro-epiploic artery**, and the **Vasa Brevia**, which have been already exposed. Some of the latter arise directly from the Splenic artery, and others from its terminal branches.

The main trunk of the Splenic vein lies under cover of the branches, but many of its branches are exposed as they accompany the several branches of the Splenic artery.

The **Hepatic artery** is exposed by removing the Peritoneum from its anterior surface, when it is seen to run to the right along the upper border of the Pancreas. It has been already exposed in the rest of its course.

By means of this dissection the Cœliac axis and the distribution of its several branches have been exposed.

TO EXPOSE THE PORTAL VEIN AND ITS BRANCHES.

I. Open the Abdomen by the ordinary crucial incision, and note the several structures divided in doing so, and the various portions of the Abdominal contents exposed. Hook the flaps outwards.

II. Hook upwards the Liver, and pull downwards the Stomach and Great Omentum.

III. Remove the Anterior layer of the Lesser Omentum, and expose—

1. The **Hepatic ducts**, the **Common Hepatic duct**, the **Cystic duct**, and the **Common Bile duct**. The Common duct disappears below behind the first piece of the Duodenum.
2. The **Hepatic artery** lying to the left, giving off the

Pyloric artery, and the Gastro-duodenal artery, which runs down behind the first portion of the Duodenum. The Hepatic artery divides into right and left Hepatic branches, the right giving off the Cystic artery.

3. The **Portal vein** lying between the **Common Bile duct** on the right and the **Hepatic artery** on the left, and in a plane posterior to both. It emerges below from beneath the first piece of the Duodenum, where it receives the **Pyloric vein**, and immediately above it the **Coronary vein of the Stomach**. The distribution of these two branches may now be exposed.

Near the right end of the transverse fissure of the Liver, the Portal vein becomes enlarged to form the **Sinus**, and then divides into a right and a left branch.

The right branch enters the right lobe of the Liver, at once receiving the **Cystic vein** from the Gall Bladder, while the longer and smaller left branch passes to the left end of the fissure, where it also enters the substance of the Liver. Before doing so it is seen to receive from behind the attachment of the obliterated **Ductus Venosus**, and from in front the attachment of the round ligament of the Liver. Small par-umbilical branches of the Portal vein run with the round ligament, and may be shown to anastomose with the **Epigastric veins**.

4. A **Lymphatic plexus** and **Lymphatic glands**.
5. A plexus of **Sympathetic nerves**, and branches of both **Vagi**.

IV. Now dissect out in the Great Omentum, and in its continuation the Gastro-splenic Omentum,

1. The **Right Gastro-epiploic vein**, which terminates in the **Superior Mesenteric vein**.
2. The **Left Gastro-epiploic** and the **Vasa Brevia veins**, which open into the **Splenic vein** or its branches.
3. The **Right Gastro-epiploic artery**, arising from the **Gastro-duodenal**.
4. The **Left Gastro-epiploic artery**, and
5. The **Vasa Brevia arteries** arising from the **Splenic artery**.
6. Branches of **Sympathetic nerves**.
7. **Lymphatic glands and ducts**.

V. Pull the Stomach and Great Omentum upwards, and the Small Intestines downwards and to the left, and by removing the Anterior layer of Peritoneum from the Mesentery, expose—

1. The **Superior Mesenteric artery** emerging from beneath the **Pancreas**, and crossing the third portion of the **Duodenum**. It runs down in the **Mesentery**, forming a loop with its convexity to the left, and terminates in supplying branches to the end of the **Ileum**.

It gives off the **Inferior Pancreatico-duodenal artery** from its right side. This artery runs between the second and third pieces of the **Duodenum** and the **Pancreas**.

It gives off from its concavity lower down the **Middle Colic**, the **Right Colic** and the **Ileo-colic arteries**. The first may be exposed by removing the layer of **Peritoneum** from the under surface of the transverse **Meso-colon**, and the second and third, by removing the **Perito-**

neal lining of the Posterior Abdominal wall, which covers its anterior surface.

From its convexity the Superior Mesenteric gives off the Intestinal branches, the **Vasa Intestini Tenua**, which supply the Jejunum and Ileum. These are about twelve in number, and form by bifurcating four or five tiers of loops, straight branches from the terminal loops being distributed to the Intestines.

2. An abundant plexus of Sympathetic nerves.
3. Lymphatic glands and vessels.
4. The Superior Mesenteric vein lying to the right of the artery, and overlapping it slightly. It receives branches which correspond to and accompany the various branches of the artery which we have already observed.

VI. Pull the Small Intestines upwards and to the right, the Sigmoid Flexure and Rectum downwards and to the left, so as to make tense the Meso-sigmoid and Meso-rectal folds, and expose—

1. The Superior Hæmorrhoidal artery and vein in the Meso-rectum. The former vessel divides into two branches which descend on either side of the Rectum, and the latter commences in the Hæmorrhoidal plexus, a single vein being formed in the upper part of the Meso-rectum. The Inferior Mesenteric artery can be traced upwards with the vein, giving off Sigmoid arteries, which form loops like the Vasa Intestini Tenua, and the Left Colic artery, which runs to the left to the descending Colon.
2. The Inferior Mesenteric vein receiving branches corresponding to those of the artery, but leaving it at

its upper part, and passing beneath the Pancreas and transverse Meso-colon at a variable distance from the spinal column.

3. **Lymphatic vessels and glands.**

4. **Plexuses of Sympathetic nerves.**

VII. Divide the first piece of the Duodenum and the Pancreas, the transverse Colon with its Mesentery and contained vessels, Sympathetic nerves and lacteals, along a line joining the Superior Mesenteric vein with the Portal vein. The Superior Pancreatico-duodenal artery is also divided, and the right limit of the lesser bag of Peritoneum is opened.

The junction of the **Superior Mesenteric and Splenic veins** is exposed, and the **Gastro-duodenal artery** is seen to run downwards to the left of the Portal vein.

VIII. Divide the remaining layer of the Great Omentum along the convexity of the Stomach, cut through the reflections of the Peritoneum from the posterior surface of the Pylorus and the anterior surface of the Duodenum, and turn the Stomach upwards.

IX. Remove the Peritoneum from the upper margin of the Pancreas, and expose—

1. **The Aorta.**

2. **The Semilunar Ganglia and Solar Plexus.**

3. **The Cœliac axis.**

4. **The Hepatic artery** running to the right along the upper margin of the Pancreas.

5. **The tortuous Splenic artery** running to the left along its upper margin, and giving off branches to it, the **Large and Small Pancreatic arteries**. It then breaks up into its terminal branches to the Spleen, and the **Left Gastro-epiploic and Vasa Brevia vessels**.

6. The commencement of the **Gastric artery** as it runs upwards and to the left.

X. Remove the **Hepatic** and **Splenic arteries** from the upper border of the **Pancreas**, and turning down the margin of this gland, expose—

1. The **Splenic vein** commencing in numerous branches near the hilum of the **Spleen**, and receiving the **Vasa Brevia** and **Left Gastro-epiploic veins**, which have already been fully exposed; also the **Pancreatic veins**, and the **Inferior Mesenteric vein** at a variable distance from its termination in joining the **Superior Mesenteric vein** in front of the **Vena Cava**. The **Splenic vein** crosses the front of the **Left Kidney** and the **Aorta**, frequently lying upon the **Superior Mesenteric artery**.

The seat of junction of the **Inferior Mesenteric** and **Splenic veins** is very variable, but the former usually ascends beneath the **Pancreas** and **transverse Colon**, and upon the **Left Kidney**.

To expose it in this position, divide over the course of this vein the **transverse Colon** with the **ascending** and **descending** layers of the **transverse Meso-colon**, the **Middle Colic vessels**, **lacteals**, **Lymphatic glands**, and **Sympathetic nerve plexus**; also the **Pancreas**, its duct, and the **Pancreatica Magna artery**.

Portions of the **Left Spermatic vein**, the **Ureter**, and the **Renal vessels** will also be exposed in this dissection.

We have now fully exposed the whole of the **Portal System** outside the **Liver**.

TO EXPOSE THE OUTER ASPECT OF THE SPLEEN.

Place the body on its right side.

Define the angles of the Ninth, Tenth, and Eleventh Ribs, and the Anterior extremity of the Ninth Rib.

I. SKIN INCISIONS.

1. Make a vertical incision from the upper margin of the Ninth Rib to the lower margin of the Eleventh over their angles.
2. Make an incision from the upper extremity of No. 1 along the upper margin of the Ninth Rib to its anterior extremity.
3. From the lower extremity of No. 1 make an incision along the lower margin of the Eleventh Rib, and along its cartilage to the margin of the Thorax.
4. Make a vertical incision from the anterior extremity of the Ninth Rib to the Costal margin.

II. Reflect the skin, and expose—

1. **Superficial Fascia**, containing
2. The external branches of the **Posterior divisions** of the **Eighth, Ninth, and Tenth Dorsal nerves** ;
3. The **Anterior and Posterior branches** of the **Lateral Cutaneous branches** of the **Eighth, Ninth, and Tenth Intercostal Nerves** ;
4. **Branches of Arteries** accompanying these nerves.

III. Remove the **Superficial Fascia**, and expose—**Deep Fascia**.IV. Remove **Deep Fascia**, and expose—

1. The **Latissimus Dorsi** arising by fleshy digitations from the Ninth, Tenth, and Eleventh Ribs ;

2. The lower margin of the **Serratus Magnus** ;
3. The **External Abdominal Oblique** ;
4. The **Lateral Cutaneous** branches of the **Intercostal** nerves and vessels as they emerge between the digitations of the **External Oblique**, and break up into anterior and posterior branches.

V. Remove the portion of **Latissimus Dorsi** exposed, dividing the attachments of its digitations to the Ninth, Tenth, and Eleventh Ribs, and expose—

1. The **Serratus Posticus Inferior** ;
2. Ninth, Tenth, and Eleventh Ribs ;
3. The **Intercostal Fascia** covering the **Intercostal** muscles ;
4. A further portion of the **External Abdominal Oblique**.

VI. Remove the **External Abdominal Oblique**, the **Serratus Posticus Inferior**, and the **Serratus Magnus** if it extends into the area of the dissection, and expose—

1. Further portions of the Ninth, Tenth, and Eleventh Ribs and Cartilages, with
2. The **Intercostal Fascia** in the several spaces.

VII. Divide the Ninth, Tenth, and Eleventh Ribs at their angles.

Cut transversely through the **Intercostal** muscles and **Fascia** of the ninth and tenth spaces with the **Intercostal** vessels and nerves, and the subjacent pleura.

Cut through the **Intercostal Fascia**, muscles and pleura along the upper margin of the Ninth Rib, from its angle to its anterior extremity.

Cut through the **Costal** cartilages of the Ninth and Tenth Ribs in the line of the **Anterior Vertical Skin Incision**.

Raise this portion of the Chest wall ; liberate it by cutting the **Intercostal Fascia**, **Intercostal** muscles, **Pleura**,

Diaphragm, Transversalis muscle, and Internal Oblique muscle, which are attached to its lower margin.

Branches of the Ninth and Tenth Intercostal nerves and arteries and branches of the Internal Mammary vessels are also divided.

You now expose—

1. The **Left Pleural Cavity** ;
2. The **Lung** lying in its upper and back part,
3. The **Pericardium**, and
4. The upper surface of the **Diaphragm** all covered by **Pleura**.

VIII. Remove the portion of the **Diaphragm** which corresponds to the limits of the portion of the **Chest wall** excised, dividing, in so doing, **Pleura, Diaphragm**, branches of the **Left Phrenic nerve, Comes Nervi Phrenici, Left Inferior Phrenic artery and vein, Sympathetic Nerve plexus**, and the subjacent **Peritoneum**, and expose—

1. The whole of the outer surface of the **Spleen** covered by **Peritoneum**.
2. The **Left Lobe of the Liver** above it ;
3. The **Convexity of the Stomach** in front of it ;
4. The **Splenic flexure of the Colon** below and in front of it ;
5. The **Costo or Pleuro-colic fold of Peritoneum** extending upwards, below and outside the **Spleen** to the under surface of the **Diaphragm**.

TO EXPOSE THE INFERIOR VENA CAVA IN ITS WHOLE LENGTH.

POSITION.—Place the body in the supine position.

I. INCISIONS.—Open the Abdomen by crucial incisions—

The **vertical** extending from the Xiphoid cartilage to the Symphysis ; and

The **horizontal** passing through the Umbilicus.

You cut through in the vertical incision—

Skin ; Superficial Fascia ; Deep Fascia ; the Conjoined Aponeuroses of the External Oblique, Internal Oblique, Transversales and Pyramidales muscles, which form the Linea Alba ; Transversalis Fascia ; Sub-peritoneal Fat ; the Peritoneum, and possibly the Urachus.

In the transverse incision you divide—

Skin ; Superficial Fascia ; Deep Fascia ; the muscle and Aponeurosis of the External Oblique, Internal Oblique and Transversales muscles ; the Recti muscles, with the Anterior and Posterior Layers of their Sheaths ; Transversalis Fascia, Sub-peritoneal Fat, and Peritoneum.

Branches of the Superior and Deep Epigastric arteries and veins in the substance of the Rectus ;

Branches of the Ascending Division of the Deep Circumflex Iliac vessels between the Internal Oblique and Transversalis, and

Branches of the Tenth, Eleventh, and Twelfth Intercostal vessels and nerves.

II. Hook outwards the four segments of the Abdominal Wall.

Pull up the Stomach and Great Omentum over the margin of the Thorax, and retain them in position with hooks.

Pull upwards and to the right the Small Intestines, with their Mesentery.

Define with your finger the bifurcation of the Aorta, and the position of the Right Common Iliac Artery.

Remove the Peritoneum, which covers the upper inch of the Right Common Iliac artery, and expose this portion of the vessel, covered by a prolongation of the Aortic plexus of Sympathetic, and by branches of the Lumbar ganglia passing to the Hypogastric plexus on the front of the last Lumbar Vertebra.

III. Remove this portion of the Right Common Iliac artery with the branches of Sympathetic nerve that lie superficial to it, and expose—

The Vena Cava, as it is formed by the junction of the two Common Iliac veins on the front of the Fifth Lumbar vertebra.

IV. By the removal of a further portion of Peritoneum, expose the Cava below the level at which it is crossed by the Mesentery.

V. Divide over the Inferior Vena Cava the Small Intestine, Mesentery, and contained structures, namely, Lymphatics, Lymphatic glands, Sympathetic nerves, the termination of the Superior Mesenteric artery and vein, and, a little higher up, the Right Colic vessels.

VI. Remove the Peritoneum covering the front of the Inferior Vena Cava, take away the Right Spermatic artery, and expose the Cava from its origin up to the third portion of the Duodenum.

VII. Define the convex margin of the second portion of the Duodenum, and along it divide the **Transverse Colon**, the two layers of the **Transverse Meso-Colon**, branches of the **Right and Middle Colic vessels**, and of **Sympathetic nerves and Lymphatics**, and cut through the reflection of the **Peritoneum** from the convex margin of the Duodenum. Then reflect the Duodenum and Pancreas inwards from off the **Right Kidney**, its vessels, and ureter, till you have exposed the **Anterior surface of the Inferior Cava**.

VIII. By the removal of a little more **Peritoneum**, that portion of the **Inferior Cava** which bounds posteriorly the foramen of Winslow is exposed.

IX. Define the fissure for the **Vena Cava** in the Liver.

Cut through the falciform and round ligaments, and a portion of the anterior layer of the **Coronary ligament**, and expose the **Vena Cava** as it perforates the central tendon of the **Diaphragm** between the right and middle leaflets.

X. Divide the **Liver** vertically over the Cava, hook to the right and left the two portions of the Liver, and expose that portion of the **Cava** which lies in a deep groove in its substance, and the several **Hepatic veins** as they enter it.

In cutting through the Liver you divide the ducts of the **Gall bladder** and branches of the **Portal vein**, **Hepatic vessels and ducts**.

XI. In order to expose the portion of the **Inferior Cava** within the **Thorax**, divide the **Diaphragm** by making an incision from the caval orifice forwards to the costal margin, cutting through **Peritoneum**, **Diaphragm**, **Serous Layer of Pericardium**, and branches of the **Phrenic nerve**,

Comes Nervi Phrenici, and **Right Upper Phrenic artery** in the substance of the Diaphragm.

XII. By pushing the Heart to one side, and by removing the covering of serous Pericardium, from the **Inferior Cava** the **Intra-thoracic** portion of that vessel is exposed, as it enters the posterior inferior angle of the **Right Auricle**.

The **Inferior Vena Cava** is now exposed in its whole length, and it is seen to receive the **Hepatic veins**, the **Lumbar veins**, the **Spermatic** or the **Ovarian veins**, the **Renal veins**, the **Capsular** and **Inferior Phrenic veins**. The **Middle Sacral vein** occasionally opens into the angle of junction of the **Common Iliac veins**.

A DISSECTION TO EXPOSE THE POSTERIOR SURFACE OF THE KIDNEY.

In performing this dissection we must remember that the length of the lowest Ribs and the lower limit of extent of the **Pleural Cavity** vary in the male and female subject, and in different subjects of the same sex. This is a matter of very considerable importance, especially as the **Kidney** is now being frequently incised or excised through the **Loin**. I have described the variations in the length of the Ribs, and the associated variations in the level of the **Pleural limit** very fully in a paper in the **Guy's Hospital Reports**, 1886 ; and I would refer the student to that paper for the general laws which govern their conditions.

POSITION.—Place the body in the prone posture.

Define the spinous processes of the **Eleventh Dorsal** and **Third Lumbar vertebræ**.

I. SKIN INCISIONS.

1. From the lower limit of the extremity of the Spinous processes of the Third Lumbar vertebra make an incision outwards to the centre of the Iliac crest.

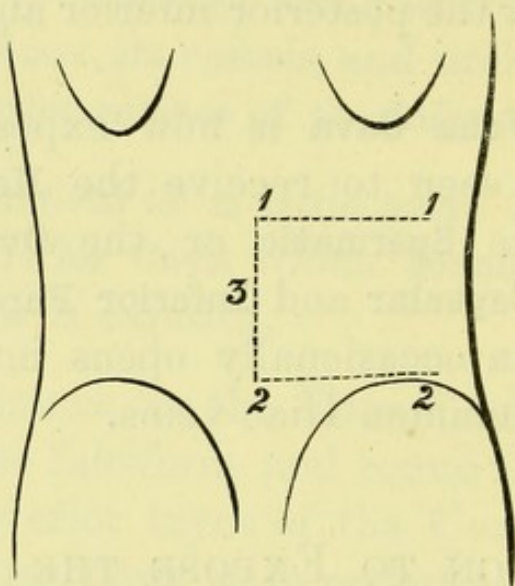


Fig. 20.

2. From the extremity of the Spinous process of the Eleventh Dorsal vertebra make a transverse incision outwards to a point vertically above the centre of the Iliac crest.
3. Join the inner extremities of the two horizontal incisions by a vertical incision. (Fig. 20.)

II. Reflect the skin outwards, and expose—

1. **Superficial Fascia**, containing
2. A variable amount of **fat**.
3. The **external branches** of the **Posterior Primary Divisions** of the **Eleventh** and **Twelfth Dorsal** nerves at the upper part, about one inch from the Median line. The branch from the Twelfth nerve lies external to the other.
4. The **Posterior branches** of the **Lateral Cutaneous** off-

sets of the **Tenth** and the **Eleventh Dorsal** nerves extending backwards at the anterior and upper part of the dissection.

5. The **External** branches of the **Posterior Primary Divisions** of the **First, Second, and Third Lumbar** nerves passing over the crest of the Ilium, the upper ones supplying filaments to the skin over the lower part of the space between the last Rib and the Crest of the Ilium.
6. Small **Cutaneous** branches from the **Intercostal** arteries running with the **Posterior and Lateral Cutaneous** branches of the **Dorsal** nerves, and from the **Lumbar** arteries with the branches of the **Lumbar** nerves.

III. Remove the **Superficial Fascia** and the structures contained in it, and expose—

Deep Fascia attached to the crest of the Ilium and to the **Spinous Processes** of the **Dorsal and Lumbar** vertebræ.

IV. Remove the **Deep Fascia**, and expose—

1. The **Aponeurosis** of the **Latissimus Dorsi** muscle attached to the **Lumbar** spines and to about the posterior half of the crest of the Ilium. **Fleshy fibres** of the muscle are seen for an inch or more in front of its aponeurotic iliac attachment, and also in the whole outer part of the dissection.
2. The lower limit of origin of the **Trapezius** from the **Spinous processes** of the **Eleventh and Twelfth Dorsal** vertebræ.
3. The **External Abdominal Oblique** emerging from beneath the **Latissimus Dorsi**.
4. A portion of the **Internal Oblique** is exposed between the free margin of the **Latissimus Dorsi** and the **Posterior free margin** of the **External Oblique**.

5. The several nerves already mentioned as they emerge from the *Latissimus Dorsi*.

V. Cut through the *Latissimus Dorsi* muscle at its attachment to the Iliac crest, and again along the upper border of the dissection, dividing the origins of this muscle from the Eleventh and Twelfth Ribs, and again cutting it along the outer vertical skin incision. Reflect the muscle inwards as far as possible towards the median line behind, and expose—

1. The *Serratus Posticus Inferior* arising from the Lumbar Aponeurosis and from the Spines of the Lumbar and Dorsal vertebræ exposed in the dissection. Its insertions by fleshy digitations into the outer surfaces of the Eleventh and Twelfth Ribs are also observed.
2. The *External Abdominal Oblique*, arising by fleshy digitations from the outer surface of the Eleventh and Twelfth Ribs. This muscle is inserted into the outer lip of the Iliac Crest.
3. Portion of the *Intercostal* muscles of the last interspace covered by a layer of fascia.
4. The *Fascia Lumborum*, attached in the middle line to the tips of the Spinous processes and to the Supraspinous ligament. The tendon of the *Serratus Posticus Inferior* continues this Aponeurosis upwards. It joins with the middle layer of the *Transversalis Aponeurosis* along the vertical outer margin of the *Erector Spinæ*, and it is usually described as the posterior of the three layers into which the *Transversalis Aponeurosis* splits.
5. The *Internal Oblique*, arising by fleshy fibres from the middle lip of the Iliac Crest, and from the posterior surface of the middle layer of the *Trans-*

versalis Aponeurosis. Its fibres pass upwards and outwards beneath the External Oblique.

VI. Remove the External Oblique within the limits of the dissection, and expose—

A further portion of the Internal Oblique, and the insertion of that muscle into the lower border of the Twelfth and, perhaps, of the Eleventh Rib also.

VII. Remove the Internal Oblique within the limits of the dissection, dividing, in doing so, branches of the Lumbar and Deep Circumflex Iliac arteries, which ramify in its substance, and expose—

1. The fleshy layer and the undivided Posterior Aponeurosis of the Transversalis muscle. This Aponeurosis is marked by an oblique line which runs upwards and inwards from a point on the crest about one inch to one and a half inches external to the outer margin of the Erector Spinæ. This line passes under cover of the outer margin of the Erector Spinæ, usually at a point intermediate between the last Rib and the Iliac Crest, but this is very variable. If the last Rib be very long, the Quadratus Lumborum is proportionally broad, in which case the Erector Spinæ may overlap its outer margin hardly if at all.

2. The Last Dorsal nerve and artery perforating the undivided Aponeurosis of the Transversalis muscle. They then run obliquely downwards and forwards on its surface, the nerve giving off in the anterior limit of the dissection the undivided Lateral Cutaneous branch.

3. Branches of the Lumbar arteries emerging from the middle layer of the Transversalis Aponeurosis.

VIII. Remove the portions of the Lumbar Aponeurosis or Fascia and of the Serratus Posticus Inferior seen in the dissection, and expose—

1. The **Spinalis Dorsi**, arising from the last two Dorsal and from the upper two Lumbar Spinous processes.
2. The **Erector Spinæ**, dividing in the upper portion of the dissection into the **Longissimus Dorsi**, and the **Sacro-lumbalis**.
3. The **Posterior branches** of the **Dorsal and Lumbar nerves**, with accompanying branches of **Intercostal and Lumbar arteries** emerging from the substance of the **Erector Spinæ**.

IX. Remove the **Erector Spinæ** within the limits of the dissection, dividing the insertion of the **Longissimus Dorsi** into the Transverse processes of the Eleventh and Twelfth Dorsal Vertebrae and into the accessory processes of the several Lumbar Vertebrae exposed ; also the outer series of insertions of this muscle into the Eleventh and Twelfth Ribs and into the whole length of the Lumbar Transverse Processes and the fascia connected with them.

Divide also the insertion of the **Sacro-lumbalis** into the two last Ribs, and the origin of the **Musculus-accessorius** from the same bones and expose—

1. The **Multifidus Spinæ** ;
2. The **Transverse processes** of the **Upper Four Lumbar Vertebrae**, the third being the longest ;
3. Portions of the **Eleventh and Twelfth Ribs** ;
4. The **Middle Lamella** of the **Transversalis Aponeurosis** inserted into the tips of the several Transverse processes ;
5. The several **Inter-transverse muscles** ;

6. The last **Levator Costæ** muscle ;
7. The **Posterior** branches of the **Lumbar** nerves and arteries passing back from between the Transverse processes, and internal to the Inter-transversales Mediales muscles.

X. Remove the middle layer of the Transversalis Aponeurosis, and expose—

1. The **Quadratus Lumborum** arising below from the Iliac Crest, and inserted into the Transverse processes of the Lumbar vertebræ and into the inner half of the lower border of the last Rib ;
2. The **Anterior** branches of the upper three **Lumbar** arteries running outwards upon the **Quadratus Lumborum**.

XI. Remove the **Quadratus Lumborum**, and expose—

1. The anterior layer of the Transversalis Aponeurosis.
The arrangement of this structure in the upper portion of the dissection varies considerably in different subjects, the variation depending on the length of the Twelfth Rib. It presents an abrupt thickening, which is attached externally to the centre of the last Rib, and internally to the Transverse process of the First or Second Lumbar vertebra.

Above this thickened band, and covered over by a thin layer of fascia is the lower limit of the **Pleural cavity**. It is obvious that if the last Rib is long, the lower margin of the Pleural cavity may extend considerably below the lower margin of that bone, and in some cases this interval amounts to one and a half inches. If the last Rib be short, the Pleura may only reach its upper margin, or may extend but a short distance downwards over its

anterior surface. In the latter case the Pleura will not be exposed at present in the dissection ;

2. The **Anterior Divisions** of the **Last Dorsal** nerve and **artery** crossing the space obliquely below the last Rib ;
3. The **Ilio-hypogastric** and **Ilio-inguinal** nerves crossing still more obliquely below the last Dorsal vessels and nerve ;
4. The **Fourth Lumbar** artery may or may not be exposed.

XII. Remove the Transversalis muscle, its undivided Aponeurosis and its anterior Lamella, together with the vessels and nerves already described, and expose—

The Transversalis Fascia.

XIII. Remove the Transversalis Fascia, and expose—

The Subperitoneal Fat. This varies considerably in quantity in different bodies.

XIV. By the removal of this fat the Kidney falls forwards from its connection to the abdominal wall, and in not a small number of subjects the whole of its posterior surface is now exposed. Yet if the lowest Ribs are of more than the average length, it becomes necessary to remove the prolongation of the Pleural cavity below the last Rib, together with the portion of the Diaphragm arising from the Ligamentum Arcuatum Externum.

Should this not be enough, a sufficient length of the last Rib must be excised with or without the superjacent intercostal muscles, and further portions of Pleura and Diaphragm.

The ascending or descending Colon, with branches of vessels from the Superior or Inferior Mesenteric trunks are exposed between the last Rib and the Iliac crest.

The Peritoneum is seen covering the Kidney and Colon and occupying the remainder of the interval exposed within the area of the dissection.

By this means the whole of the posterior surface of the Kidney will be exposed, together with its Pelvis and the commencement of the Ureter, branches of the Renal vessels, and the Sympathetic Nerve Plexus.

A DISSECTION TO EXPOSE THE POSTERIOR SURFACE OF THE SACRAL PLEXUS.

POSITION.—The body lying on the face, and the Abdomen and Pelvis raised on blocks so as to allow the legs to hang down to a moderate extent.

I. SKIN INCISIONS.

1. An incision running horizontally outwards for four inches from the **Median Line**, at a level of one inch above the **Posterior Superior Iliac Spine**.
2. From the inner end of 1 along the median line, for three-fourths of the distance to the **tip of the Coccyx**.
3. From the lower end of 2 obliquely downwards and outwards to the **Tuber Ischii**.

Reflect the flap outwards and expose—

1. The loose **Areolar Tissue** of the buttock, and in it,
2. The **External branches of the Posterior Primary Divisions of the upper two Sacral nerves**, the Superior near the top of the Sacrum, the Inferior in the lower part of the dissection.
3. Cutaneous branches of the **Lateral Sacral arteries** accompanying the preceding nerves.
4. Cutaneous branches of the **Gluteal and Sciatic arteries**

over the Sacrum, and the **Coccygeal** branch of the latter at the lower part of the bone, also branches of the **Gluteal** artery perforating the **Gluteus Maximus** muscle.

5. Small filaments of the **External** branches of the **Posterior Primary Divisions** of the upper three **Lumbar** nerves running back over the upper part of the surface exposed.

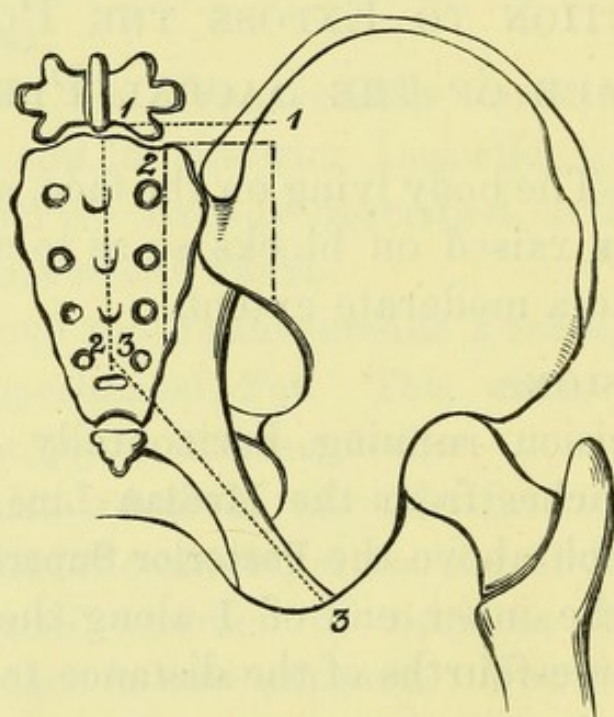


Fig. 21.¹

6. The **Perforating Cutaneous** nerve from the anterior branch of the fourth Sacral, and terminal branches of the **External Cutaneous**, **Last Dorsal**, and **Ilio-Hypogastric** nerves.

II. Remove the preceding structures and expose—

1. The **Lumbar Aponeurosis** and the conjoined **aponeurotic** origin of the **Latissimus Dorsi**. The former

¹ The dotted lines (1, 2, 3) indicate the skin incisions, and the others the piece of bone removed.

aponeurosis blends below with the subjacent tendon of the Erector Spinæ.

2. The **Fascia Lata** over the Gluteus Maximus muscle.

III. Remove the preceding and expose common aponeurotic origin of the **Erector and Multifidus Spinæ muscles**, and the **Gluteus Maximus muscle**.

IV. Detach the preceding muscles, dividing branches of the **Gluteal artery and vein** to the **Gluteus Maximus muscle**, and noticing branches of the **Inferior Gluteal nerve** and the **External branches** of the **Sacral nerves** entering its deep surface. Remove the layer of **Fascia Lata** which lay beneath the **Gluteus Maximus**.

There will now be exposed—

1. The upper three fourths of the **Posterior Surface** of the **Sacrum** and the four posterior foramina.
2. The **Posterior and Oblique Sacro-iliac ligaments**, with the several ligaments which connect the lamina, spinous and articular processes of the **Fifth Lumbar Vertebra** to the **Sacrum**.
3. The **Posterior Primary Divisions** of the upper four **Sacral nerves**, the first three bifurcating, the fourth being undivided. The inner branches are divided on the removal of the **Multifidus muscle**, in which muscle they terminate; the outer branches of the first three are seen to unite in loops on the back of the **Sacrum** with one another, and with the fourth **Sacral** and the last **Lumbar nerves**. These nerves form a second series of loops upon the posterior surface of the great **Sciatic ligament**.
4. The corresponding **arteries and veins** from and to the **Lateral Sacral** and **Sacra Media vessels**.
5. The parts of the **Sacrum** and **Ilium** from which the

Gluteus Maximus muscle arises, the **Spine** of the **Ischium**, and the upper part of the **Tuber Ischii** covered by a **Bursa**.

6. The **Great** and **Small Sacro-sciatic** ligaments.
7. The posterior part of the **Gluteus Medius**.
8. The **Pyriformis**.
9. The **Gemelli** with the intervening tendon of the **Obturator Internus** muscle.
10. The origins of the **Hamstring** muscles from the **Tuber Ischii**.
11. The cut **Superficial** branches of the **Gluteal** artery and vein above the **Pyriformis**.
12. The **Sciatic** artery and vein below this muscle.
13. The **Pudic** nerve, artery, and vein crossing the **Ischial** spine.
14. The **Great Sciatic** nerve below the **Pyriformis**.
15. The **Small Sciatic** nerve, also below this muscle, and the divided branches of the **Inferior Gluteal** nerve to the **Gluteus Maximus** muscle.
16. The nerve to the **Obturator Internus** muscle, lying usually outside the **Pudic** artery.
17. The nerve to the **Gemellus Superior** muscle.
18. The upper part of the nerve to the **Gemellus Inferior** and **Quadratus Femoris** muscles, if the **Great Sciatic** nerve is pulled outwards.

V.

- a. Remove the **Gluteus Medius** muscle from the posterior part of its **Iliac** attachment.
- b. Cut through the **Pyriformis** muscle as it emerges from the **Pelvis**, and turn it outwards.
- c. Cut through and remove the **Sacro-sciatic** ligaments.
- d. Clear away the fat and fascia from the posterior part of the **Ischio-rectal** fossa.

- e. Chisel through the **Ilium** from the centre of the great Sacro-sciatic foramen vertically upwards to the crest; and through the **Sacrum** just outside the posterior foramina, as far down as the fourth; connect these incisions above, and remove the included portions of the bones. The incision into the Sacrum should not be carried high enough to remove the upper part of the lateral mass, which is left. All but the upper part of the Sacro-iliac articulation is taken away and with it

The oblique and transverse fasciculi of the
Posterior Sacro-iliac ligaments.

The **Auricular cartilage.**

The **Anterior Sacro-iliac ligaments.**

- f. Remove the portion of the **Pyramiformis muscle**, which arose from the Sacrum, between the several foramina.
- g. Take away the loose areolar tissue about the vessels and nerves.

There will now be exposed—

1. The **Lumbo-sacral cord**; and,
2. The first four **Sacral nerves**, forming the Sacral Plexus.
3. The **Gluteal nerve** arising from the Lumbo-sacral cord and the first Sacral nerve.
4. The **Great Sciatic**, a direct continuation of the Plexus.
5. The **Small Sciatic** branch arising by two cords from the back of the second and third Sacral nerves, and receiving a descending branch from the Inferior Gluteal nerve.
6. The **Inferior Gluteal nerve** to the **Gluteus Maximus muscle** from the Lumbo-sacral cord and the first and second Sacral nerves.

7. The **Pudic branch** derived from the third nerve, and involving the whole of the portion of the fourth which joins the Plexus.
8. Usually two **branches to the Pyriformis muscle** arising from the upper part of the posterior surface of the Plexus, or the first two nerves before they join it.
9. The **nerve to the Obturator Internus muscle** will be seen below, but not at its origin from the union of the Lumbo-sacral cord and the first Sacral nerve on the anterior surface. The **nerves to the Gemelli muscles** will now be seen at their origin from the front and lower part.
10. The descending branches of the **fourth Sacral nerve** running downwards over the anterior surface of the Coccygeus muscle and the **Visceral branches** passing forwards to the Pelvic Plexus.
11. The **Gluteal artery and vein** emerging from between the Lumbo-sacral cord and the first Sacral nerve.
12. The **Sciatic artery and vein**.
13. The **Pudic artery and vein**, passing backwards from below the Sacral Plexus.
14. Branches of the **Lateral Sacral arteries** accompany the Sacral nerves.
15. The **Coccygeus muscle** passing from the spine of the Ischium to the Sacrum and Coccyx.
16. A small piece of the **Gluteus Minimus muscle** at the margin of the Sacro-sciatic foramen.
17. A small piece of the **Obturator Internus muscle** at the outer margin of this foramen.
18. The posterior part of the **Levator Ani muscle** where the Ischio-rectal fossa is cleaned.
19. The **Pelvic Fascia** is seen upon the anterior surface of the Plexus, separating the nerves from the

branches of the Internal Iliac artery. As the Gluteal Sciatic and Internal Pudic vessels perforate this fascia, they derive separate sheaths from it.

A DISSECTION TO EXPOSE THE ANTERIOR SURFACE OF THE SACRAL PLEXUS IN THE MALE SUBJECT, THE BUTTOCK AND PERINÆUM BEING DISSECTED, THE ABDOMEN OPENED, THE LEG AND THE VISCERA REMOVED.

POSITION.—The body lying on its back.

I. The first thing to be done is to make a **side view of the Pelvis**, and to do this the following steps are necessary on the side on which the section is to be made. The Plexus of the opposite side is the one that is to be exposed.

- a.* Remove the **Psoas muscle** and the **External Iliac vessels** along the brim, and part of the **Iliacus muscle** from the **Venter Ilii**.
- b.* Dissect off the **Pelvic Fascia** from the brim of the Pelvis. This is to be done carefully by keeping close to the bone, in order to remove the **Obturator Internus muscle**, and the dissection should be carried nearly as far forwards as the **Symphysis**, backwards to the **Fascia of the Pyramiformis**, and as low down as possible.
- c.* Separate the **Obturator Fascia**, with the **Falciform process of the Great Sciatic ligament**, and the **Obturator muscle**, from the bone forming the outer wall of the **Ischio-rectal fossa**. This incision will meet the above.
- d.* Saw off the **Spine of the Ischium**.
- e.* Saw through the **Rami of the Pubis and Ischium**, an inch external to the **Symphysis Pubis**.

f. Saw through the **Innominate** bone behind, the incision extending from the outer margin of the **Quadratus Lumborum** above, vertically downwards to the Great **Sacro-sciatic foramen**. Or the bone may be disarticulated behind, by removing the **Multifidus** and **Erector Spinæ** muscles from the **Sacro-vertebral** groove, dividing the **Anterior** and **Posterior Sacro-iliac**, the **Ilio-lumbar**, and **Great Sciatic** ligaments, and forcibly separating the bones. In this way the **Auricular cartilage** which adheres to the **Sacrum** mostly, may be displayed.

g. When the bone is removed, the spine of the **Ischium** should be fixed down, and the **Obturator Internus** muscle gently peeled off the outer surface of the **Pelvic Fascia**, when the following will be exposed—

1. The **Pelvic Fascia**, and white line extending from the lower part of the body of the **Pubis** to the **Ischial spine**.
2. The **Obturator Fascia** below this line.
3. The **Obturator nerve, artery, and vein**, running transversely above, in this order from above downwards, and passing out in front through the opening above the **Obturator membrane**. They lie in the substance of the **Pelvic Fascia**. The **Pudic vessels, and nerve** are seen lying in the substance of the **Obturator Fascia**, or rather in a sheath derived from its inner surface. They may be traced backwards round the **Ischial spine**, and as far forwards as the **Triangular ligament**.¹

¹ A good dissection of the **Pudic artery** may be made in this

II. Remove now the **Obturator Fascia** at the white line. Divide the **Anal Fascia** along this line ; cut through the origin of the **Levator Ani** muscle from it, and expose the **Recto-vesical Fascia**¹ running downwards and inwards to the viscera. Below it are the following **parts closing the Pelvic outlet** from before backwards :—

1. The **Triangular ligament**.
2. The **Levator Ani** muscle.
3. The **Coccygeus** muscle, and the **Small Sacro-sciatic ligament**.
4. The **Great and Small Sciatic nerves**, the **Pudic nerve**, and the nerve to the **Obturator Internus** muscle.
5. The **Sciatic vessels**, piercing the fascia of the **Pyriformis**.

The preceding vessels and nerves leave the Pelvis below the **Pyriformis** muscle.

6. The **Pyriformis** muscle.

way, but the anterior section of the bone would have to be modified.

¹ The above is the account of the arrangement of the Pelvic Fascia as usually given. In the last edition of Quain's "Anatomy," 1882, the Pelvic Fascia is described as consisting of two parts, the Recto-vesical and Obturator Fasciæ.

The latter is attached to the Ilio-pectineal line, to the body of the Pubis, to the anterior margin of the Great Sciatic notch and ligament, and to the Ischial and Pubic Rami. It is prolonged back over the Pyriformis to form the Fascia of that muscle.

The Recto-vesical Fascia is attached to the Pubis above the Obturator Fascia, from which it is separated by the origin of the Levator Ani. Laterally this Fascia is connected with the Obturator Fascia along a curved line from the upper part of the Obturator Foramen to the Ischial Spine, and posteriorly it is continuous with the Fascia of the Pyriformis.

The white line is described as a thickened band in the Recto-vesical Fascia, and it corresponds in its posterior part to the origin of the Recto-vesical Fascia from Obturator Fascia.

7. The **Sacral Plexus** lying upon it, and giving off the above-named branches.
8. The **Gluteal vessels and nerve**, above the **Pyriformis** muscle, and piercing the fascia over it.

III.

- a. Cut away the **Recto-vesical Fascia** and its prolongations to the viscera on the side of the **Pelvic** section, the **Pubo-prostatic ligament**, and the **Lateral ligament of the Rectum**.
- b. Remove the piece of **Peritoneum** passing to the **Viscera** from the side of the **Pelvis** on which the section has been made, and display in this way a side view of the **Pelvic Viscera**.¹

The following are the parts now seen—

1. The divided portions of the **Innominate bone**.
2. The **Rectum** in the concavity of the **Sacrum** and **Coccyx**; most posteriorly branches of the **Superior Hæmorrhoidal artery** may be seen in removing the sheath of **Recto-vesical Fascia**. Owing to the curvature of this viscus to the left, a better view is obtained by making the section on this side.
3. The **Bladder** in front of the preceding.
4. The **Recto-vesical pouch** of **Peritoneum** between the **Bladder** and **Rectum**.
5. The **Prostate gland** surrounding the neck of the **Bladder**, and enveloped by the **Prostatic Plexus** of veins, the sheath of the **Recto-vesical Fascia** being removed.
6. In front of the preceding the two layers of the **Triangular ligament** perforated by the **Membranous Urethra**, and in front of the ligament the **Bulb**.

¹ To show the parts more clearly, the **Bladder** should be inflated through the **Ureter**, and the **Rectum** filled with tow.

7. Between the Fundus of the Bladder and the Rectum the **Vesicula Seminalis** of the side dissected.
8. The **Ureter** descending internal to the Internal Iliac vessels, and entering the posterior and external part of the Fundus of the Bladder.
9. The obliterated **Hypogastric artery** running transversely on the upper part of the side of the Bladder to its apex, and continuous behind with the **Internal Iliac artery**.
10. Crossing over the immediately preceding structure, and running vertically down internally to it and the Ureter, is the **Vas Deferens**, accompanied by its artery.
11. Extending from the apex of the Bladder on to the Abdominal wall are the **Urachus**, and both obliterated **Hypogastric arteries**.
12. The **Internal Iliac artery** extending from the Abdomen over the Sacro-iliac Synchronosis. Its **Obturator**, **Sciatic**, and **Pudic branches** are divided, as well as the **Gluteal**, but the **Superior**, **Middle**, and **Inferior Vesical offsets** are seen, the former giving the branch to the Vas, and the Middle being very inconstant. The **Middle Hæmorrhoidal artery** is also displayed, commonly arising from the Inferior Vesical or the Pudic branches.
13. The corresponding veins. These are plexiform at their origin, and form the **Prostatic**, **Vesical**, and **Hæmorrhoidal Plexuses**, which are found on the sides of the corresponding viscera. The **Dorsal vein** of the Penis is seen entering the Prostatic Plexus.
14. The **Pelvic Plexus** of the Sympathetic nerve of the side dissected surrounding the Iliac vessels, and

sending prolongations to the viscera along the vessels.

15. **Lymphatic glands** along the Iliac vessels.

16. Below these structures the parts closing the outlet of the Pelvis already enumerated above.

IV.

Divide now the following structures—

a. The **Spermatic cord** at the Internal Abdominal ring of the side on which the section has been made.

b. The obliterated **Hypogastric artery**.

c. The **Ureter**.

d. The **Vesical and Middle Hæmorrhoidal arteries** and veins of the side dissected.

e. Cut through the **Meso-rectum**, containing the **Superior Hæmorrhoidal artery** and vein, with the accompanying **Sympathetic Plexus**, and draw the **Rectum** well over to the side from which the bone has been removed.

f. Strip off the **Peritoneum** passing from the Bladder and Rectum to the opposite side of the Pelvis.

g. Divide the obliterated **Hypogastric artery**, the **Spermatic cord**, the **Vesical and Hæmorrhoidal vessels**, and the **Ureter** of the opposite side.

h. Cut through the **Recto-vesical Fascia** of the opposite side at its Visceral attachments, and pull the Bladder over to the same side as the Rectum.

i. Dissect out the **Internal Iliac vessels** and their branches, and remove them all except the **Obturator**, which may remain on the Pelvic wall. These branches have already been enumerated.

In cleaning these the **Pelvic Sympathetic Plexus** of the opposite side will be destroyed.

j. Remove the Fascia of the **Pyriformis**.

There are now exposed—

1. The anterior surfaces of the **Sacrum** and the **Coccyx** and the posterior surface of the **Symphysis Pubis**.
2. The **Sacra Media** and **Lateral Sacral** arteries and veins lying on the **Sacrum**. The **Hypogastric Sympathetic Plexus**, and the gangliated cords of the **Sympathetic**, one on each side, are seen uniting below in the **Ganglion Impar**. The **Coccygeal** gland may be found below this, receiving branches from the **Ganglion Impar** and the **Sacra Media** artery.
3. The **Psoas** muscle, **External Iliac** vessels, and **Pelvic** wall of the opposite side.
4. The **Pelvic Fascia** lining the **Obturator Internus** muscle; below is the **white line**, and below this the **Recto-vesical Fascia** covering the **Levator Ani** muscle. The **Recto-vesical Fascia** may be seen closing the **Pelvis** in front, leaving in the **Median** line a little **triangular interval** between the **Pubic** attachments of the **Levatores Ani**; here it is very thin, and dips down to join the **Prostatic capsule**. *This fascia is seen to be separated from the Triangular ligament by the Levatores Ani muscles.*
5. The **Obturator** nerve, artery, and vein are seen running across the **Pelvic** wall in this order from above downwards. Behind the **Symphysis** are the **Pubic** branches of the **Obturator** and **Deep Epigastric** arteries.
6. The **Coccygeus** muscle behind the **Levator Ani** muscle, passing from the side of the **Sacrum** and **Coccyx** to the **Ischial spine**.

7. The **Sacral Plexus** consisting of the Lumbo-sacral cord, and the First, Second, Third, and part of the Fourth Sacral nerves, their communications with the Sympathetic ganglia and the following branches. The **Superior Gluteal nerve** arising from the posterior part of the Lumbo-sacral cord, and the first Sacral nerve. The **Inferior Gluteal nerve** from the back of the Plexus by fibres from the Lumbo-sacral cord and the First and Second Sacral nerves. The **Small Sciatic nerve** from the posterior aspect of the Second and Third Sacral nerves. The **Great Sciatic nerve** continuing the main part of the Plexus. The **Pudic nerve** from the Third and Fourth, and frequently the Second Sacral nerves. The **Perforating Cutaneous nerve** from the Fourth Sacral. The nerve to the **Obturator Internus muscle** and the nerve to the **Quadratus Femoris** from the front of the Plexus at the union of the Lumbo-sacral cord with the first Sacral nerve. **Visceral branches** to the Bladder and Vagina, from the Second, Third, and Fourth nerves. Ellis describes them as coming from the Fourth nerve, and sometimes from the Third. In this dissection they came from the Second, Third, and Fourth.

8. The remainder of the **Fourth nerve**, its **Hæmorrhoidal branch**, which is seen passing over the **Coccygeus muscle** and turning to the back of the **Coccyx**, between that muscle and the **Levator Ani**, or perforating the former. The branch to the visceral surface of the **Levator Ani muscle**, which also supplies the **Coccygeus**. This is internal to the preceding, and is seen by dissecting off the **Rectovesical Fascia** from the **Levator Ani muscle**.

9. The nerve formed by the united anterior primary branches of the **Fifth** and the **Coccygeal**, and a branch of the **Fourth**, perforating the Coccygeus muscle, &c., to be distributed to the posterior surface of the Coccyx.

A DISSECTION TO EXPOSE THE TRUNKS AND BRANCHES OF THE INTERNAL PUDIC ARTERY AND NERVE.

POSITION.—Place the body in the prone position.

Introduce a number of blocks beneath the Pelvis, arranging the trunk in such a manner that the chest shall rest upon the table, that the ischio-rectal Fossa and Perineum shall look upwards and backwards, and that the abducted legs shall hang over the sides of the end of the table.

By this means the lower portion of the buttock, the Ischio-rectal Fossa, the Perineum, Scrotum, and Penis are exposed simultaneously to the student facing this portion of the body.

Define carefully the position of the Posterior Superior Spinous process of the Ilium, the tip of the Coccyx, the Tuber Ischii, and the lower margin of the Symphysis Pubis.

Render the half of the Scrotum of the side on which you intend to expose the vessel or nerve tense by fixing it with hooks to the opposite thigh, and in a similar manner fix and stretch the Penis.

INCISIONS.

1. Make an incision from the Posterior Superior

Spine to the tip of the Coccyx, then downwards along the middle line, around the margin of the Anus, and then along the middle line of the Perineum and Scrotum. Continue this median incision along the under surface of the Penis to the end of the Prepuce, and then make a median incision from the root of the Penis along its dorsal aspect to the anterior termination of the Prepuce.

2. Make an incision from the Posterior Superior Spine, obliquely outwards and downwards, parallel to the lower margin of the Gluteus Maximus for two and a half inches.
3. Make an incision from the tip of the Coccyx along the lower margin of the Gluteus Maximus to the Tuber Ischii.

I. Reflect outwards the quadrilateral flap of skin from the Gluteal area.

II. Reflect outwards to a line joining the Tuber Ischii and root of the Penis, the skin covering the Ischio-rectal Fossa, Perineum, Scrotum, and Penis.

In doing this you find that the skin of the Scrotum or the Dartos is very intimately connected to the subjacent coverings of the Testis, and that in the Perineum and Ischio-rectal Fossa you divide fibres of origin and insertion of the External Sphincter, and fibres of insertion of the Corrugator Cutis Ani around the margin of the Anus. You expose—

1. The **Superficial Fascia**, which, where it forms the Dartos, contains no fat, is bluish in colour, and a large quantity of involuntary muscle fibre enters into its formation. Where it sheaths the Penis it

contains no fat, and some involuntary muscle fibres are present in it. It becomes thicker and denser at the upper aspect of the root of the Penis, where it is described as forming the Suspensory ligament.

This structure, formed by the Fascia of the Abdomen, is, I believe, quite distinct from that which I am accustomed to demonstrate as the Suspensory ligament.

At the Posterior and upper limit of the Scrotum, the Superficial Fascia is seen to split into two layers.

The **Superficial layer** contains an abundance of fat. It passes backwards over the Perineum, being continuous over the Rami of the Pubes and Ischium with the Superficial Fascia of the Thigh. It occupies the Ischio-Rectal Fossa, and runs backwards and upwards over the outer surface of the Gluteus Maximus.

2. The fibres of the **Corrugator Cutis Ani**, which radiate outwards from the Anal aperture.
3. The **External Sphincter Ani**, which arises by a small tendon from the tip and back of the Coccyx, and from the skin in the vicinity of that bone. It runs forwards, and splits, to enclose the Anal aperture, forming a layer nearly an inch broad on its lateral aspect. These divisions join in front of the Anus, and are inserted partly into the central tendinous point of the Perineum, and partly into the adjacent skin.

III. Remove the Superficial layer of Superficial Fascia from the Perineum, Ischio-Rectal Fossa, and surface of the Gluteus Maximus, carefully dissecting out and pre-

serving the several arteries and nerves which are distributed in it. You now expose—

1. The **Deep layer of Superficial Fascia**, or the **Fascia of Colles**. This is thin and membranous, and contains no fat. It is attached to the margins of the Rami of the Pubes and Ischium and to the tuberosity of the Ischium. It then passes upwards into the Pelvis, turning over the under and posterior surface of the subjacent Transversus Perinei muscle, to be attached laterally to the Obturator Fascia and superiorly to the Anal Fascia, and to the Posterior limit of the Triangular ligament.
2. The **Anal Fascia**. This covers the under surface of the Levator Ani and Coccygeus muscles, and is attached externally and superiorly to the Obturator Fascia.
3. The **Obturator Fascia** lines the inner surface of the Obturator Internus muscle, as it bounds the Ischio-rectal Fossa externally. It is attached below to the Tuber Ischii, and behind to the Great Sciatic ligament, where it becomes continuous with the Fascia Lata.
4. The **Fascia Lata**, where it covers the Gluteus Maximus.

The following vessels and nerves have been exposed in or upon the Fasciæ, described in order, from before backwards—

1. The **Dorsal vein**, commencing as branches from the Glans Penis, and receiving branches from the sides of the Penis. It passes back between the two layers of the Suspensory ligament.
2. The **Superficial Lymphatics of the Penis**, forming two vessels, one being placed on the Dorsum, and run-

ning with the Dorsal vein, and one on its lateral surface. They run upwards and outwards from the dissection.

3. The **Dorsal artery of the Penis** emerging from between the two layers of the Suspensory ligament, outside the Dorsal vein. It is distributed to the Glans and Prepuce, sending also branches to the integument.
4. The **Dorsal nerve**, accompanying the Dorsal artery, but lying external to it. It supplies the gland and skin of the Penis. It is said to be joined by branches of sympathetic nerves on the Dorsum.
5. Branches of the **Superficial and Deep External Pudic vessels** and accompanying **Lymphatics**, as they supply the anterior aspect of the Dartos.
6. Branches of the **Ilio-inguinal nerve**, accompanying the preceding vessels.
7. The **External or Posterior Superficial Perineal nerve**, running from the outer wall of the Ischio-rectal Fossa forwards, through the Superficial layer of Superficial Fascia, to be distributed to the Dartos. It communicates with
8. The **Anterior or Internal Superficial Perineal nerve**, which emerges from the Deep layer of Superficial Fascia in the Perineum, and which also supplies the Dartos.
9. The **Inferior Pudendal nerve**, running forwards and inwards over the Ramus of the Ischium, and joining with the two preceding nerves in their terminal distribution. They are frequently described as the **three long Scrotal nerves**.
10. The **Superficial Perineal artery**, emerging from the Deep layer of Superficial Fascia, and accompanying the Anterior Superficial Perineal nerve.

11. An unnamed branch of the **Sciatic artery**, accompanying the **Inferior Pudendal nerve**.
12. The **Inferior Hæmorrhoidal nerve**, and
13. The **Inferior Hæmorrhoidal vessels**, distributed upon the inner wall of the **Ischio-rectal Fossa**. The nerve sends branches to communicate with the **Inferior Pudendal** and **Superficial Perineal nerves**.
14. The **Perineal** or **Hæmorrhoidal branch** of the **Fourth Sacral**, supplying the **External Sphincter Ani**, and cutaneous filaments to the adjacent skin.
15. The distribution of the terminal branches of the anterior divisions of the **Fifth Sacral** and **Coccygeal nerves** upon the back of the **Coccyx**.
16. Cutaneous branches of the **Posterior divisions** of the **Coccygeal nerve**, and of the **Fourth** and **Fifth Sacral nerves** in the region of the **Coccyx**.
17. Filaments of the **External branches** of the **Posterior divisions** of the **Second** and **Third Sacral nerves**.
18. Branches of vessels from the **Middle** and **Lateral Sacral vessels** accompanying the preceding **Sacral nerves**.
19. Some branches of the **Lumbar Cutaneous nerves**.
20. The **Gluteal Cutaneous branches** of the **Small Sciatic nerve**, turning up over the lower border of the **Gluteus Maximus**, with
21. The **Perforating Cutaneous nerve**, a branch of the **Fourth Sacral**.
22. Branches of the **Coccygeal artery**, and other small branches of the **Sciatic** and **Gluteal vessels**.

IV. Remove the **Fascia Lata** where it is exposed, covering the **Gluteus Maximus**, and expose—

A quadrilateral area of the **Gluteus Maximus**.

V. Remove this portion of muscle which is seen, dividing

in doing so branches of the Sciatic and Gluteal vessels, and of the Inferior Gluteal nerve. Also the several cutaneous branches of the Posterior divisions of the Sacral nerves as they run through its substance. You expose—

A layer of **Deep Fascia**, divided from the **Fascia Lata**.

VI. Remove this layer of **Deep Fascia**, and expose—

1. A portion of the **Iliac bone**, from which the muscle arose, and the upper margin of the **Great Sciatic notch**.
2. The lower border of the **Gluteus Medius**.
3. The **Pyriformis**, emerging from the **Great Sciatic Foramen**, and receiving an attachment to its upper margin.
4. A small portion of **Gluteus Minimus**, beneath and above the **Pyriformis**.
5. The **Obturator Internus**, emerging from the **Small Sciatic Foramen**, and
6. The **Gemelli**, coming into relation with its upper and lower borders.
7. The **Tuberosity of the Ischium**, covered by a bursa, and giving attachment to the **Hamstring muscles**.
8. The **Great Sciatic ligament**, in the whole of its extent.
9. The **Small Sciatic ligament**, as it passes outwards from beneath the **Great Sciatic ligament**, and is attached to the **Spine of the Ischium**.
10. A small area of the adjacent portions of the **Coccygeus muscle** and **Levator Ani**.
11. The superficial branch of the **Gluteal artery** emerging from between the adjacent borders of the **Pyriformis** and **Gluteus Medius** muscles.
12. The **Sciatic artery** emerging from beneath the lower

margin of the *Pyriformis*, and descending upon the *Obturator Internus* and *Gemelli*. It gives off in this dissection branches to the *Gluteus Maximus* and the *Coccygeal* branch, which perforates the Great Sciatic ligament. It may also be seen to give off the *Anastomotic* branch and the *Comes Nervi Ischiadici*.

13. The Internal Pudic vessels emerge from beneath the lower margin of the *Pyriformis* internal to the Sciatic artery. The artery runs downwards upon the back of the Spine of the Ischium, and enters the Small Sciatic Foramen.
14. The Great and Small Sciatic nerves emerging from beneath the lower border of the *Pyriformis*, and descending upon the *Obturator Internus* and *Gemelli*. The latter nerve gives off here the *Gluteal Cutaneous* branches and the *Inferior Pudendal* nerve.
15. The *Inferior Gluteal* nerve also appearing from beneath the *Pyriformis*.
16. The nerve to the *Obturator Internus*, and
17. The *Internal Pudic* nerve, accompanying the Pudic vessels on the Spine of the Ischium, the former nerve lying external to the Pudic artery, and the latter Internal to it.
18. The nerve to the *Quadratus Femoris*, lying under cover of the Great Sciatic nerve.

VII. Remove the *Pyriformis* within the limits of the dissection, exposing upon its Pelvic, or inner surface, the outer portion of the Sacral Plexus, and upon that the Fascia of the *Pyriformis*, which is connected to the outer margin of the Great Sciatic Foramen.

I will not describe the several portions of the Plexus in

detail, but will merely indicate that the Pudic nerve arises from its lower part, namely, from the Third and Fourth, and sometimes also from the Second nerves.

The **Gluteal artery** is seen to pass backwards, between the Lumbo-sacral cord and First Sacral nerve, and to divide into the Superficial branch which we have already observed, and the Deep branch which runs outwards and forwards, with the Superior Gluteal nerve between the Gluteus Medius and Minimus. The Gluteal artery derives a sheath from the Pelvic Fascia as it emerges from it. The **Sciatic** and **Internal Pudic** arteries emerge from beneath the lower margin of the Sacral Plexus, and derives sheaths from the Pelvic Fascia as they pass through it.

VIII. To expose the origin of the Internal Pudic artery, remove the portion of Sacral Plexus and its branches which are now exposed, together with the Subjacent layer of Pelvic Fascia, and expose—

The common origin of the Internal Pudic and Sciatic arteries, as they arise from the termination of the anterior division of the Internal Iliac artery. The portion of the artery within the Pelvis is seen to rest upon the Rectum internally. From it branches are given off to the Pyriformis, Coccygeus, and Obturator Internus. Unless the Internal Pudic artery arises very abnormally, its origin can always be exposed in the manner which I have described above.

IX. Now cut through the attachment of the Great Sacro-Sciatic ligament to the Tuber Ischii, and turn the ligament inwards. By the removal of the inner wall of its sheath expose the Internal Pudic artery as it runs in

the outer wall of the Ischio-rectal Fossa, from the Small Sciatic Foramen to the point where it passes between the two layers of the Triangular ligament. It is placed from an inch to an inch and a half above the margin of the Tuber Ischii. It is accompanied by the Pudic vein. In the back part of the Fossa it gives off the Inferior Hæmorrhoidal branch, whose distribution has been already observed.

The **Superficial Perineal artery** sometimes arises from the Pudic in the anterior portion of the Ischio-rectal Fossa, where it perforates the Deep layer of Superficial Fascia, while at other times it arises from the Pudic while it lies between the two layers of the Triangular ligament.

The **Transverse Perineal artery** usually arises with the preceding, and may lie upon or beneath the Deep layer of Superficial Fascia. In the latter case many of its branches perforate this Fascia.

The **Pudic nerve** is seen to accompany the Pudic artery through the Small Sciatic Foramen, and to run in the same sheath in the Obturator Fascia, but lying deeper than it.

In the back part of the Ischio-rectal Fossa it breaks up into three branches—

One, the **Inferior Hæmorrhoidal**, has been already exposed on the inner boundary of the Fossa ;

Another, the **Dorsal nerve of the Penis**, accompanies the Pudic artery between the two layers of the Triangular ligament, lying deeper than the artery ;

While the third and largest branch, the **Perineal nerve**, runs in the Obturator Fascia below the Pudic artery in the outer wall of the Fossa, where it divides into the **External or Posterior**

Superficial Perineal nerve, which runs forwards usually superficial to the Deep layer of Superficial Fascia to the Scrotum,

The **Anterior Superficial Perineal**, which perforates the Deep layer of Superficial Fascia, and

The **Deep Perineal branches**, some of which supply the External Sphincter and the Levator Ani, while others perforate the Deep layer of Superficial Fascia.

IX. Having carefully preserved the terminal distribution of the Superficial Perineal nerves or artery, as the case may be, remove the Dartos and Deep layer of Superficial Fascia which are exposed, dividing the attachments of the latter structure to the Rami of the Pubes and Ischium to the posterior margin of the Triangular ligament, to the Obturator and Anal Fascia, and to the Median Raphé of the Accelerator Urinæ muscle. In taking away the Dartos, it is noticed that this structure is but loosely connected to the subjacent coverings of the Cord and Testis.

Hook the Cord and Testis to one side. There are now exposed—

1. The **Transversus Perinei muscle**, arising from the inner surface of the Ischial Tuberosity, and running inwards and forwards to the central point of the Perineum.
2. The **Erector Penis**, arising from the inner surface of the Tuberosity and Ramus of the Ischium, and inserted by an Aponeurotic expansion into the lower and outer aspects of the Crus.
3. The **Ejaculator Urinæ**, arising from the central point of the Perineum, and from a common Median Raphé. The Posterior fibres are inserted into the

under surface of the Triangular ligament, the Middle fibres comprising the bulk of the muscle surround the Corpus Spongiosum, uniting with the corresponding fibres of the opposite side, and the Anterior fibres surround the Corpus Cavernosum and the Corpus Spongiosum, and blend with the opposite muscle on the Dorsum of the Penis.

4. A portion of the **Anterior layer of the Triangular ligament** in the interval between these muscles.
5. The portion of the **Superficial Perineal artery**, which lies beneath the Deep layer of Superficial Fascia. It usually perforates the Transversus Perinei muscle, and often gives off the **Transverse Perineal artery** in this space.
6. The **Anterior Superficial Perineal nerve**, as it runs with the Superficial Perineal artery.
7. Branches of the **Deep Perineal nerve**, which are distributed to the three muscles exposed, and to the Corpus Spongiosum.

X. Divide the lateral expansion of the Suspensory ligament of the Penis, as it covers the Corpus Cavernosum on this side. This ligament is a special Triangular ligamentous structure, which is attached by one side to the front of the Symphysis ; its anterior margin is free, and its third side is attached along the upper aspect of the root of the Penis. This third side splits into two layers, which surround the Penis.

On dividing the lateral process of this ligament, the portions of the Dorsal artery, vein, and nerve, which are included between its divisions, are exposed.

XI. Cut through the attachments of the Transversus Perinei, the Erector Penis, and the Crus Penis to the

Tuber Ischii, and to the Rami of the Pubes and Ischium.

Displace the Transversus Perinei inwards. The Anterior layer of the Triangular ligament is exposed, and the Dorsal nerve and vein and the Pudic artery are seen to perforate it, the vein being in the middle line, the Pudic artery next, and the Dorsal nerve most external.

The Pudic artery at once divides into the Dorsal artery, which has been fully exposed, and the artery to the Corpus Cavernosum, a larger branch, which penetrates the Crus of the Penis on its deep aspect.

XII. Cut through the Anterior layer of the Triangular ligament along its attachment to the Tuber Ischii, the Rami of the Pubes and Ischium, the Obturator Fascia, the Deep layer of the Triangular ligament, and to the Anal Fascia, and reflect it inwards. There are exposed—

1. The **Constrictor Urethræ**, which is attached to the Pubic arch, and to the Subjacent and Superjacent layers of the Triangular ligament. It forms a muscular layer, which extends inwards, some fibres passing in front of, and others behind, the **Membranous portion** of the Urethra, which is now exposed. It unites with the fellow of the opposite side in a fibrous raphé, and it encircles the **Membranous Urethra**, forming a Sphincter.
2. The **Deep Transversus Perinei muscle** is continuous with the Constrictor Urethræ, and it is sometimes described as a portion of it.

XIII. Remove these two muscles, and expose—

1. **Cowper's gland**, with its **Duct**, which perforates the Anterior layer of the Triangular ligament by the side of the **Membranous Urethra**.

2. The **Sub-pubic ligament**.
3. The **Dorsal vein**, communicating with the **Pudic vein**, and dividing into two branches, which pass into the Pelvis between the divisions of the Deep layer of the **Triangular ligament**.
4. The **Pudic artery**, running close to the **Pubic arch**. It gives off in this area the artery to the **Bulb**, which runs inwards, and perforates the **Anterior layer** of the **Triangular ligament** by the side of the **Membranous Urethra**, while between the two layers of the ligament it gives off a branch to **Cowper's gland**, and branches to the **Membranous Urethra**.

In some cases the **Pudic artery** divides into its two terminal branches while between the layers of the **Triangular ligament**.

XIV. To expose the **Dorsal nerve** in this area, it is necessary to remove and hook inwards the **Pudic artery**, and to divide a layer of fascia which covers the nerve, and separates it from the artery. The **Dorsal nerve** gives off branches to the **Constrictor Urethræ** and to the **Deep Transverse muscle**.

The **Internal Pudic artery** and nerve, with their branches of distribution, have now been fully exposed.

NOTE ¹ ON THE TRIANGULAR LIGAMENT OF THE URETHRA.

The anatomy of the **Triangular ligament** of the **Urethra** has in the experience of the writer often proved

¹ Reprinted from a paper by Dr. Carrington in the "Guy's Hospital Reports."

to be somewhat of a stumbling-block to students. This note is written with the view of endeavouring to make the connections of this structure clearer. The difficulty arises, I believe, from two causes: *firstly*, that *identical* parts of the Pelvic Fascia have received a different nomenclature; and, *secondly*, that incorrect, or at all events inexplicit accounts are given in most of the text books in ordinary use.

To obviate the first difficulty, I shall take that account of the Pelvic Fascia which is now commonly received, and indeed followed by the authors usually read; but the connections of the various parts of which, with the structure under consideration, are either not stated explicitly, or are else erroneously given. I mean that description which states that the Pelvic Fascia divides at some point in a line extending from the Symphysis of the Pubes to the spine of the Ischium, into two parts, one of which extends on to the various Pelvic Viscera, and the other of which is continued down on the inner surface of the Obturator Internus muscle to the outlet of the Pelvis. The line of Bifurcation is called the **white line**, the part of the fascia above this line is named **Pelvic**, the portion below, **Obturator**, and the piece extending on to the Viscera, **Recto-vesical**. Further, there is a thin fascia derived from the Obturator, which lines the under surface of the Levator Ani muscle, to which the name **Anal** is applied.

But whilst laying down these hard and fast lines, I will quote here a passage from "Quain's Anatomy" (vol. i., page 327), because whilst I have been repeatedly convinced of its accuracy, I do not think that any other of the authors ordinarily read, mention the facts stated therein. It is as follows:—

“The Obturator Fascia is sometimes included in the description of the Pelvic Fascia, while the Recto-vesical is considered as an offset from it. It will be found, however, on dissection, that the Recto-vesical Fascia is always most directly continuous with the Pelvic Fascia, and that the Obturator Fascia is only loosely connected with it. Indeed, the fibres of the Levator Ani muscle in most cases pass upwards to some extent beyond the white line, and thus separate the Obturator from the Pelvic Fascia.”

We will now take the various descriptions¹ given of the anatomy of the Triangular ligament. We shall find that there is no difficulty about the **Anterior or Superficial lamella**, for this is described by all as a *special layer of fascia closing the upper part of the Pubic arch*. It is in the connections of the **deep layer** that the discordant accounts, real or apparent, are given. Thus in “Gray’s Anatomy” (page 751) it is stated “the Posterior layer is *derived from the Pelvic Fascia*,” and again (pp. 755-56) the *Pelvic Fascia* “is continuous below the Pubes with the fascia of the opposite side, so as to close the front part of the outlet of the Pelvis, blending with the Posterior layer of the Triangular ligament;” and, further, the Obturator Fascia “is a direct continuation of the Pelvic Fascia below the white line, and is *attached to the Pubic arch*.” The inference from this account is, I take it, that the posterior layer is formed by the *Pelvic Fascia*, closing the Pelvis in front and beneath the Symphysis, and that the Obturator division takes no part in the formation of the Triangular ligament, but stops short at the Pubic arch.

In “Quain’s Anatomy” (vol. i., page 326), we find, “this

¹ The italics are my own, in all the succeeding quotations.

layer (*i.e.*, Deep layer of Triangular ligament) is superficial to the anterior fibres of the Levator Ani, which lie between it and the *Pelvic Fascia*,¹ and is *connected with a thin web of Areolar tissue which extends backwards on the surface of the Levator Ani muscle, and is distinguished as the Anal Fascia.*" The Obturator division is described as being attached to the Rami of the Pubes and Ischium.

There is nothing said as to the connection of the Triangular ligament with the Pelvic Fascia, or with any part of it, and I think that we must either infer that both layers of the ligament are to be looked upon as *special fasciæ*, or that else the Deep layer is derived from the *Anal Fascia*.

In Heath's account of the Triangular ligament, no mention is made of its connection with any part of the Pelvic Fascia, but in describing the *Recto-vesical layer* (page 261), the following is stated, "it is seen to dip down to the Prostate, and is thus continued from one side to the other of the Pelvis, of which it closes the outlet."

In "Ellis's Anatomy" (eighth edition, page 546), no distinction is made between Pelvic and Obturator Fasciæ, but the *whole membrane lining the inner surface of the Obturator muscle is called Pelvic*, and the following statement is made:—"Inferiorly the fascia is attached to the Hip bone along the side of the Pubic arch." He is here speaking of the part *below the white line, i.e.*, the Obturator division of other writers. On page 549, it is stated that the Recto-vesical Fascia between the Pubo-prostatic

¹ The word *Pelvic* must here be read in connection with the passage quoted above (vol. i., p. 327). *Recto-vesical* is probably meant as being a direct continuation of the *Pelvic fascia*.

ligaments of opposite sides "dips down to reach the Triangular ligament of the Perinæum, and closes the Pelvis between the Levatores Ani." On page 429 we find, "The Posterior layer (of the Triangular ligament) is *derived from the Recto-vesical Fascia*." Here, then, we have another account of the origin of this layer.

I may here note that in the sixth edition of this writer's work (page 587), the account given of the Pelvic Fascia differs substantially from the later one just quoted ; in that, it (the Pelvic Fascia) is stated to be "continued from the one hip bone to the other, so as to close the cavity of the Pelvis in front for a short distance," and that, on page 458, it is said that "the Posterior layer (*i.e.*, of the Triangular ligament) is derived from the Pelvic Fascia ;" we must, however, of course, take the later description, which gives the origin from the Recto-vesical Fascia.

I think I have quoted enough to justify the statement that the connections of the Posterior layer of the Triangular ligament may well be a stumbling-block, for we have the following different accounts given :—

1. From the Pelvic Fascia (Gray).
2. A special structure, or from the Anal Fascia (Quain).
3. From the Recto-vesical Fascia (Ellis).

It seems to me that the following considerations may make the matter clearer.

1. The Pubic arch is of course below the level of the Symphysis.
2. The white line extends from the *lower part* of the Symphysis Pubis.

Therefore the *Triangular ligament must be below the level of the Pelvic Fascia*, which only extends as far down as the white line.

I believe the true account, and it is one which I have verified by dissection, to be as follows:—

The **Superficial layer** is a *special fascia*. All accounts here agree. The **Deep layer** is formed by the **Obturator Fascia**, which anteriorly is found to stretch across the Pubic arch and close it; or perhaps a little more exactly, the Obturator Fascia may be described as running down to be fixed to the margin of the Pubic arch, and a little above its attachment to give off a process which passes across the upper part of the arch, and which, joining with a like process from the fascia of the opposite side, forms the Deep layer of the Triangular ligament. If, therefore, in Gray's account for *Pelvic* we write *Obturator*, it would be correct. The Triangular ligament is continuous behind with the Anal Fascia, but I do not think that the second alternative of Quain's description is correct, viz., that the Posterior layer is derived from the Anal Fascia, for this would be tracing a comparatively thick membrane from a very thin one, and as to the first, that it is a special structure not connected with any division of the Pelvic Fascia, I would say that I have often made out the continuity with the Obturator piece.

Finally, we have Ellis's derivation from the Recto-vesical layer. This, to my mind, cannot be the case, for, as is indeed expressly stated by Quain, the fibres of origin of the Levator Ani muscle from the Symphysis Pubis, are found distinctly between the Recto-vesical Fascia and the Posterior layer of the Triangular ligament. It is, however, a fact that the Recto-vesical Fascia closes the Pelvis *above* these attachments of the Levatores Ani, "between the Puba-prostatic ligaments of opposite sides," except in the centre, where it dips down to join the Prostate, leaving a small interval; but this makes another

layer closing the Pelvis just below the Symphysis, and we have indeed from without inwards—

1. The Superficial layer of the Triangular ligament.
2. The Deep layer of the same, derived from the Obturator Fasciæ.

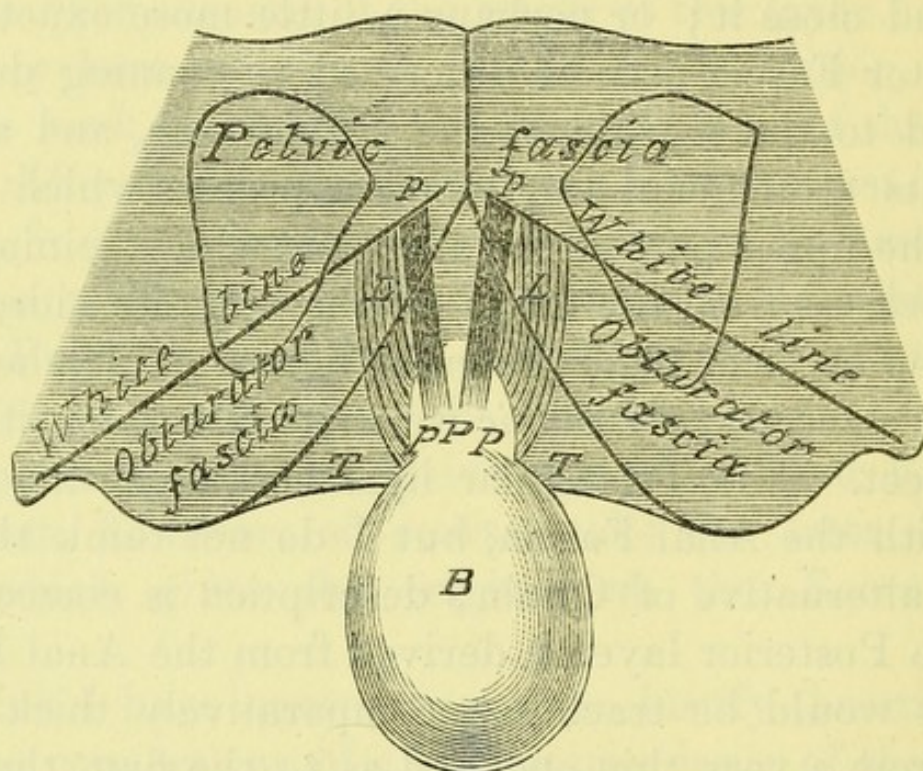


Fig. 22.

DIAGRAM OF THE POSTERIOR SURFACE OF THE SYMPHYSIS PUBIS, showing the divisions of the Pelvic fascia and the connections of the Posterior layer of the Triangular ligament.

P. Prostate.

B. Bladder, drawn backwards.

p. p. Pubo-prostatic ligaments.

L. L. Anterior fibres of Levatores ani, arising from the lower part of the Symphysis.

T. T. The Posterior layer of the Triangular ligament.

The white line corresponds to the cut edge of the Recto-vesical fascia. The Pubo-prostatic ligaments to the anterior edges of the same; between these there is an interval in which the Recto-vesical fascia dips down in the Median line to join the Posterior layer of the Triangular ligament and the Capsule of the Prostate. The Pubo-prostatic ligaments are above the Levatores Ani muscles.

3. The Recto-vesical Fascia.

And between the Recto-vesical Fascia and the Triangular ligament, a Median Septum is formed by the former dipping down in the centre to join the latter.

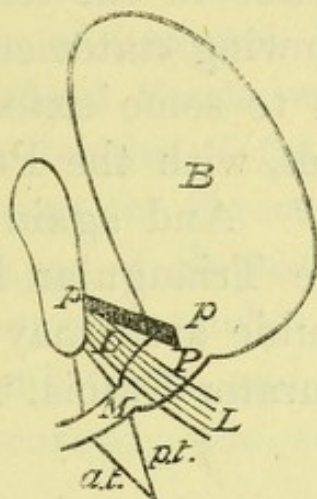


Fig. 23.

ANTERO-POSTERO VERTICAL SECTION THROUGH THE BLADDER AND SYMPHYSIS PUBIS.

B. Bladder.

P. Prostate.

M. Membranous Urethra.

p. p. Pubo-prostatic ligament.

L. L. Levator Ani, arising from the Symphysis, and placed between the Pubo-prostatic ligament (*i.e.*, Recto-vesical fascia) and the Posterior layer of the Triangular ligament.

p. t. Posterior layer, and

a. t. Anterior layer of the Triangular ligament.

On either side of this there is a little space bounded above by the Recto-vesical Fascia, below by the Deep layer of the Triangular ligament, and internally by the Median Septum, externally by the Pubic bone, and in this the anterior fibres of the Levator Ani muscle run up to the Symphysis.

The above statement is pretty nearly a reprint of my note in the "Guy's Gazette." Since it was written I

have consulted Henle, and I gather that allowing for his difference of description, the connections are much the same as given above. "Handbook of Anatomy," vol. ii., Part I., pp. 406-8, p. 525, and fig. 402, and pp. 541-42.

I find also that Godlee in the text to Part VI. of his Plates makes the following statements (page 220):—"It (Obturator Fascia) is to some extent continuous, along the arch of the Pubes, with the Posterior layer of the Triangular ligament." And again (page 221):—"The Posterior layer of the Triangular ligament * * * at its attachment to the Pubic arch may be said to be continuous with the Obturator Fascia."

A DISSECTION TO EXPOSE THE DISTRIBUTION OF THE FIFTH SACRAL AND COCCYGEAL NERVES OUTSIDE THE SACRAL CANAL.

POSITION.—Place the body in the prone posture, and introduce beneath the Pelvis a sufficient number of blocks to cause the body to rest upon the upper portion of the chest and knees. Separate the legs.

Define the lower limit of the Vertebral Foramen in the Sacrum. This point varies within wide limits with the sex and occupation of the individual.

I. SKIN INCISIONS.

1. Make a median incision from the lower extremity of the Spinous process of the Sacrum to the lower end of the Coccyx.
2. From the tip of the Coccyx make an incision an inch in length outwards along the lower margin of the Gluteus Maximus.

3. From the upper extremity of No. 1 make an incision parallel to No. 2, and one inch and a half long.

4. Join the outer extremities of the two transverse incisions No. 2 and No. 3.

II. Remove the skin, and expose—

A layer of **Superficial Fascia**, which is very thick and coarse, large lobules of fat being contained in the meshes between the fibrous Septa.

III. Remove this layer of **Superficial Fascia**, carefully dissecting out the several branches of nerves and arteries which ramify in its substance, and expose—

1. **Deep Fascia** covering the surface of the **Gluteus Maximus** ;

2. **Anal Fascia** covering a portion of the **Levator Ani** ;

3. The terminal distribution of some of the branches of the **Posterior divisions of the Upper Three Sacral nerves** ;

4. **Branches of the Lateral Sacral arteries** accompanying these branches of the **Sacral nerves** ;

5. **Branches of the Small Sciatic nerve** ;

6. **Branches of the Perforating Cutaneous nerve** from the **Fourth Sacral nerve** ;

7. **Terminal branches of the Posterior divisions of the Fifth Sacral and Coccygeal nerves** ;

8. **Terminal branches of the Anterior divisions of the Fifth Sacral and Coccygeal nerves** ;

9. **Branches of the Sciatic artery** ;

10. **Branches of the Inferior Hæmorrhoidal nerve**.

IV. Trace the undivided **Posterior branches of the Fifth Sacral and Coccygeal nerves** to their exit from the lower aperture of the **Sacral canal** by removing a fascial **Aponeurosis** which roofs it in.

Remove the Deep Fascia from the surface of the Gluteus Maximus which is exposed, and remove the subjacent muscle from the area of the dissection, dividing its origin from the Great Sciatic ligament, and from the side of the Sacrum and Coccyx. In doing this you divide branches of the Sciatic artery and branches of the Inferior Gluteal nerve. You expose—

1. Portion of the **Great Sciatic ligament** ;
2. A further portion of the **Levator Ani**, and
3. The anterior part of the **Coccygeus** covered by **Anal Fascia**.
4. The **Anterior branch** of the **Fifth Sacral nerve** emerging from the Sacral canal, and perforating the Great and Small Sacro-sciatic ligaments and Coccygeus opposite the junction of the Sacrum with the first vertebra of the Coccyx.
5. The **Anterior branch** of the **Coccygeal nerve** emerging from the lower aperture of the Spinal canal, running down on the posterior surface of the lower end of the Sacrum, and on the back of the first piece of the Coccyx. It perforates the Sacro-sciatic ligaments and subjacent Coccygeus muscle by the side of the first piece of the Coccyx immediately below its transverse process.
6. A **Second Coccygeal nerve** occasionally ;
7. The conjoined **Anterior branches** of the **Fifth Sacral** and **Coccygeal nerves** are seen, not uncommonly, to emerge from the Coccygeus and Sacro-sciatic ligaments by the margin of the Coccyx. Their distribution on the back of the Coccyx has been already exposed.
8. The **Filum Terminale** is seen to emerge from the lower aperture of the Spinal canal, to run down

on the back of the lower two pieces of the Sacrum, and to blend with the Periosteum on the posterior surface of the first piece of the Coccyx.

V. Snip through the base of the transverse process of the First Coccygeal Vertebra, and remove it from the subjacent Periosteum. Cut through the Periosteum torn from the anterior surface of the transverse process, and expose—

The **Anterior branch** of the **Fifth Sacral nerve** as it descends upon its anterior surface within the Pelvic cavity.

VI. Having done this cut through the Sacro-sciatic ligaments, Coccygeus and Levator Ani attached to the margin of the Coccyx in the intervals of the points of entrance and exit of the anterior branches of the last Sacral and Coccygeal nerves, and expose—

The **distribution of these branches in the Pelvis.** The **Anterior branch** of the **Fifth Sacral nerve** is seen to be joined in the Pelvis by a **descending branch** of the **Fourth Sacral nerve**, to descend upon the Coccygeus, and to be joined lower down by the **Anterior branch** of the **Coccygeal nerve**. The combined nerves give filaments to the Coccygeus, and very frequently return to the back of the Coccyx, being distributed as already observed.

A DISSECTION TO EXPOSE THE OBTURATOR NERVE COMPLETELY.

POSITION.—The body supine, the thigh of the side dissected to be abducted, rotated out, and slightly flexed.

I. The **Abdomen** is to be opened by a crucial incision, and the lower flap on the side to be dissected removed by an incision parallel with and a little above the line of Poupart's ligament, then inwards to the median line, the other flaps to be turned outwards and fixed.

In the flap cut away there will be removed the following structures in layers, lettered A, B, C, D, E, F, G, H, K.¹

A. Skin.

B. **Superficial fascia** in two layers at the lower part.

Superficial Pudic artery and vein passing inwards over the cord.

Superficial Epigastric artery and vein passing upwards over the centre of Poupart's ligament.

Superficial Circumflex Iliac artery and vein, sending twigs over the lower part of the Abdomen at the outer part.

Ilio-hypogastric nerve, cutaneous about one inch above the external Abdominal ring.

Ilio-inguinal nerve coming through the ring.

Lymphatic glands along Poupart's ligament.

One or two of the **Lower Anterior Cutaneous nerves** accompanied by twigs of the **Deep Epigastric artery**.

¹ Paragraphs A, B, C, D, E, F, G, H, K have been printed in smaller type because the anatomy of this flap is not an essential part of the dissection: nevertheless it is a good plan to mention every structure divided or removed which is visible to the naked eye.

The **Spermatic cord** emerging at the ring.

C. The aponeurosis of the **External Oblique muscle**, with the following parts :—

External ring above and outside the spine of the Pubes.

Intercolumnar fibres crossing transversely the lower fibres of the aponeurosis, which run downwards and inwards,

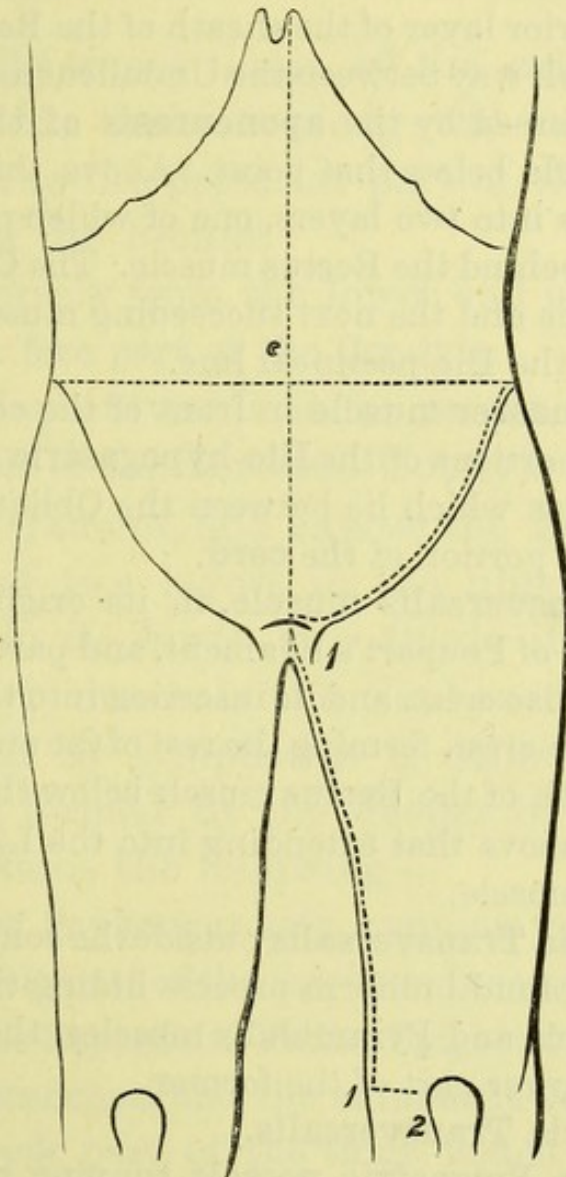


Fig. 24.

and the fascia of the same name covering in the ring.

The **Triangular fascia** belongs to this muscle, but is seen in the next layer as it runs up beneath the inner pillar of the ring to the Linea Alba.

The **Anterior layer of the sheath of the Rectus muscle** is

seen more internally, consisting partly of the aponeurosis of the External Oblique muscle and partly of the next.

- D. The **Internal Oblique muscle** in its origin from about the outer half of Poupart's ligament and part of its origin from the crest of the Ilium, and in its insertion to the Linea Alba and crest of the Pubes forming the rest of the anterior layer of the sheath of the Rectus muscle as far as half way between the Umbilicus and Pubic crest, but reinforced by the **aponeurosis of the Transversalis muscle** below that point. Above this the aponeurosis splits into two layers, one of which passes in front and one behind the Rectus muscle. The **Conjoined tendon** of this and the next succeeding muscle at its insertion into the Ilio-pectineal line.

The **Cremaster muscle** in front of the cord.

Further portions of the **Ilio-hypogastric and Ilio-inguinal nerves** which lie between the Oblique muscles.

A further portion of the **cord**.

- E. The **Transversalis muscle**, in its origin from the outer third of Poupart's ligament, and part of its origin from the Iliac crest, and its insertion into the Linea Alba and Pubic crest, forming the rest of the anterior layer of the sheath of the Rectus muscle below the point indicated, but above that extending into the Linea Alba behind the muscle.

The **Fascia Transversalis** outside the conjoined tendon and its Infundibuliform process hiding the internal ring.

- F. The Rectus and Pyramidalis muscles, the latter in front of the lower part of the former.

- G. The **Fascia Transversalis**.

The **Deep Epigastric vessels** running up internal to the ring and behind the Rectus muscle, giving off and receiving the Pubic branches.

The **Deep Circumflex Iliac vessels**, running out parallel with Poupart's ligament.

The **obliterated Hypogastric artery**, corresponding in its position with the Epigastric, but on its deep surface.

- H. **Subperitoneal fat**.

- K. **Peritoneum**.

II. NOW DISSECT THE PART OF THE NERVE IN THE THIGH.

POSITION.—Flex the hip and knee joints, and abduct and rotate outward the thigh.

SKIN INCISIONS.

1. From the inner limit of the crest of the Pubes make an incision along the inner part of the Thigh to the posterior part of the **Internal Condyle** of the Femur.
2. Transversely from the lower end of the preceding to the **fore part of the Condyle**.

Reflect the flap outwards as far as the line joining the Anterior portion of the Internal Condyle with the centre of Poupert's Ligament, and expose the **Superficial Fascia**, which consists of two layers in the upper portion of the dissection, but in its lower two thirds it forms a single layer.¹ Above it conceals the Saphenous opening, and being perforated by lymphatics is called the **Cribriform Fascia**, which is formed by the deeper of the two layers. This fascia contains the following—

1. The **Long Saphenous vein**, running up along the inner and front part of the thigh, and receiving at the upper part the **Superficial Pudic, Epigastric, and Circumflex Iliac** branches, and the **cutaneous veins** of the inner and back part of the thigh which have previously united into one trunk, which enters the Saphenous vein below the opening of that name. Sometimes the veins of the outer part of the thigh unite in a similar manner and join it near the same spot.

¹ The student will find this structure described more fully in succeeding dissections.

2. The cut ends of the **Superficial Pudic, Epigastric, and Circumflex Iliac** arteries, and cutaneous twigs of the **Anastomotica Magna** artery in front and on the inner aspect of the Inner Condyle.
3. The branch of the **Ilio-inguinal nerve** to the skin of the Upper and Inner Third of the Thigh.
4. The **Internal Cutaneous nerve** perforating the **Fascia Lata** at the junction of the Lower with the Middle Third. **Smaller twigs** of the nerve are cutaneous above this along the **Saphenous vein**, one or two about the **Saphenous opening**, and another half-way down.
5. The **Genito-crural nerve**.
6. Numerous **Lymphatic vessels** in the front of the Thigh, and a chain of glands along the course of the **Internal Saphena Vein**.

III. Remove the **Superficial Fascia** with the structures contained in it, and expose—

1. **Poupart's and Gimbernat's ligaments**.
2. The **Fascia Lata** of the Thigh, presenting at the upper and inner part, immediately below **Poupart's ligament**, the **Saphenous opening**.

IV. Clear these structures away and expose—

1. The **Pectineus muscle** at the upper and outer part of the dissection.
2. If this muscle be separated from the next succeeding, the **Adductor Brevis muscle** is seen in small part, and lying upon it the three muscular branches of the **Superficial division of the Obturator nerve**.
3. The **Adductor Longus muscle** below and internal to the preceding. A branch of the **Superficial division of the Obturator nerve** is found lying along its inner border.

4. The **Gracilis** muscle most internal, descending from the Ramus of the Pubes, and flattened against the Adductor muscles.
5. The lower fleshy fibres and tendon of the **Adductor Magnus** muscle, below the Adductor Longus muscle.
6. The **Sartorius** muscle crossing obliquely the lower part of the Thigh, first lying in front and external and then internal to the Adductor Longus and Magnus muscles.
7. A small piece of the **Vastus Internus** muscle, external to the Adductor Longus and Magnus, and overlapped below by the Sartorius muscle.
8. The funnel-shaped **Crural** sheath of the **Femoral** vessels is seen above, reaching for two inches below Poupart's ligament. This may now be cleaned away at once, when the **Femoral** artery with the vein internal to it may be seen until they are covered by the Sartorius muscle. The **Inferior External Pudic** branch is seen passing inwards over the Pectineus, and the ending of the **Deep** branch of the **Anastomotica Magna** artery lying upon the tendon of the Adductor Magnus muscle. The vein corresponding to the Inferior Pudic branch is cut inasmuch as it joins the Saphenous.
9. The **Deep Crural** arch which has already been removed as it crossed the upper part of the Femoral sheath.

V.

- a. Divide the **Sartorius** muscle where it appears beneath the skin at the upper and outer part of the dissection, and reflect it downwards from the subjacent structures, dividing, in doing so, the patellar branch of the Internal Saphenous nerve as it perforates it. The branch of the Obturator

nerve which runs along the Adductor Longus muscle may be traced to its junction with the inner branch of the Internal Cutaneous nerve, which is exposed. The Aponeurotic covering of Hunter's Canal is seen, and may be at once removed. When this is done, the Femoral artery may be traced to the opening in the Adductor Magnus muscle. Immediately above this point it is seen to give off the Anastomotica Magna branch. The Femoral vein is found lying behind the artery in the upper part of Hunter's Canal, but below it gets somewhat to its outer side. The Long Saphenous nerve is also seen lying externally to the artery above, but lower down crossing it superficially to the inner side. A communication between the inner branch of the Internal Cutaneous and the Long Saphenous nerves may be traced, thus completing the Obturator Plexus.

- b. Detach the Pectineus muscle from its origin and pull it outwards, dividing its nerves from the Anterior Crural, and occasionally from the Superficial division of the Obturator nerve and from the Accessory Obturator nerve.
- c. Cut through the Adductor Longus muscle at its origin and pull it outwards, taking care of its branch from the Superficial division of the Obturator nerve.

There will now be exposed—

1. The upper part of the Obturator Externus muscle below the horizontal Ramus of the Pubes.
2. The Adductor Brevis muscle, below this and overlapping it internally.

3. A further portion of the **Adductor Magnus** muscle still lower.
4. The tendon of the **Psoas** with the **Iliacus** muscle passing to the **Lesser Trochanter** of the **Femur** above the upper border of the **Adductor Brevis** muscle.
5. The portion of the **Profunda Femoris** artery which lies beneath the **Adductor Longus**. Its **Perforating branches** are seen, the first and second piercing the **Adductor Brevis** muscle, and the third and the terminal branches of the artery the **Adductor Magnus** muscle.
6. Branches of the **Internal Circumflex** artery, superficial to the **Adductor Brevis** muscle.
7. The corresponding **veins** with the preceding arteries.
8. The **Superficial division** of the **Obturator nerve**, running down over the **Obturator Externus** and **Adductor Brevis** muscles, and sending branches to the **Hip Joint**, **Gracilis**, **Adductor Longus** and **Brevis** muscles, occasionally to the **Pectineus** and to the **Obturator Plexus**, all of which are now displayed. A terminal twig to the **Femoral** artery breaks up into small branches which surround that vessel.
9. The **Accessory Obturator nerve**, if present, as it descends along the inner margin of the **Psoas** tendon and divides into a branch which joins the superficial division of the **Obturator nerve**, a branch to the **Hip Joint**, and a branch which enters the under surface of the **Pectineus** muscle.

VI. Divide the **Adductor Brevis** muscle at its insertion. Remove the branches of the **Internal Circumflex** vessels which are superficial to it. Pull the muscle inwards and fix it. In this way the branches of the **Superficial** division may be preserved. There will be exposed—

1. A further portion of the **Adductor Magnus** muscle.
2. Other branches of the **Internal Circumflex** vessels beneath the **Adductor Brevis** muscle.
3. The **Deep** division of the **Obturator** nerve whose distribution may now be traced. It emerges from the **Anterior** portion of the **Obturator Externus**. It gives off branches to the **Obturator Externus** and **Adductor Magnus** muscles, and to the **Adductor Brevis** muscle, when it is not supplied by the **Superficial** division. A branch may be traced through the fibres of the **Adductor Magnus** muscle to the **Popliteal** artery by removing a portion of the muscle and by pulling the tendons of the **Semi-membranosus**, **Semi-tendinosus**, and **Gracilis** muscles backwards. It may in this way be followed to the **Posterior** ligament of the knee-joint. While it is in relation with the **Popliteal** artery, it sends filaments to that vessel.

VII. THE ABDOMINAL PORTION OF THE DISSECTION SHOULD NOW BE RESUMED.

- a. The **Great Omentum** and **Transverse Colon** should be placed upon the ribs, and the **Intestines** turned to the opposite side of the body to that on which the dissection is being made.
- b. Clear away the **Peritoneum** from the brim of the **Pelvis**, and from the **Posterior** wall of the **Abdomen** from the median line to the **Right** or **Left Colon**, as the case may be.
- c. Divide the junction of the **Rectum** with the **Sigmoid Flexure**, or the **Ileum** with the **Cæcum**, according to the side dissected, and ligature the cut ends of the gut.

- d. Cut through the cord at the Internal Abdominal ring if this has not already been done.

There will be exposed—

1. The **Psoas Magnus** muscle and **Fascia**, and the **Psoas Parvus** if present.
2. The **Iliacus** muscle in the **Venter Ilii**, covered by its fascia.
3. The **Common Iliac** artery and its **Bifurcation**, the upper part of the **Internal**, and the whole of the **External Iliac** branches, the latter running along the brim of the Pelvis, and becoming continuous with the **Femoral**.
4. The corresponding veins.
5. The **Sigmoid** branch of the **Inferior Mesenteric** artery or the **Ileo-colic** of the **Superior Mesenteric**, with their corresponding veins, **Sympathetic** and **Lymphatic Plexuses**, according to the side dissected, as they cross the **Psoas** muscle.
6. The **Ureter** and **Spermatic** vessels descending over the **Psoas** muscle.
7. The branches of the **Genito-crural** nerve lying upon the **Psoas** muscle and **Internal Iliac** artery, and traceable below to the **Femoral** artery and the **Internal** ring.
8. The **Anterior Crural** nerve between the **Psoas** and **Iliacus**.
9. The **External Cutaneous** nerve crossing the **Iliacus** muscle.

VIII.

- a. Remove the **Sigmoid** or **Ileo-colic** vessels, as the case may be.
- b. Cut through the **External Iliac** vessels at their origins from the **Common Iliac** artery and

vein, reflect them downwards, and displace the Common and Internal Iliac vessels and their branches inwards from the side of the true Pelvis.

- c. Separate the **Pelvic fascia** from the brim and upper part of the Pelvic wall. The **Obturator nerve**, **artery**, and **vein**, in this order, from above downwards, will be found running along the outer wall of the Pelvis to the opening in the Thyroid foramen ; parallel and internal to its upper part will be found the large **Lumbo-sacral cord** passing from the **Fourth and Fifth Lumbar nerves**, and between this and the Obturator the **Ilio-lumbar artery and vein**.
- d. Pull the **Ureter** inwards, and the **Spermatic vessels** outwards from off the **Psoas**, and remove the **Psoas Fascia** and the inner part of this muscle from its origin as far upwards as the lower border of the **Second Lumbar vertebra** and downwards to the Pelvic brim.
- e. Remove a piece of the **horizontal Ramus of the Pubes**, an inch and a half in length, where it forms the upper boundary of the Thyroid foramen, opening in this way the canal at the upper part of this foramen, dividing and removing a portion of the **Obturator Externus muscle and membrane**.

There will be exposed—

1. The bodies of the **Third, Fourth, and Fifth Lumbar vertebræ**, and the intervertebral discs between the **Fifth Lumbar vertebra** and the **Sacrum**, and between the **Second and Third Lumbar vertebræ**.
2. The **Iliacus muscle** covered by its fascia.
3. The remaining portion of the **Psoas muscle**.

4. The **Aorta**, giving off the Second, Third, and Fourth Lumbar arteries.
5. The **Renal vessels** of the side dissected, at the upper part of the dissection.
6. Further portions of the **Ilio-lumbar vessels**.
7. The **gangliated cord of the Sympathetic nerve** lying on the sides of the bodies of the vertebræ, and the communications between the ganglia and Lumbar nerves.
8. The **Genito-crural nerve** arising from the Second Lumbar nerve, and breaking up in the substance of the Psoas into the Genital branch, which ran upon or near the External Iliac artery and the Crural branch which descended upon the Psoas.
9. The **External Cutaneous nerve**, arising from the loop formed by the Second and Third Lumbar nerves, and perforating the outer border of the Psoas.
10. The origin of the **Anterior Crural nerve**, from the Second, Third, and Fourth Lumbar nerves, from which point it runs obliquely downwards and outwards through the substance of the Psoas muscle. While it lies between the Iliacus and Psoas it supplies branches to the former muscle.
11. The communication between the Fourth and Fifth Lumbar nerves, and the commencement of the **Lumbo-sacral cord**.
12. The origin, course, and distribution of the **Obturator nerve**. It arises from the Second, Third, and Fourth Lumbar nerves, and runs nearly vertically through the Psoas muscle, emerging from its inner border at the brim of the true Pelvis. It courses along the side of the true Pelvis, above the Obturator vessels to the upper part of the Obturator

foramen, in which it has been seen to divide into an Anterior and a Posterior branch.

13. The **Accessory Obturator nerve**, if present, arising from the Obturator nerve, or separately from the same Lumbar nerves. It descends along the inner border of the Psoas muscle, and over the Pubic bone.

TO EXPOSE THE OBTURATOR EXTERNUS MUSCLE FROM THE FRONT OF THE LEG.

POSITION.—Place the body in the supine position. Define the Anterior Superior Spine of the Ilium, the Spine of the Pubes, and the level of the Tuber Ischii.

I. SKIN INCISIONS.

1. Make a vertical incision from the Spine of the Pubes to the level of the lowest portion of the Tuber Ischii.
2. Make a vertical incision from the Anterior Superior Spine to the same level.
3. Connect the upper extremities of Nos. 1 and 2, and
4. The lower extremities of these two incisions.

II. Remove the skin and expose—

The **Superficial layer of Superficial Fascia**, containing a variable amount of fat, and continuous with the **Superficial Fascia** of the abdomen over Poupart's ligament.

III. Remove the Superficial layer of Superficial Fascia and expose—

1. The **Deep layer of Superficial Fascia**, which is thin and

membranous, and is attached to Poupart's ligament and to the margin of the saphenous opening, the portion closing in this aperture forming the **Cribriform Fascia**.

Between the two layers of Superficial Fascia,

2. A vertical chain of **Inguinal glands**, receiving from below the **Lymphatics** which accompany the Internal Saphenous vein and its branches, and occasionally the Lymphatics from the Penis and Scrotum. Lymphatics pass from this chain of glands to perforate the Cribriform Fascia.
3. **Branches of the Ilio-inguinal nerve** ;
4. **Crural branch of the Genito-crural nerve** ;
5. **Branches of Internal Cutaneous nerve** ;
6. The **Superficial External Pudic**,
7. The **Superficial Epigastric**, and
8. The **Superficial Circumflex Iliac arteries and veins** ;
9. The **Internal Saphena vein**, receiving branches from the inner aspect of the thigh, and the **Superficial Epigastric, Superficial Circumflex Iliac, and Superficial External Pudic veins**.

IV. Remove the Deep layer of Superficial Fascia, and the structures superficial to it, and expose—

1. The **Fascia Lata**, consisting of two portions above.

The **Iliac portion** attached to Poupart's ligament, and forming internally where it bounds the saphenous opening above, the **Falciform border**.

The **Pubic portion** attached to the Ilio-pectineal line, passing outwards behind the Femoral sheath, and being continuons below by a free margin with the Iliac portion.

2. The **External Cutaneous nerve**, as it emerges from a tunnel in the substance of the Fascia Lata a varying

distance below the Anterior Superior Spine of the Ilium.

3. The two branches of the **Middle Cutaneous nerve**, as they perforate the Deep fascia about two or three inches below Poupart's ligament.
4. The **Deep External Pudic artery** perforating the Deep fascia just below and external to the Spine of the Pubes.

V. Remove the **Fascia Lata** within the limits of the dissection, dividing the attachments of deep processes, and expose from within outwards—

1. The **Adductor Longus** ;
2. The **Pectineus** ;
3. The **Psoas** ;
4. The **Iliacus** ;
5. The **Sartorius** ;
6. The **Rectus** ;
7. The Anterior margin of the **Tensor Vaginæ Femoris** ;
8. The **Crural sheath** enclosing the Femoral vessels and extending on them as a conical covering for two inches below Poupart's ligament. Below this the Crural sheath blends with the sheath of the vessels.

VI. Remove the Anterior layer of the Crural sheath, and expose from within outwards—

1. The **Crural canal** containing a **Lymphatic gland**, and closed above by the **Septum Crurale** ;
2. The **Canal** for the **Common Femoral vein**, and
3. That for the **Common Femoral artery** ;
4. Separating these three canals are two vertical fibrous septa.

VII. Remove the Crural sheath, its septa, and its prolongation, and expose—

1. The **Common Femoral artery** lying upon the tendon of the Psoas, and dividing into
2. The **Superficial Femoral**, which lies upon the Pectineus, separated from it by the Profunda artery and vein and the Femoral vein, and then disappears beneath the Sartorius, and into the
3. **Profunda Femoris artery**, which passes outwards, then downwards, inwards, and backwards, behind the Superficial Femoral artery, lying upon the Pectineus, and disappearing beneath the Adductor Longus. It gives off
4. The **External Circumflex**, which is seen to pass outwards between the branches of the Anterior Crural nerve, and to disappear beneath the Rectus, and the
5. **Internal Circumflex Iliac artery**, which passes backwards between the Psoas and Pectineus muscles.
6. The **Deep External Pudic artery** as it comes off from the Common Femoral and runs upwards and inwards upon the Pectineus muscle.
7. The origins of the **Superficial External Pudic**, **Superficial Epigastric**, and **Superficial Circumflex Iliac** arteries from the Common Femoral.
8. The **Common Femoral vein** lying internal to the Common Femoral artery in the interval between the Pectineus and Psoas muscles, and receiving the
9. **Profunda Femoris veins**, the
10. **Superficial Femoral vein**, which below lies behind the Superficial Femoral artery, and the
11. **Internal Saphena vein**, whose divided extremity still remains.
12. The **Anterior Crural nerve**, in the interval between the Psoas and Iliacus muscles, dividing into a

Superficial and a Deep set of branches, the **Superficial** comprising

13. The two branches of the **Middle Cutaneous** nerves, which perforate the **Sartorius** ;
14. The **Internal Cutaneous** nerve, which gives off, high up, a small branch, which we have already seen accompanying the **Internal Saphena** vein, and below crosses in front of the **Superficial Femoral** artery at the apex of **Scarpa's** triangle ;
15. The two branches to the **Pectineus**, which pass inwards beneath the **Common Femoral** artery and vein, and enter the **Anterior** surface of the **Pectineus** muscle ;
16. The nerve to the **Vastus Externus**, and
17. The nerve to the **Rectus**, both of which disappear beneath the **Sartorius** ;
18. The nerve to the **Vastus Internus**, and
19. The **Internal Saphenous** nerve, both of which come into a close external relationship with the **Superficial Femoral** artery, as it passes beneath the **Sartorius**.

VIII. Remove the **Sartorius** within the limits of the dissection, dividing the branches of the **Middle Cutaneous** nerve in its substance.

Cut the **Tensor Vaginæ Femoris** from its attachment to the crest of the **Ilium**, and displace it outwards, dividing the branch of the **Superior Gluteal** nerve, which emerges from between the **Gluteus Medius** **Minimus**, and enters its under surface.

Remove the process of **Fascia Lata** which runs beneath this muscle.

Cut through the **Rectus** above at the junction of the straight with the reflected head, and below along the line of

the lower transverse incision, dividing also the nerve to that muscle, and expose—

1. The upper portion of the **Vastus Internus**, and overlapping it
2. The free inner margin of the **Vastus Externus**, whose aponeurotic outer surface is also seen.
3. The **External Circumflex** vessels dividing into three sets of branches, an **ascending**, which runs upwards and outwards over the front of the capsule of the hip joint, portion of which is exposed, and anastomoses with branches of the Gluteal artery, which emerge from between the **Gluteus Medius** and **Minimus**; a **transverse set**, which passes outwards and disappears beneath the **Vastus Externus**, and a **descending branch**, which accompanies the nerve to the **Vastus Externus** as it descends along the free inner margin of that muscle.
4. Further portions of the **Femoral** and **Profunda** vessels, **Internal Saphenous** nerve, and the nerves to the **Vastus Internus**, **Psoas** and **Pectineus** muscles.

IX. Cut through the **Common Femoral** vessels beneath **Poupart's** ligament, the termination of the **External Circumflex** vessels along the limits of the dissection, the **Internal Circumflex** vessels as they pass back between the **Psoas** and **Pectineus**, and the **Profunda Femoris** vessels as they disappear beneath the **Adductor Longus**. Remove all the vessels from the dissection.

Cut through the **Anterior Crural** nerve beneath **Poupart's** ligament, the branches to the **Pectineus** as they enter that muscle, the **Internal Saphenous** and the **Internal Cutaneous** nerves, the nerves to the **Vastus Internus** and **Vastus Externus** muscles at the lower limit

of the dissection, and remove the Anterior Crural nerve and its branches from the area of the dissection.

Remove the Pectineus muscle, dividing the branches of the Obturator nerve or of the Accessory Obturator nerve which enter its under surface, should one or both those nerves be present, and expose—

1. The **Triangular Surface** of the **Pubes**, from which the Pectineus arises ;
2. The inner portion of the **Capsule** of the **Hip joint** and the **Pubo-femoral ligament** ;
3. The upper portion of the **Adductor Brevis** ;
4. Portion of the **Obturator Externus** muscle ;
5. The **Quadratus Femoris** in the angular interval between the Adductor Brevis and Obturator Externus ;
6. The **Internal Circumflex vessels**, as they pass backwards between the Obturator Externus and Adductor Brevis, giving branches to the **Adductor muscles** ;
7. The **Accessory Obturator nerve**, as it passes over the Pubes and gives a branch to the **Hip joint**, which perforates its Capsule ;
8. The three branches of the **Superficial division** of the **Obturator nerve**, lying on the Obturator Externus and upon the Adductor Brevis, and disappearing beneath the Adductor Longus ; also its branch to the **Hip joint** and an occasional communication with the **Accessory Obturator nerve** ;
9. The **Deep or Posterior portion** of the **Obturator nerve**, as it emerges from the fibres of the Obturator Externus, and disappears behind the Adductor Brevis ;
10. **Small branches** of the **Obturator artery**.

X. Cut through the Psoas and Iliacus muscles beneath

Poupart's ligament, and remove the Iliacus Minor or Iliocapsularis from its origin from the Anterior Inferior Spine and Capsule of the Hip joint, and from its insertion into the triangular interval in front of the Lesser Trochanter. Divide the tendon of the Psoas as near its insertion as possible, and expose—

1. The **Anterior aspect** of the **Capsule** of the joint and the **Ilio-femoral ligament**;
2. The **Bursa** beneath the **Psoas** and **Iliacus**;
3. The **Foramen** or **Aperture**, which is frequently present in the front of the Capsule, and by means of which the Bursa beneath the Ilio-psoas muscle frequently communicates with the cavity of the hip joint;
4. A further portion of the **Obturator Externus**.

XI. Remove that portion of the Adductor Longus exposed in the dissection, dividing branches of the Obturator nerve, which supply it, and exposing—

1. Further portions of the **Obturator Externus**, and
2. **Adductor Brevis** muscles;
3. The upper portion of the **Adductor Magnus** muscle, and
4. Further portions of those branches of the **Superficial division** of the **Obturator nerve**, which supply the Gracilis and Adductor Brevis.

XII. Remove that portion of the Adductor Brevis seen in this dissection, dividing the branch of the Obturator nerve that supplies it, and the branch to the Gracilis, and expose—

1. The upper portion of the **Adductor Magnus**, overlapping
2. The **Obturator Externus** muscle, of which a considerable portion is now seen in this dissection;
3. The **Deep division** of the **Obturator nerve** lying on the Adductor Magnus;

4. The two terminal branches of the **Internal Circumflex vessels**, the ascending branch accompanying the tendon of the **Obturator Externus** below the neck of the Femur, and the transverse branch passing backwards between the **Quadratus Femoris** and **Adductor Magnus**.

XIII. Remove that portion of the **Adductor Magnus** which is situated above the level of the **Tuber Ischii**, and which overlaps the **Obturator Externus** muscle, cutting through the deep division of the **Obturator nerve**, as it emerges from the **Obturator Externus**, and expose—

1. The whole of the origin of the **Obturator Externus**.
2. The inner aspect of the **Gracilis**.

XIV. Cut through the neck of the Femur at its junction with the shaft by means of a **Hey's** or a key-hole saw, dividing the lower limits of insertion of the **Ilio-trochanteric** and **Ilio-femoral ligaments**.

Cut through the **Anterior**, upper and lower portions of the **Capsule** along the **Acetabular margin**.

Grasp the neck of the Femur with lion forceps, and, displacing the head of the Femur from the **Acetabulum**, cut through the **Ligamentum Teres** with the small vessel that runs in its substance. Dislocating the bone still further, cut through the remainder of the **Capsule** of the joint, dividing branches of the **Sciatic artery**, **Superior Gluteal nerve and artery** and **Great Sciatic nerve**, and expose—

1. The tendon of the **Obturator Externus**, as it runs outwards and upwards behind the neck of the Femur, and then as it lies somewhat above the level of the neck at its insertion into the **Digital Fossa**.
2. A further portion of the **Quadratus Femoris** behind and below the tendon of the **Obturator Externus**, and above this muscle

3. The **Obturator Internus** and **Gemelli**, and still higher up
4. The **Pyriformis** muscle.

The **Obturator Externus** muscle has now been exposed in the whole of its extent.

A DISSECTION TO EXPOSE THE GLUTEUS MINIMUS MUSCLE.

POSITION.—The body lying on its face, the Abdomen and the Pelvis raised on blocks, and the legs hanging down to a moderate degree.

I. SKIN INCISIONS.

1. From the **Anterior-superior Iliac spine** to the **Anterior-inferior angle** of the **Great Trochanter**.
2. From the upper end of No. 1, along the **Anterior** two thirds of the **Iliac crest**, and then downwards and backwards to a point three inches below the **Posterior superior Iliac spine**.

Reflect the flap downwards, and expose the loose **Fascia** of the buttock, containing—

1. The **Posterior branches** of the **External Cutaneous nerve** most anteriorly.
2. The **Lateral Cutaneous branch**¹ of the **Last Dorsal nerve**, crossing the **Iliac crest**, and running as far as the **Trochanter Major**.
3. The **Iliac branch** of the **Ilio-hypogastric nerve**¹ posterior to this.
4. The **External branches** of the **Posterior Primary**

¹ These nerves bear an inverse ratio to one another as to their size.

divisions of the first three Lumbar nerves, crossing the Iliac crest still further inwards.

5. The **External branches of the Posterior Primary divisions of the first two Sacral nerves**,—the upper one near the Iliac crest, the lower giving filaments over the lower part of the surface exposed.
6. **Ascending branches of the Small Sciatic nerve.**

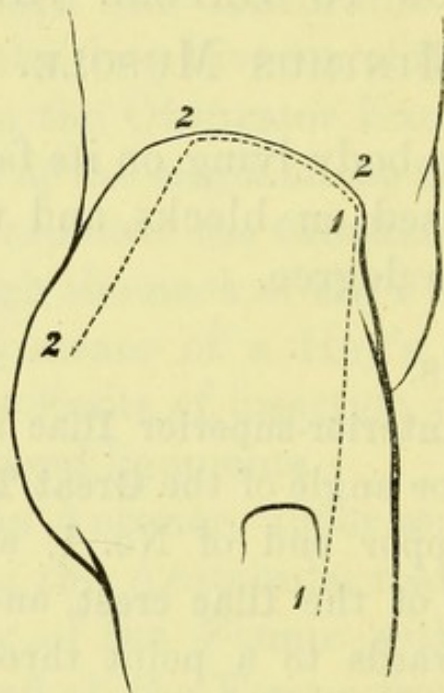


Fig. 25.

II. Remove the preceding structures and expose—

The **Fascia Lata** forming anteriorly the **Ilio-tibial band**, above covering the **Gluteus Medius** muscle, and dividing below to enclose the **Gluteus Maximus** muscle.

III. Remove the **Fascia** covering the **Gluteus Maximus** and **Medius** muscles, and then take away that portion of the **Gluteus Maximus** exposed in the dissection, with the subjacent layer of deep fascia.

In doing this you divide—

1. The **Superficial branch of the Gluteal artery**,

2. The Inferior Gluteal branches of the Sacral Plexus, with arteries from the Sciatic.
3. The Bursæ over the Great Trochanter, and over the Aponeurotic outer surface of the Vastus Externus muscle.

IV. Divide the **Tensor Vaginæ Femoris** muscle at its origin, and hook it well forwards, cutting the branches supplying it from the Gluteal artery and the Superior Gluteal nerve.

There will now be exposed, from above downwards—

1. The **Gluteus Medius** muscle.
2. The **Pyriformis** muscle.
3. The **Gemellus Superior** muscle.
4. The **Obturator Internus** muscle.
5. The **Gemellus Inferior** muscle, at its insertion.
6. The tendon of the **Obturator Externus**.
7. Part of the insertion of the **Quadratus Femoris**.
8. The **Vastus Externus** muscle on the outer side.
9. The **Trochanter Major**, below and externally.
10. Beneath the **Tensor Vaginæ** muscle is an **Anastomosis** between the Gluteal, External Circumflex, and Internal Circumflex Iliac Arteries.
11. Branches of the **Internal Circumflex** or **Obturator** artery accompanying the tendon of the **Obturator Externus**.
12. The divided **Superficial** branch of the Gluteal artery and vein above the **Pyriformis** muscle.

V. Cut through the **Gluteus Medius** at its origin and insertion and remove it. Branches of the Gluteal artery and nerve will be divided in taking away this muscle.

1. The **Gluteus Minimus** muscle will now be exposed, and lying upon it the **Superior Gluteal** nerve and the

Deep Branch of the artery of the same name. Each divides into an **upper** and **lower** branch, the former of which runs along the upper margin of the muscle, the latter crosses it, passing downwards and outwards. The nerve to supply the *Tensor Vaginæ Femoris* muscle, and the artery to join in the *Anastomosis* previously mentioned are derived from the lower divisions.

2. The insertion of the tendon of the **Pyriformis** into the upper border of the **Great Trochanter**. This muscle is closely united before its insertion to
3. The subjacent tendon of the **Obturator Internus** and **Inferior Gemellus**. The insertion of these muscles into the depression on the fore part of the inner surface of the **Great Trochanter** is also seen.
4. The insertion of the tendon of the **Obturator Externus** into the bottom of the **Digital Fossa**.
5. **Bursæ**, which are occasionally present between the **Pyriformis** and **Gluteus Medius**, and between the **Pyriformis** and the tendon of the **Obturator Internus**; also one between the **Great Trochanter** and the **Gluteus Medius**.

VI. Hook the upper border of the **Pyriformis** downwards, and expose—

1. The lowest portion of the **Gluteus Minimus**;
2. A portion of the surface of bone below the lower limit of the **Gluteus Minimus**, and
3. Of the capsule of the hip-joint.
4. The outer part of the **Sacral Plexus**, and the origin of the **Superior Gluteal** nerve from it.
5. The **Gluteal** artery emerging from the **Pelvic** cavity above the **Sacral Plexus**, and deriving a fascial sheath from the **Pelvic Fascia**.

TO EXPOSE THE QUADRATUS FEMORIS FROM BEHIND.

POSITION.—Place the body in the prone position, and introduce a block beneath the Pelvis.

Define the highest and lowest limits of the Tuber Ischii and the Great Trochanter.

I. SKIN INCISIONS.

1. Make a transverse incision from the highest portion of the Tuber Ischii outwards to the Great Trochanter.
2. Make another transverse incision outwards from the lowest point of the Tuber Ischii to a point vertically below the outer extremity of No. 1.
3. Join by a vertical incision the outer extremities of No. 1.

II. Reflect the skin backwards and inwards, and expose—

1. **Superficial Fascia**, containing
2. A variable amount of fat ;
3. **Gluteal Cutaneous** branches of the **Small Sciatic** nerve ;
4. **Branches** of the **External Cutaneous** nerve ;
5. **Branches** of the **External divisions** of the **Posterior** branches of the **First, Second, and Third Sacral** nerves ;
6. Perhaps some terminal fibres of the **Lateral Cutaneous** branch of the **Last Dorsal** nerve ;
7. The **Iliac** branch of the **Ilio-Hypogastric** nerve ;
8. The **External** branches of the **Posterior divisions** of the upper three **Lumbar** nerves.
9. The **Perforating Cutaneous** nerve.
10. **Branches** of the **Sciatic** and **Gluteal** arteries.

III. Remove the Superficial Fascia and contained structures, and expose—

Fascia Lata.

IV. Remove this Deep Fascia, and expose—

1. The lower portion of the **Gluteus Maximus**.

V. Remove the portion of this muscle exposed, with the branches of the Inferior Gluteal nerve, and of the Gluteal and Sciatic vessels which supply it, and expose and remove the layer of Deep Fascia which lies beneath the excised area of muscle. There is now exposed—

1. The **Tuber Ischii**, covered by
2. A **Bursa**, and having attached to its inner margin
3. The **Great Sacro-Sciatic Ligament**.
4. Descending from their origins from the **Tuber Ischii** portions of the **Semi-membranosus**,
5. **Semi-tendinosus**,
6. **Biceps**, and
7. **Adductor Magnus** muscles.
8. In the interval between the **Tuber Ischii** and **Great Trochanter**, and from above downwards the **Obturator Internus**,
9. **Inferior Gemellus**,
10. **Oburator Externus**, **Quadratus Femoris**, and
11. The upper margin of the **Adductor Magnus** muscles.
12. Externally a portion of the Aponeurotic outer surface of the **Vastus Externus**, covered by
13. A **Bursa**, and above that
14. The **Great Trochanter**, covered also by
15. A **Bursa**.
16. The **Great** and
17. **Small Sciatic** nerves, lying upon the **Obturator Internus**, **Gemellus Inferior**, **Quadratus Femoris**, and **Adductor Magnus** ;

18. The **Sciatic artery**, and the **Comes Nervi Ischiadici** accompanying the Great Sciatic nerve ;
19. A branch of the **Internal Circumflex artery** accompanying the tendon of the **Obturator Externus** ;
20. The termination of the **Internal Circumflex artery** appearing externally from between the **Quadratus Femoris** and **Adductor Magnus** ;
21. The nerve to the **Quadratus Femoris** emerging from beneath the **Inferior Gemellus**, and passing under the **Quadratus Femoris** close to the **Tuber Ischii**.

VI. Remove those portions of the hamstring muscles which lie superficial to the **Quadratus Femoris**, together with the nerves and arteries enumerated which cross its posterior surface vertically, and the posterior surface of the muscle is completely exposed.

TO EXPOSE THE FLEXOR LONGUS HALLUCIS.

POSITION.—Place the body in the prone position, fixing the foot at right angles to the leg.

I. SKIN INCISIONS.

1. Make a median incision along the calf from the level of the junction of the lower two-thirds with the upper third of the **Fibula** downwards to the level of the extremities of the **Malleoli**.
2. Make two transverse incisions inwards from the upper and lower extremities of the vertical incision, the upper reaching to the inner margin of the **Tibia**, and the lowest the tip of the **Internal Malleolus**.

3. Make two transverse incisions outwards from the same points, the upper reaching to the outer surface of the leg, and the lower to the tip of the External Malleolus.

II. Reflect the skin and expose—

1. **Superficial Fascia**, containing
2. The **Internal Saphenous nerve, vein, and lymphatics**, which pass obliquely forwards out of the dissection ;
3. The **External or Short Saphenous vein**, which perforates the Deep Fascia midway between the knee and foot, and, being joined by
4. The **Peroneal Communicating nerve**, accompanies
5. The **External Saphena vein and lymphatics** behind the outer ankle ;
6. Small branches of the **Small Sciatic** running with the **External Saphena vein** above, and joining the **External Saphenous nerve** ;
7. The **Superficial branch** of the **Anastomotica artery**, as it accompanies the **Internal Saphenous nerve**.

III. Remove the **Superficial Fascia** and the structures contained in it, and expose—

Deep Fascia attached to the inner margin of the **Tibia**, and continuous below with the **Internal Annular ligament**. On the outer aspect of the leg the attachment of the **Intermuscular Septum** between the **Soleus** and **Flexor Longus Hallucis** behind, and the **Peronei** in front is seen. Still lower the **Deep Fascia** is attached to the posterior margin of the **Triangular Subcutaneous surface** on the **Fibula**, and is continuous with the **External Annular ligament**.

IV. Remove the **Deep Fascia** from the surface of the

Gastrocnemius, Soleus, and Tendo-Achilles, whose margins are readily defined, and expose—

1. The **Gastrocnemius** with the **Tendo-Achilles**, and
2. The **Soleus**, as it projects beyond the margins of the Gastrocnemius and Tendo-Achilles.

V. Cut transversely through the Gastrocnemius at the upper limit of the dissection, dividing in so doing sural branches of the Internal Popliteal nerve and the Popliteal vessels. Turn the muscle downwards, and expose—

The **Soleus**, whose Aponeurotic Posterior aspect blends below with the Tendo-Achilles.

VI. Cut transversely through the Soleus at the upper limit of the dissection. Divide the origin of the Soleus from the inner margin of the Tibia, cut away the Soleus from its origin from the Intermuscular Septum which separates it from the Peronei muscles and turn the Soleus and Tendo-Achilles downwards. In doing this branches of the Posterior Tibial nerve and vessels which perforate the under surface of the Soleus are divided. You now expose—

A layer of **Deep Fascia**, which extends between the Tibia and Fibula, and is continuous below with the Annular ligaments.

VII. Remove this layer of Deep Fascia, and expose—

1. The **Flexor Longus Digitorum**, as it arises from the Tibia and ends in a tendon which is separated from the Tibia and Inner Malleolus by the tendon of the Tibialis Posticus.
2. The **Tibialis Posticus**, as it arises from both bones and interosseous membrane, being overlapped considerably by the common fascial origin of the Flexor Longus Digitorum and the Flexor Longus Hallucis ;
3. The **Flexor Longus Hallucis**, arising from the lower

two thirds of the Tibia, from the intermuscular Septum between it and the Peronei, and from the common Fascial origin already mentioned. Its tendon grooves the back of the lower end of the Tibia, and like the two last mentioned tendons, is enclosed in a Synovial sheath which extends for a variable distance upwards above the Malleolus ;

4. The **Posterior Tibial artery**, lying on the Tibialis Posticus, Flexor Longus Digitorum, Tibia and Ankle-joint. It gives off the **Peroneal artery**, which runs downwards and outwards upon the Tibialis Posticus and disappears beneath the Flexor Longus Hallucis. Its termination emerges from beneath the lower margin of the Flexor Longus Hallucis.

It gives off **muscular branches** to the Tibialis Posticus, the Flexor Longus Digitorum, and to the Soleus and the **communicating artery**, which runs outwards beneath the tendon of the Flexor Longus Hallucis to join the Peroneal artery ;

5. The **Venæ Comites**, which accompany the Posterior Tibial artery and its branches ;

6. The **Posterior Tibial nerve**, lying above on the inner side of the Posterior Tibial artery, then crossing it superficially and running down on its outer side.

It gives off **muscular branches** to the three deep muscles and to the Soleus, the **nerve** to the **Flexor Longus Hallucis**, running with the Posterior Peroneal artery ; a **Calcaneo-Plantar branch**, which perforates the Annular ligament, and **Articular branches** to the **Ankle joint**.

VIII. Having now exposed the Flexor Longus Hallucis in the leg, in order to complete the dissection of the muscle, extend the foot so that the sole is well exposed.

IX. SKIN INCISIONS.

Continue the median incision in the calf downwards over the heel, and then forwards and inwards along the outer margin of the great toe to its extremity.

X. Reflect the flap of skin inwards to a line joining the Internal Malleolus with the extremity of the great toe, and expose—

The **Superficial Fascia**, which is thick and dense, and consists of lobules of fat enclosed in strong fibrous processes.

Running in this Fascia are branches—

1. Of the **Internal Saphena vein** and **Lymphatics**,
2. Of the **Internal Saphenous nerve**,
3. Of the **Internal Plantar artery**,
4. Of the **Internal Plantar nerve**,
5. Of the **Musculo-cutaneous nerve**,
6. Of the **Digital branch** of the **First Dorsal Interosseous artery**, and
7. Of the **Plantar digital branch** of the **Dorsalis Pedis artery**.
8. The **termination** of the **Calcaneo-plantar Cutaneous branch** of the **Posterior Tibial nerve**.

XI. Remove the **Superficial Fascia** and contained structures, and expose—

1. The **Internal Annular ligament** attached to the **Internal Malleolus**, and to the inner portion of the tuberosity of the **Os Calcis**. It is continuous with
2. The **inner division** of the **Plantar Fascia**, the whole of which is exposed.
3. A portion of the **middle division** of the **Plantar Fascia**, and its process to the great toe, with the inner part of

4. The **Superficial Transverse** ligament of the toes ;

5. The **Vaginal sheath** of the great toe.

XII. Remove the **Internal Annular** ligament, and divide the inner division of the **Plantar Fascia** and **Abductor Hallucis** at their attachment to the tuberosity of the **Os Calcis** and to the **Internal Intermuscular Septum**. Reflect them to the inner limit of the dissection and expose—

1. The **insertion** of the **Tibialis Anticus** into the **Internal Cuneiform** and base of the first metatarsal bone ;

2. The **tendon** of the **Tibialis Posticus**, as it passes obliquely downwards and forwards upon the **Internal Lateral** ligament of the ankle-joint, then upon the **Superior Internal Calcaneo-scaphoid ligament**,¹ and is inserted into the **Tubercle** of the **Scaphoid** and **Internal Cuneiform** bones ;

3. The **tendon** of the **Flexor Longus Digitorum**, as it lies upon the inner aspect of the **Sustentaculum Tali**, and passes forwards and outwards to perforate the **Internal Intermuscular Septum** ;

4. Portion of the fleshy **inner head** of the **Accessorius**, as it arises from the concave inner surface of the **Os Calcis** between the tuberosity and the lesser process ;

5. The **Flexor Brevis Hallucis**, as it passes obliquely inwards beneath the tendon of the **Flexor Longus Hallucis**, to be inserted by two heads into the sides of the base of the first phalanx ;

6. The **tendon** of the **Flexor Longus Hallucis**, grooving the posterior margin of the **Astragalus**, and the under surface of the **Sustentaculum Tali**, then

¹ This tendon is incorrectly described in text-books of anatomy as lying upon the **Inferior Calcaneo-scaphoid** ligament. See **Guy's Hospital Reports**, 1886-1887, "The Anatomy, Causation, and Physiology of the Deformities that Develop in Young Life," p. 252.

passing obliquely inwards beneath the tendon of the Flexor Longus Digitorum, to which it is connected by a tendinous slip, and lying upon the Flexor Brevis Hallucis till it passes into the Vaginal sheath ;

7. The **Posterior Tibial artery** (with its *Venæ Comites*) dividing on a level of a line joining the tip of the Internal Malleolus and Heel into the **Internal** and **External Plantar** arteries.
8. The **Internal Plantar** is smaller than the external. At first it lies under cover of the Abductor Hallucis, but beyond that muscle it ends by joining the Digital artery on the inner side of the great toe. In its course it gives off many **muscular** and **cutaneous branches**. Very rarely small branches of the Internal Plantar accompany the Digital branches of the Internal Plantar nerve.
9. The **External Plantar** passes obliquely forwards and outwards out of the dissection, crossing the tendon of the Flexor Longus Pollicis and the inner head of the Accessorius. It lies superficial to both Plantar nerves.
10. The **Posterior Tibial nerve**, dividing on the same level as the artery into the Internal and External Plantar nerves.
11. The **Internal Plantar nerve**, the larger of the two, accompanies the Internal Plantar artery, and in this dissection gives off branches to the Abductor Hallucis and Flexor Brevis Digitorum ; **Cutaneous branches** ; the **First Digital branch**, which supplies the inner side of the great toe, and the **Second Digital**, which gives off the branch to the outer side of the great toe.

12. The **External Plantar nerve** passes obliquely forwards and outwards out of the dissection.

XIII. Remove the External Plantar vessels, and the Internal and External Plantar nerves, where they lie superficial to the Flexor Longus Hallucis, and divide the tendon of the Flexor Longus Digitorum where it crosses it.

Divide the vaginal sheath longitudinally.

The **Flexor Longus Hallucis** is now exposed in the whole of its extent.

A DISSECTION TO EXPOSE THE PROFUNDA FEMORIS ARTERY.

POSITION.—Place the body in the supine position. Flex, abduct, and rotate outwards the leg on which the dissection is to be performed, and flex the knee also.

I. SKIN INCISIONS.

1. Make an incision from the centre of Poupart's ligament along the upper two thirds of a line joining the centre of Poupart's ligament with the Adductor Tubercle on the inner condyle of the Femur.
2. At the extremities of this incision make two transverse incisions inwards and outwards, each one and a quarter inches long.

II. Reflect the skin inwards and outwards, and expose—

1. The **Superficial Fascia**, which in the lower portion of the dissection forms a single layer, but in the upper four or five inches of the area exposed it is readily divisible into two layers.

2. The **Superficial layer** is thick, and contains a variable amount of fat. It is freely continuous over Poupart's ligament with a similar layer of Superficial Fascia of the abdomen.
3. The **Deep layer** is thin and membranous, containing no fat. It is attached above to Poupart's ligament, and to the margins of the saphenous opening covering in that aperture. This portion of the Deep layer is called Cribriform Fascia, as it is perforated by the Internal Saphenous vein, Lymphatics, and arteries.

Between the two layers of Superficial Fascia are—

4. The **vertical set of the Superficial Inguinal Lymphatic glands**. These surround the upper end of the Internal Saphena vein for two or three inches of its course, and they receive the Lymphatic vessels that ascend in company with that vein. Their efferent vessels perforate the Cribriform Fascia.
5. The **Internal Saphena vein**, which is exposed in the whole length of the dissection. It receives a large **Anterior branch** from the front of the thigh, and a large **Posterior branch** from the inner aspect of the thigh.

Above it receives the **Superficial Circumflex Iliac, Superficial Epigastric**, and the **External Pudic veins**.

6. The **Superficial Circumflex Iliac artery**, running upwards and outwards ;
7. The **Superficial Epigastric artery**, running directly upwards ;
8. The **Superficial External Pudic artery**, running inwards and upwards ;

9. **Small branches of arteries to the Lymphatic glands and Superficial Fascia ;**
10. **The two branches of the Middle Cutaneous nerve,** emerging from the Deep Fascia, about four or five inches below Poupart's ligament. Communicating with this nerve are branches of
11. **The Crural branch of the Genito-crural nerve.** This nerve emerges from the Deep Fascia immediately below Poupart's ligament, and just outside the Femoral artery.
12. **Cutaneous branches of the Internal Cutaneous nerve** perforate the Deep Fascia in the upper part of the dissection. These branches usually accompany the Internal Saphena vein. The highest of these emerges from the Fascia near the Saphenous opening, and the others lower down. The anterior branch of the Internal Cutaneous perforates the Deep Fascia in the lowest portion of the dissection.

III. Remove the Superficial Fascia and contained structures, together with the Cribriform Fascia, and expose—

1. **The Fascia Lata,** enclosing between its Iliac and Pubic portions the Saphenous opening.
2. A portion of the **Crural sheath** is exposed in that opening.

IV. Remove the Deep Fascia within the limits of the dissection, detaching the Iliac portion from Poupart's ligament and from the anterior surface of the Crural sheath, and the Pubic portion from the Ilio-pectineal line and Gimbernath's ligament, dividing its prolongation outwards behind the sheath of the Femoral vessels. You expose from above downwards portions of the following muscles—

1. The Psoas ;
2. The Iliacus ;
3. The Sartorius ;
4. The Rectus ;
5. The Pectineus ;
6. The Adductor Longus ;
7. The Adductor Magnus ;
8. The Gracilis ;
9. The Vastus Internus. Also
10. The Crural sheath, enclosing the Common Femoral vessels, and continuous below with the sheath of the Superficial Femoral vessels.
11. The Deep-seated Inguinal glands, surrounding the Femoral artery and vein, and receiving the Deep Lymphatics of the limb, and some of the Efferent Lymphatics from the Superficial Inguinal glands. Their efferent vessels proceed upwards with the Femoral vessels, many perforating the Crural sheath to enter the Crural canal.
12. The Superficial Femoral artery, running downwards upon the Psoas and Pectineus muscles, and disappearing beneath the Sartorius. It is separated from the Pectineus by the Femoral vein and Profunda artery and vein.
13. The Profunda Femoris artery, arising from the outer and back part of the Common Femoral artery, about one inch and a half below Poupart's ligament.
It runs at first outwards, lying upon the Iliacus muscle, and then inwards, backwards, and downwards, behind the Superficial Femoral vessels.
It gives off from its convexity—
14. The External Circumflex artery, which runs outwards beneath the Sartorius and Rectus muscles and be-

tween the branches of the Anterior Crural nerve ; and from its inner side it gives off

15. The **Internal Circumflex** artery, which passes backwards between the Psoas and Pectineus.
16. The **Deep External Pudic** artery, emerging from the Crural sheath, and running inwards upon the Pectineus muscle.
17. The **Superficial Epigastric, Circumflex Iliac, and External Pudic** arteries emerging from the anterior surface of the Crural sheath.
18. The **Femoral vein** emerging from the Crural sheath, above lying internal to the Femoral artery, and below lying beneath it. It receives above
19. The **Deep Femoral vein**, which lies superficial to its artery.
20. The **Anterior Crural** nerve, lying in the groove between the Psoas and the Iliacus muscles. It is flattened out, and divided roughly into two parts, one being muscular, and the other chiefly cutaneous in distribution. It gives off
21. A branch to the **Femoral artery**, which is distributed to the upper portion of that vessel ;
22. The **Two Middle Cutaneous** branches, which perforate the Sartorius ;
23. The **Internal Cutaneous** nerve, which gives off the **Small Cutaneous** branches we have already observed running with the Internal Saphena vein, and crosses obliquely the upper part of the Superficial Femoral artery. It divides on the inner side of that vessel into two branches, the **Anterior** and **Posterior**. The Anterior we have already seen to perforate the Deep Fascia. The Posterior descends along the posterior margin of the Sartorius.

24. **Two** branches from the Anterior Crural run inwards beneath the Crural sheath to supply the **Pectineus** muscle.
25. The nerve to the **Vastus Internus** and
26. The **Internal Saphenous** nerve descend on the outer side of the Femoral vessels.
27. The nerve to the **Vastus Externus** and
28. The nerve to the **Rectus** run downwards and outwards.
29. A branch of the **Genito-crural** nerve, which is exposed immediately to the outside of the Crural sheath, descends on the **Femoral** artery.

V. Remove the Sartorius muscle where it forms a boundary of Hunter's canal, and expose—

1. The **Aponeurosis**, which extends from the **Vastus Internus** to the anterior surface of the **Adductor Longus** and **Magnus** muscles, blending with the Aponeurosis of the **Adductor Magnus** below.
2. The **Superficial** branches of the **Anastomotica Magna** vessels emerging from this sheath at its lowest part, and accompanied by the **Internal Saphenous** nerve.
3. A branch of the **Superficial** division of the **Obturator** nerve emerging from beneath the lower margin of the **Adductor Longus**, and communicating with a branch of the **Internal Saphenous**, and with the **Internal Cutaneous** nerves forming the **Obturator Plexus**.

VI. Remove the sheath of Hunter's canal, and expose—

1. The **Femoral** artery, giving off the **Anastomotica Magna**, which divides into its **Superficial** and **Deep** branches.
2. The **Femoral** vein, which lies behind the **Femoral**

artery in the upper part of the canal, and outside it in the lower part.

3. The **Internal Saphena nerve**, lying above to the outer side of the Femoral artery, but lower down, crossing the artery superficially, and then lying internal to it.
4. A further portion of the **nerve to the Vastus Internus**, lying outside the Internal Saphenous nerve in the upper part of Hunter's canal.

VII. Remove the Superficial Femoral vessels and the Internal Cutaneous and Internal Saphenous nerves, cut through the Adductor Longus at its insertion into the Femur, reflect this muscle inwards, and expose—

1. The subjacent portions of the **Adductor Brevis** and
2. The **Adductor Magnus** muscles.
3. **Branches of the Superficial division of the Obturator nerve.**
4. The **Profunda** artery, lying upon the Pectineus, Adductor Brevis and Adductor Magnus, the Profunda vein lying superficial to it.

VIII. Remove the Profunda vein and its branches, and The Profunda artery is fully exposed.

The three perforating branches vary much in size and in distribution. They are generally four in number, including the termination of the Profunda artery as the Fourth Perforating. They pass through small tendinous arches in the insertion of the Adductor Magnus close to the Femur.

The **First Perforating** passes backwards at the lower margin of the Pectineus, perforating the Adductor Brevis ;

The **Second Perforating** perforates the Adductor Brevis below the First ;

The **Third Perforating** perforates the Adductor Magnus below the Adductor Brevis ;

The **Fourth Perforating** perforates the Adductor Magnus at the junction of the Middle and Lower thirds of the Femur.

A DISSECTION TO EXPOSE THE POPLITEUS MUSCLE.

POSITION.—The leg lying on its anterior surface.

I. SKIN INCISIONS.

1. From the middle of the outer surface of the **external Condyle of the Femur** obliquely downwards and inwards across the back of the joint to the upper margin of the **inner Tuberosity of the Tibia** at the junction of its posterior and inner aspects.
2. From the outer end of (1) vertically downwards for one inch.
3. From the inner end of (1) vertically downwards along the upper third of the leg.

Reflect the flap downwards, and expose the **Superficial Fascia**, containing—

1. Branches of the **Internal Saphenous nerve** running backwards over the Tibia at its inner part.
2. The **Inner branch of the Internal Cutaneous nerve** posterior to this.
3. Branches of the **Small Sciatic nerve** perforating the deep Fascia over the Popliteal space, and the nerve itself coming through just below it.
4. Branches of the **External Popliteal nerve** supplying the skin at the outer part.

5. On the inner side a Cutaneous artery from the **Anastomotica Magna**.
6. The termination of the **Sciatic artery** with the Small Sciatic nerve, but reinforced here by a branch from the **Popliteal**.
7. A Cutaneous artery on the outer side from the **Popliteal**, which accompanies the External Popliteal nerve.

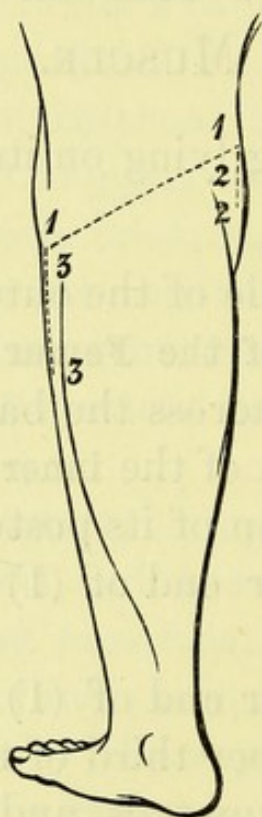


Fig. 26.

8. The **Internal Saphenous vein** along the inner border of the Tibia.
 9. The **External Saphenous vein** along the centre of the space, usually perforating the Fascia Lata opposite the centre of the articulation, but sometimes running up higher.
 10. **Lymphatics** accompanying the Saphena veins.
- II. Remove the preceding structures including the Internal Saphenous vein. This exposes the **Fascia Lata**,

strengthened over the Popliteal space by transverse fibres. This must be taken away, and then the following are exposed—

1. Above and externally, the tendon of the **Biceps muscle** inserted into the head of the Fibula and split by the **Long External Lateral ligament**.
2. Below, externally and internally, portions of the heads of the **Gastrocnemius muscle**, the greater part of the inner being visible.
3. A part of the origin of the **Plantaris muscle**, above the outer head of the Gastrocnemius muscle.
4. On the inner side and below, the tendons of the **Semi-membranosus** and the **Semi-tendinosus** muscles, the prolongation of the latter to the Fascia Lata is divided.
5. Along the median line, the **Internal Popliteal nerve** giving off branches below to both heads of the Gastrocnemius, to the Plantaris, Soleus and Popliteus muscles, the commencement of the **Inferior Internal Articular** nerve, and a Cutaneous branch running downwards to the integument of the calf, and called the **Ramus Communicans Tibialis**,¹ or sometimes the **External Saphenous nerve**.
6. The **External Popliteal nerve** following the tendon of the Biceps muscle. A slender branch of this, or of the Great Sciatic nerve, which comes off above the limits of the dissection, may be seen lying on its outer side; it gives off, above, the **Superior External Articular**, and below, the **Inferior External Articular** branches, the latter of which passes

¹ For simplicity's sake these branches should be called the Communicans Tibialis and Communicans Fibularis, and the nerve which results from their junction the External Saphenous.

beneath the outer head of the **Gastrocnemius** muscle. The **External Popliteal** nerve gives off the **Ramus Communicans Peronei** or **Fibularis**, which perforates the **Fascia Lata** considerably above the **Ramus Communicans Tibialis**.

7. The **Popliteal vein** beneath and internal to the **Internal Popliteal** nerve, receiving the **External Saphenous** branch, and other **veins** corresponding to the offsets of the artery to be next enumerated.
8. The **Popliteal artery** beneath and somewhat external to the vein, and almost hidden by it and by the **Internal Popliteal** nerve. **Branches** running up to the **Hamstring** muscles and others descending to the calf are seen (**Sural**), the **Superior External Articular** artery with the corresponding nerve, the **Inferior Internal** and **External Articular** offsets, with the nerves of the same name, and the **Azygos** branch. There is also a **Cutaneous** branch previously seen accompanying the **External Popliteal** nerve.
9. Four or five **Lymphatic** glands or fewer along the **Popliteal** vessels.

III.

- a. Hook the **Semi-tendinosus** and **Semi-membranosus** muscles inwards.
- b. Divide the **Gastrocnemius** muscle above and below, and remove it within the limits of the skin incisions. Its **nerves** and **arteries** are divided, and there are exposed—
 1. The **Popliteus** muscle upon the upper part of the posterior surface of the **Tibia**, covered by its **Special Fascia** derived from the tendon of the **Semi-membranosus** muscle.

2. The **Soleus** muscle below it.
3. The **Plantaris** muscle crossing it, passing over the vessels and the Internal nerve.

The **Plantaris** should be taken away, inasmuch as it crosses the next-mentioned structures.

4. More of the **Internal Popliteal** nerve and the branches more fully—viz., to the **Soleus** and **Popliteus** muscles. The nerve to this latter muscle is seen turning round its lower border. The **Inferior Internal Articular** branch running along the upper border of the **Popliteus** muscle, and beneath the expansion of the **Semi-membranosus** muscle with the corresponding artery.
5. A further portion of the **Popliteal** artery, and its branches enumerated above, more fully.
6. More of the **Popliteal** vein.

IV.

- a. Divide and remove the **Popliteal** artery and vein, and the **Internal Popliteal** nerve.
- b. Cut through the **Biceps** tendon. Open the **Capsule** of the joint by removing its outer part, and divide the **Long** and **Short External Lateral** ligaments.
- c. Remove the **Fascia** over the **Popliteus** muscle, and trace out the tendinous origin of the muscle from the external **Condyle**.

The whole of the **Popliteus** muscle is now exposed, and in addition—

1. The ligament of Winslow.
2. More of the **Inferior External Articular** nerve and vessels.

A DISSECTION TO EXPOSE THE PERONEAL ARTERY AND ITS BRANCHES.

POSITION.—The body supine, the leg rotated inwards and lying upon its inner aspect.

I. SKIN INCISIONS.

1. From the head of the **Fibula** vertically along the upper two thirds of the bone, and then obliquely forwards and downwards to the centre of the anterior surface of the **Ankle-joint**.

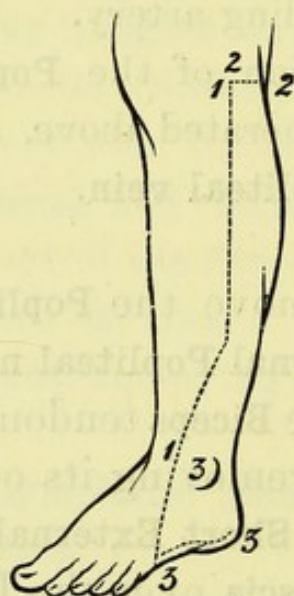


Fig. 27.

2. A transverse incision from the upper end of No. 1 backwards and inwards to the middle of the posterior surface of the leg.
3. A third from the lower end of No. 1 downwards and forwards to the base of the **Fifth Metatarsal bone**, then backwards along the outer border of the foot to the centre of the heel.

Reflect the flap backward to the middle line, and expose the **Superficial Fascia** and the following parts—

1. The **Triangular Subcutaneous** surface and the **External Malleolus** of the Fibula.
2. The **External Saphenous vein**, from its commencement at the outer side of the Dorsum of the foot, upwards behind the outer ankle and along the median line of the leg through the whole extent of the dissection. It is accompanied by Lymphatic vessels.
3. **Cutaneous arteries.**
 - a. From the **Popliteal** above and externally running with branches of the External Popliteal nerve.
 - b. From the **Sciatic** along the median line, with the Small Sciatic nerve, and reinforced by twigs from the **Popliteal artery**.
 - c. Numerous branches from the **Peroneal** along the anterior border of the Fibula, and others behind and below the External Malleolus.
 - d. From the **Anterior Tibial** artery in front of the Fibula, with branches of the Musculo-Cutaneous nerve; and the **External Malleolar** arterial branch in front of the ankle.
 - e. From the **Tarsal** and **Metatarsal** arteries.
 - f. Twigs from the **External Plantar** and **Tarsal arteries** at the outer side of the Dorsum of the foot.
4. Cutaneous branches of the **External Popliteal** nerve at the upper and outer part; one larger than the rest, called the **Ramus Communicans Fibularis**, running downwards and inwards to the middle of the calf.
5. The small portion of the **Communicans Tibialis** nerve seen superficial to the Deep Fascia, a little above the centre of the calf.
6. The nerve called **External Saphenous** resulting from the junction of the preceding, and accompanying

the vein of the same name behind the **External Malleolus** to the outer border of the foot.

7. The **Small Sciatic nerve** perforating the **Fascia Lata** just below the **Popliteal space**, running down the middle of the leg, and joining the **Communicantes Tibialis** and **Fibularis** nerves just at their union. Branches of this nerve are **Cutaneous** at the upper part.

8. In front of the **Fibula** branches of the **Musculo-cutaneous nerve**, which run to the fourth and fifth toes, and other filaments supplying the skin on the outer side of the **Dorsum** of the foot.

II. Remove the preceding structures and expose the **Deep Fascia**, which forms the upper and lower divisions of the **Anterior Annular ligament** in front of the ankle, and the **External Annular ligament** between the **Malleolus** and **Os Calcis**. The **External Annular ligament** is continuous below with the outer division of the **Plantar Fascia** whose outer limit is exposed in this dissection. In front of the exposed portion of the **Fibula** the fascia is very strong, and joined to the anterior border of the bone.

III. Remove the above Fascial structures and expose—

1. The **Gastrocnemius muscle** and **Tendo-Achillis**.
2. The outer border of the **Soleus muscle**, which projects beyond the outer margin of the preceding muscle.
3. The **Peroneus Longus muscle** lying on the **Fibula**, and covering in the **Peroneus Brevis muscle** except for the anterior part of the lower third.
4. The lower part of the **Peroneus Tertius muscle** in front of the **Fibula**.
5. The upper part of the origin of the **Extensor Brevis Digitorum muscle** on the **Dorsum** of the foot.
6. The **Anterior Peroneal artery and vein** in front of the

lower end of the Fibula, and on the outer side of the Dorsum of the foot.

7. The small portion of the lesser **Sciatic nerve**, which, in this dissection, lies beneath the **Fascia Lata**.
8. The greater part of the **Communicans Tibialis nerve**, which is beneath the **Deep Fascia**.
9. The **External Popliteal nerve** at the upper part of the head of the Fibula.

IV. Divide the outer head of the **Gastrocnemius** along the upper transverse skin incision, and then cut vertically through the belly of this muscle along the posterior limit of the dissection.

In doing this branches of the **Popliteal vessels** and of the **Internal Popliteal nerve** to the **Gastrocnemius** are divided. Reflect this portion of the **Gastrocnemius** downwards, and expose—

1. The **Soleus**, arising from the posterior surface of the head and upper third of the shaft of the Fibula, also from a tendinous arch between the Tibia and Fibula. Its **Aponeurotic Posterior surface** blends below in the **Tendo-Achilles** with the tendinous anterior surface of the **Gastrocnemius**.
2. Immediately above and outside the upper margin of the **Soleus**, a small portion of the **Popliteus muscle** covered by the fascial prolongation from the tendon of the **Semi-membranosus** may be exposed.

V. Remove the **Soleus** from its attachment to the Fibula, divide this muscle vertically along the middle of the calf, and reflect this portion of the **Soleus** with the **Gastrocnemius** and **Tendo-Achilles** downwards to the **Os Calcis**. In doing so the branch of the **Internal Popliteal nerve**

which enters its posterior surface and that of the Posterior Tibial nerve which enters its anterior surface are divided.

A **Layer of Deep Fascia** is exposed. It is continuous below with the External Annular ligament, and with the Deep Fascia of the leg.

VI. Remove this layer of Deep Fascia and the External Annular ligament, and expose—

1. The **Flexor Longus Hallucis**, arising from the lower two thirds of the postero-internal surface of the Fibula, from the Intermuscular Septum between it and the Peronei, and by an Aponeurotic origin common to it and the Flexor Longus Digitorum which covers in the Tibialis Posticus. The tendon of this muscle passes obliquely downwards and inwards out of the dissection.
2. A portion of the **Tibialis Posticus** above and internal to the **Flexor Longus Hallucis**.
3. The bifurcation of the **Popliteal vessels** at the lower border of the Popliteus muscle.
4. The **Anterior Tibial vessels** passing forward between the two heads of the Tibialis Posticus.
5. The **Posterior Tibial vessels** descending upon the Tibialis Posticus, and passing obliquely out of the dissection.
6. The **Posterior Tibial nerve** lying above internal to its artery but soon crossing it superficially.
7. The **Peroneal artery**, accompanied by the nerve to the **Flexor Longus Hallucis**, passing obliquely downwards and outwards upon the Tibialis Posticus, and disappearing beneath the Flexor Longus Hallucis. The termination of this artery, which

is called the **Posterior Peroneal**, appears at the lower margin of the muscle and runs down upon the outer aspect of the heel.

The **Anterior Peroneal** artery emerges from between the **Peroneus Tertius** and the **Fibula**, and running downwards it **Anastomoses** with branches of the **External Malleolar**, **Tarsal**, and **Posterior Peroneal** arteries.

8. The tendons of the **Peroneal** muscles, descending behind the **Malleolus** in the same synovial sheath. Lower down as the tendons occupy separate fibrous sheaths, the synovial tube is prolonged separately around each.

VII. Trace down the **Peroneal** artery in the substance of the **Flexor Longus Pollicis** muscle, dividing the muscle obliquely and pulling its lower end downwards and inwards. The artery is contained in a fibrous canal between the origins of the **Flexor Longus Hallucis** and the **Tibialis Posticus**. The **Nutrient** and **Muscular** branches are exposed, together with the **Communicating** artery which passes inwards in front of the tendon of the **Flexor Longus Hallucis**.

The **Peroneal** artery divides opposite the lower end of the **Interosseous** space into **Posterior Peroneal** which passes downwards over the **Inferior Tibio-Fibular** articulation, and into the **Anterior Peroneal** which passes forwards below the **Interosseous Membrane**.

Cut through the **Peroneus Longus** and **Brevis** muscles, and turn the ends upwards and downwards from the lower fourth of the **Fibula**.

Saw through the **Fibula** at the junction of the lower fourth with the upper three fourths, and again two inches lower down, above the external **Malleolus**. Remove this

piece of bone by dividing the attached fibres of the **Tibialis Posticus** and **Peroneus Tertius** muscles and the **Interosseous** and **Inferior Interosseous** ligaments. The **Peroneal** artery may now be followed in its whole course. Below, it is seen lying on the **Posterior Tibio-Fibular** ligament, and receiving the communicating branch from the **Posterior Tibial** artery, which may come over or under the Tendon of the **Flexor Longus Pollicis** muscle. The artery may be traced down behind the **External Malleolus** to its **Anastomoses** with twigs of the **Tarsal** and **External Plantar** arteries. The **Anterior Peroneal** branch may be followed forwards between the **Tibia** and **Fibula**, and then around the front of the outer ankle to its **Anastomoses** with the **External Malleolar** and **Tarsal** arteries.

TO EXPOSE THE PERONEUS LONGUS IN ITS WHOLE EXTENT.

POSITION.—The subject lying in the supine position, flex the hip and knee, and adduct the thigh so that you can conveniently work upon the outer aspect of the leg and foot.

Define the head of the **Fibula**, the tip of the **External Malleolus**, and the projecting posterior extremity of the **Fifth Metatarsal** bone.

I. SKIN INCISIONS.

1. Make a vertical incision from the anterior margin of the head of the **Fibula** to the tip of the **External Malleolus**; and

2. Join the tip of the External Malleolus with the extremity of the Fifth Metatarsal bone.
3. Make three transverse incisions an inch long backwards from the upper and lower extremities of No. 1, and from the lower extremity of No. 2.

II. Reflect the skin backwards for an inch, and expose—

1. **Superficial Fascia**, containing
2. **Cutaneous branches** of the External Popliteal nerve above, and
3. The **External Saphenous nerve, vein, and Lymphatics** below ;
4. **Cutaneous branches** of arteries, which will be enumerated at a later stage of the dissection.

III. Remove these structures, and expose—

1. **Deep Fascia**, strengthened above by the
2. **Fascial insertion** of the **Biceps**, and
3. Marked by **vertical lines**, indicating the **attachment of Intermuscular Septa** between the Peronei and the Extensor Longus Digitorum and Peroneus Tertius in front, and between the Peronei and the Soleus and Flexor Longus Hallucis behind ;
4. Lower down the Fascia is attached to the Posterior margin of the **Triangular Subcutaneous surface** on the Fibula, part of which is exposed where it is continuous with and forms the **External Annular Ligament** ;
5. Lower down the Deep Fascia serves to bind down the Peronei tendons to the outer surface of the Os Calcis, being attached to the Peroneal tubercle ;
6. And still lower it is continuous with the **Outer divi-**

sion of the **Plantar Fascia**, which is partly exposed.

IV. Remove the Deep Fascia and structures with which it is continuous within the limits of the dissection, cutting through the Fascial insertion of the Biceps, the Deep Fascia behind the attachment of the Intermuscular Septum between the Peronei and Extensor Longus Digitorum and Peroneus Tertius, and in front of the attachment of the Intermuscular Septum between the Peronei and Soleus and Flexor Longus Hallucis, and expose—

1. The **Peroneus Brevis**, as it arises from the lower two thirds of the outer surface of the Fibula, extending upwards in front of the Peroneus Longus, and from the Intermuscular Septum on either side. Its tendon passes downwards behind the External Malleolus, and then obliquely downwards and forwards, to be inserted into the projecting base of the Fifth Metatarsal bone.
2. The **Peroneus Longus**, arising from the outer surface of the tuberosity of the Tibia, from the head and upper two thirds of the outer surface of the Fibula, from the Fascia covering it, and from the Intermuscular Septa on either side of it. Its tendon runs down with that of the Peroneus Brevis, lying behind it. It then crosses the **Posterior and Middle Fasciculi** of the **External Lateral** ligament of the ankle joint, lying in the groove behind the Peroneal tubercle.

Leaving the surface of the Os Calcis, it comes into relation with the Cuboid bone, disappearing beneath the **Abductor Minimi Digiti**, whose outer margin is now exposed.

The tendons of the Peroneus Longus and Brevis are surrounded by a **common Synovial sheath** for two inches above the tip of the External Malleolus, but below the Malleolus the single sheath sends off a **separate prolongation** around each tendon.

3. The head of the Fibula, with the insertion of the Biceps tendon, the attachment of the **Long External Lateral ligament**, and the **Bursa** between the tendon and ligament are all seen in the upper portion of the dissection.
4. **Branches of the Peroneal, Anterior Peroneal, External Malleolar, Tarsal, Metatarsal, and External Plantar arteries** are seen on the outer aspect of the foot and ankle.
5. The **External Popliteal nerve** is exposed as it passes below the head of the Fibula, turning forwards around that bone beneath the Peroneus Longus. Emerging from the anterior surface of the Peroneus Longus at varying levels are seen the **Articular branch**, the **Anterior Tibial**, and the **Musculo-cutaneous nerves**.

V. To complete the dissection of the Peroneus Longus, place the foot so that the sole looks upwards.

Define the position of the articulation of the First Metatarsal and Internal Cuneiform bones.

VI. SKIN INCISIONS.

From the extremities of the oblique incisions on the outer aspect of the foot, make two parallel incisions inwards and forwards across the sole of the foot, the Posterior terminating at the lower and inner aspect of the Tarso-metatarsal articulation, and the Anterior at a point one inch in front of it.

Join the inner extremities of these incisions, remove the skin, and expose—

1. **Superficial Fascia**, thick and tough, and containing much fat. Ramifying in it branches of
2. The **Plantar vessels**, and
3. **Nerves** with
4. **Radicles of the Saphena veins**,
5. **Internal Saphenous nerve**, and
6. **Lymphatics**.

VII. Remove the **Superficial Fascia** and expose—

Portions of the **three divisions of the Plantar Fascia**.

VIII. Remove the portions of the outer and middle divisions of the **Plantar Fascia** which are exposed, dividing the attachments of the **Intermuscular Septa**, **Flexor Brevis Digitorum**, and **Abductor Minimi Digiti** to their under surfaces, and expose from without inwards—

1. The **Abductor Minimi Digiti**;
2. The **Abductor Quinti Metatarsi**, if it is present ;
3. The **Flexor Brevis Digitorum**;
4. The **Flexor Brevis Hallucis**, and lying upon it the tendon of the
5. **Flexor Longus Hallucis** ;
6. The **Superficial portion of the External Plantar nerve** ;
7. The **Internal Plantar nerve**, breaking up into its several **Digital branches**.
8. **Branches of the External Plantar vessels**, and
9. The **Internal Plantar vessels**, as they lie along the outer margin of the **Abductor Hallucis**.

IX. Remove the **Abductor Minimi Digiti**, the **Abductor Quinti Metatarsi**, and the **Flexor Brevis Digitorum** within the limits of the dissection, and expose—

1. The **Flexor Brevis Minimi Digiti**, as it arises from the base of the Fifth Metatarsal bone ;
2. Portion of the **Long Plantar ligament** ;
3. The tendon of the **Flexor Longus Digitorum** receiving the insertion of
4. The **Flexor Accessorius**, and then splitting up into its four divisions ;
5. The **Lumbricales** arising from the tendons of the **Flexor Longus Digitorum** ;
6. Portions of the **Interossei** muscles external to the **Flexor Accessorius** ;
7. The **Tendon** of the **Peroneus Longus**, with its Fibro-cartilaginous enlargement, as it grooves the under surface of the Cuboid, and disappears beneath the outer margin of the Long Plantar ligament ;
8. The **External Plantar vessels**, as they lie along the outer margin of the **Accessorius**, and then disappear beneath it and the **Flexor Longus Digitorum**. The outer two **Digital branches** are also exposed.

9. The **External Plantar nerve** accompanying the artery.

X. Remove the **Accessorius**, **Flexor Longus Digitorum**, and **Accessorius** muscles within the limits of the dissection, and expose—

1. A further portion of the **Long Plantar Ligament** ;
2. The **Adductor Hallucis** arising from that ligament, and from the bases of the Second, Third, and Fourth Metatarsal bones ;
3. The origin of the **Flexor Brevis Hallucis** ;
4. More of the **Interossei** muscles ;
5. The **External Plantar vessels** and **nerve**, as they disappear beneath the **Adductor Hallucis**.

XI. Hook inwards the inner division of the **Plantar Fascia** with the subjacent **Abductor Hallucis**, the tendon

of the Flexor Longus Hallucis, and the Internal Plantar vessels and nerve.

Divide the Long Plantar ligament and the origin of the Adductor Hallucis from it where they lie superficial to the tendon of the Peroneus Longus.

Remove also the Flexor Brevis Hallucis to a similar extent, and expose—

The **tendon of the Peroneus Longus**, as it crosses the sole obliquely and is inserted into the lower and back part of the First Metatarsal bone, and slightly into the neighbouring portion of the Internal Cuneiform and Second Metatarsal bones.

TO EXPOSE THE EXTERNAL PLANTAR ARTERY.

POSITION.—Place the foot so that the sole is directed upwards.

I. SKIN INCISIONS.

1. From the point of the heel make an incision to the tip of the Internal Malleolus.
2. Make an oblique incision across the sole of the foot, extending from its inner to its outer margin, and crossing the centre of the First and Fifth Metatarsal bones.
3. Make an incision from the point of the heel to the outer extremity of the oblique Plantar incision.

II. Reflect the skin inwards to a line stretching from the tip of the Internal Malleolus to the inner extremity of the oblique Plantar incision, and expose—

1. **Superficial Fascia**, which is very thick and tough, especially over the heel, and along the outer margin of the sole. It consists of masses of fat enclosed in dense fibrous trabeculæ. In it ramify
2. **Branches of the Internal Calcanean nerve**;
3. **Branches of the Internal and External Plantar nerves and arteries**;
4. **Branches of the Internal Saphenous nerve, vein, and lymphatics**;
5. **Branches of the External Saphena vein, nerve, and lymphatics**.
6. **Malleolar branches of the Anterior and Posterior Tibial arteries** in the thin layer of **Superficial Fascia** exposed on the inner aspect of the foot.

III. Remove the **Superficial Fascia** and contained structures, and expose—

1. The greater portion of the **outer division** of the **Plantar Fascia**, attached to the external tubercle of the **Os Calcis**. It presents a very thick band, which extends between the tubercle and the base of the **Fifth Metatarsal bone**.
2. The **central portion** of the **Plantar Fascia**. This is very dense indeed, and is attached posteriorly where it is narrow to the inner tubercle of the **Os Calcis**. It becomes broad in front. It is separated from the outer division of **Plantar Fascia**, and from the inner division, which will now be described, by **grooves**, indicating the position of the **Intermuscular Septa**.
3. The **inner portion** of the **Plantar Fascia**, which is much thinner than the other two divisions. It is continuous above with

4. The **Internal Annular ligament**, whose lower limit is exposed in the dissection.

5. **Branches of the Plantar nerves and arteries** already observed as they emerge from the Deep Fascia.

IV. Remove the middle division of Plantar Fascia within the limits of the dissection, dividing the attachments of the Intermuscular Septa to its margins, and the origin of the Flexor Brevis Digitorum from its deep surface.

Cut away the attachments of the inner division of the Plantar Fascia, the Abductor Pollicis, and Internal Annular ligament to the inner tubercle of the Os Calcis, and dividing the attachment of the Intermuscular Septum to this division of Plantar Fascia, reflect to the limit of the dissection the Abductor Minimi Digiti from the subjacent structures.

Remove the Flexor Brevis Digitorum within the limits of the dissection, and the Internal Intermuscular Septum. In removing these two muscles, branches of the Internal Plantar nerve are divided as they enter their deep surface. You expose—

1. The insertion of the **Tibialis Anticus** into the base of the **First Metatarsal** and the adjacent **Internal Cuneiform bones** ;

2. The tendon of the **Tibialis Posticus**, covered by its **Synovial sheath**, lying upon the **Deltoid ligament** and upon the **Superior Internal Calcaneo-Scaphoid ligament**. It is inserted into the tubercle of the **Scaphoid**, sending a prolongation onwards to the under surface of the **Internal Cuneiform bone**. It may also be seen to send a process downwards and backwards to the anterior margin of the **Sustentaculum Tali** ;

3. The **Flexor Longus Digitorum**, also surrounded by

Synovial membrane, lying on the inner aspect of the **Sustentaculum Tali**, passing obliquely forwards and outwards across the sole, and splitting into four separate tendons ;

4. The **Lumbricales** muscles arising from the tendons of the **Flexor Longus Digitorum**, the innermost one arising from the inner aspect of the tendon belonging to the second toe, and the others arising each from the adjacent sides of neighbouring tendons ;
5. The **Flexor Accessorius**, arising by two heads, the inner large fleshy head being attached to the inner surface of the **Os Calcis**, the outer narrow tendinous head emerging from beneath the **Abductor Minimi Digiti**. It is inserted into the upper surface and outer border of the tendon of the **Flexor Longus Digitorum** ;
6. The tendon of the **Flexor Longus Hallucis** sheathed above by **Synovial membrane**, as it grooves the under surface of the **Sustentaculum Tali**, and passes deeper than the tendon of the **Flexor Longus Digitorum**, to which it is connected by a process of tendon. It then rests upon the under surface of the **Flexor Brevis Hallucis** ;
7. That portion of the **Abductor Minimi Digiti** which arises from the under surface of the **Os Calcis**, in front of both tubercles ;
8. The **Flexor Brevis Minimi Digiti**, arising from the base of the Fifth Metatarsal bone ;
9. The **Interossei** muscles in the outer one or two spaces ;
10. The **Flexor Brevis Hallucis** ;
11. Portion of the **Long Plantar** ligament between the heads of the **Accessorius** ;

12. The **Posterior Tibial nerve**, lying internal to the tendon of the **Flexor Longus Pollicis**, and dividing at the margin of the dissection into the **Internal** and **External Plantar branches**;
13. The **Internal Plantar nerve**, the larger of the two branches, passes forwards in the sole where it lay under cover of the **Abductor Hallucis**. Reaching the interval between this muscle and the **Flexor Brevis Digitorum**, it divides into the **internal collateral branch to the great toe**, and into **three digital branches**. Only the origins of these digital nerves are exposed in this dissection.
14. The **External Plantar nerve** runs forwards and outwards upon the **Flexor Accessorius**, and reaching the outer margin of the **Flexor Brevis Digitorum**, divides into a **Superficial** and a **Deep branch**.
15. The **Superficial branch** divides into **two Digital branches**, one running on to the outer side of the little toe, and sending branches to the **Interosseous muscles of the Fourth Space** and to the **Flexor Brevis Minimi Digiti**, the other supplying the adjacent sides of the little and fourth toes.
16. The **Deep branch** passes inwards under cover of the tendons of the **Flexor Longus Digitorum** and of the **Accessorius**.

In the back part of the dissection the **External Plantar nerve** gives offsets to the **Flexor Accessorius**, and to the **Abductor Minimi Digiti** in its angular origin in front of the inner tubercle.

17. The **Posterior Tibial vessels** lying internal to the **Posterior Tibial nerve**, and dividing on the same level into **Internal** and **External Plantar branches**.
18. The **External Plantar vessels**, resting first upon the

Os Calcis. They then cross superficially the Internal and External Plantar nerves and the Accessorius muscle, and run forwards and outwards, lying external to the External Plantar nerve. They then turn inwards beneath the Flexor tendons accompanied by the deep branch of the External Plantar nerve.

The origins of the **Calcaneal, Muscular, Cutaneous,** and outer two **Digital** branches of the artery are now exposed.

19. The **Internal Plantar** vessels, which are much smaller than the external, accompanying the Internal Plantar nerve. It sometimes gives off twigs to accompany the **Digital** branches of the **Internal Plantar** nerve. It also supplies branches to the adjacent muscles and superficial fascia.

V. Cut through the tendons of the Flexor Longus Digitorum and the Accessorius muscle along the bases of the Metatarsal bones, and the four flexor tendons with the lumbricals along the anterior limit of the dissection, remove the excised portions of Accessorius, Flexor Longus Digitorum, and Lumbricales, and expose—

1. The **Adductor Pollicis**, arising from the bases of the Second, Third, and Fourth Metatarsal bones, and from the Long Plantar ligament ;
2. Portions of the **Interossei** muscles in the two outer spaces ;
3. The deep part of the **External Plantar** nerve, breaking up into branches, one to each of the two outer lumbrical muscles, to the several **Interossei** muscles, to the **Adductor Hallucis**, and branches which pass forwards out of the dissection to supply the **Transversus Pedis**.

VI. Remove the deep division of the external Plantar nerve, with the Adductor Hallucis, and hook forcibly inwards the Flexor Brevis Hallucis, exposing—

1. The Interossei muscles of the several spaces.
2. The attachment of the Long Plantar ligament to the Metatarsal bones.
3. The External Plantar artery with its veins running inwards and forwards upon the Metatarsal bones and Interossei muscles, and joining the termination of the Dorsalis Pedis artery at the back part of the first Interosseous space. The three inner Digital branches with the three perforating arteries are now exposed; also the Plantar Digital branch of the Dorsalis Pedis artery, as it runs forwards in the first space, giving off a branch to the inner side of the great toe.

The External Plantar artery has now been exposed in the whole of its extent.

TRANSVERSE SECTIONS OF THE UPPER AND LOWER EXTREMITIES.

While dissecting the extremities, the student may, with much advantage, render himself familiar with the relative positions of the several muscles, vessels, and nerves at various levels, by the study of the following diagrams of transverse sections, and by comparing them with the dissected subject.

Fig. 28 represents a transverse section through the thigh, immediately below the Trochanter Minor. In this as in the succeeding diagrams, the several muscles are indicated by their initial letters; the nerves by circular

or oval black areas, the arteries by circular and the veins by oval figures. For instance, in Fig. 28 the **Great Sciatic nerve**, and the **Sciatic artery** are seen to lie on the posterior aspect of the **Adductor Magnus**; the **Small Sciatic nerve** between the **Biceps**, the **Semi-Tendinosus**, and the **Gluteus Maximus**; the **Superficial division of the Ob-**

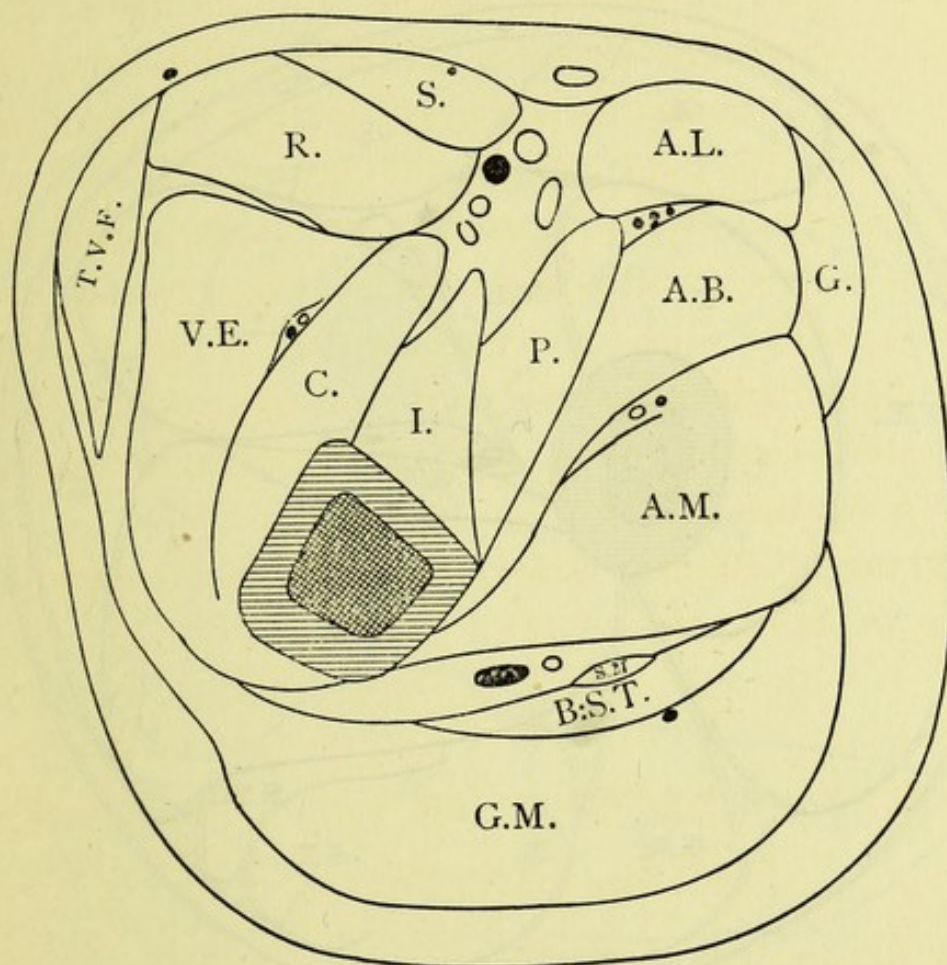


Fig. 28.

turator nerve between the **Adductor Longus** and **Brevis**; the **Deep division** on the anterior surface of the **Adductor Magnus**; the **nerve to the Vastus Externus**, accompanied by the **descending branch of the External Circumflex artery**, between the **Vastus Externus** and **Crureus**; and the **Femoral artery, vein, Anterior Crural nerve**, and the sub-jacent **Profunda artery and vein** in the interval between the **Sartorius, Rectus, Pectineus**, and **Adductor Longus**,

and the **Internal Saphena vein**, lying upon the **Deep Fascia**.

Fig. 29 represents the relationship of the several parts to one another in a transverse section through the thigh, about three inches below the lesser trochanter.

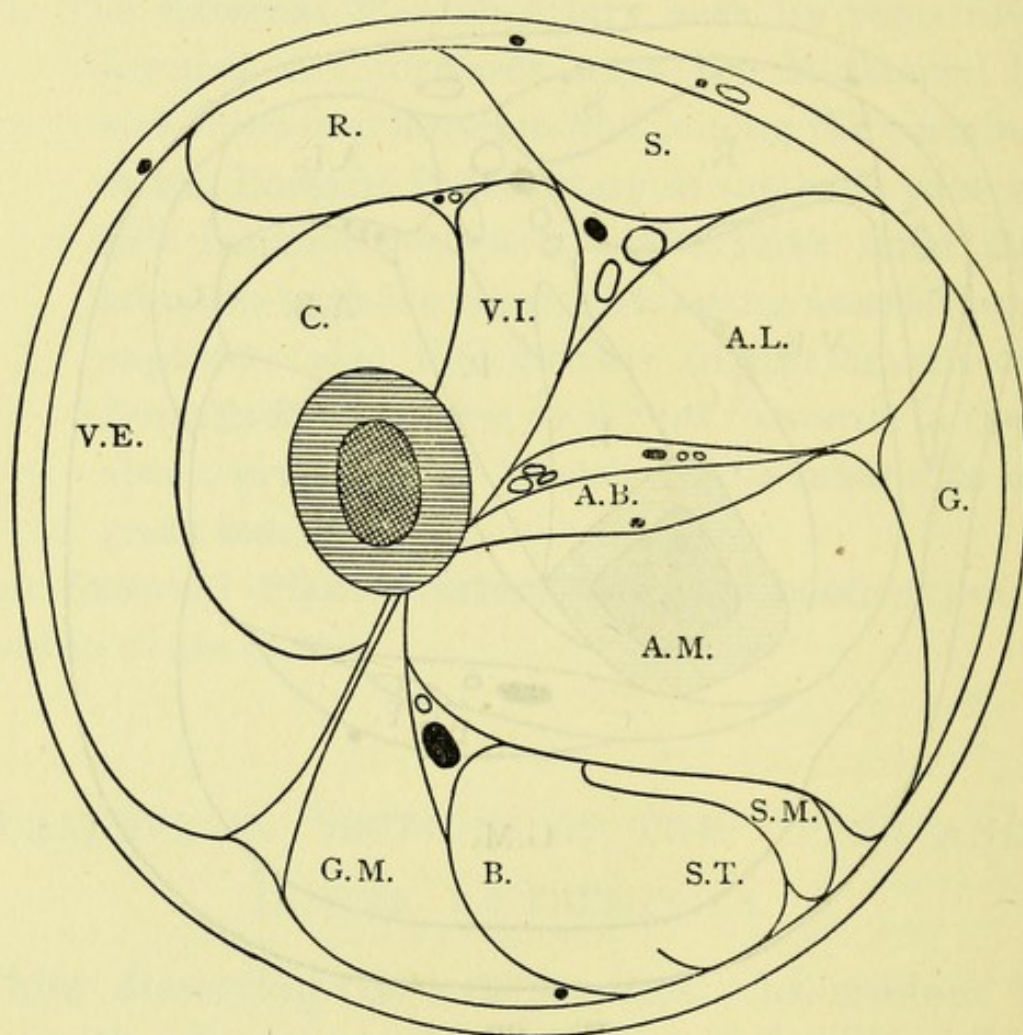


Fig. 29.

Fig. 30 represents a transverse section through the centre of the thigh.

The **Femoral vessels** and the **Internal Saphenous nerve** are seen as they lie in **Hunter's canal**; the **Profunda vessels** between the **Femur** and the **Adductor Magnus**; and the **Great Sciatic nerve**, and the **Comes Nervi Ischiadici**

between the Biceps, Semi-tendinosus, and Adductor Magnus.

Fig. 31 is a transverse section through the lower third of the thigh, and about three inches above the patella.

The **Femoral vessels** and the **Internal Saphena nerve** are seen as they lie in the lowest part of Hunter's canal, the

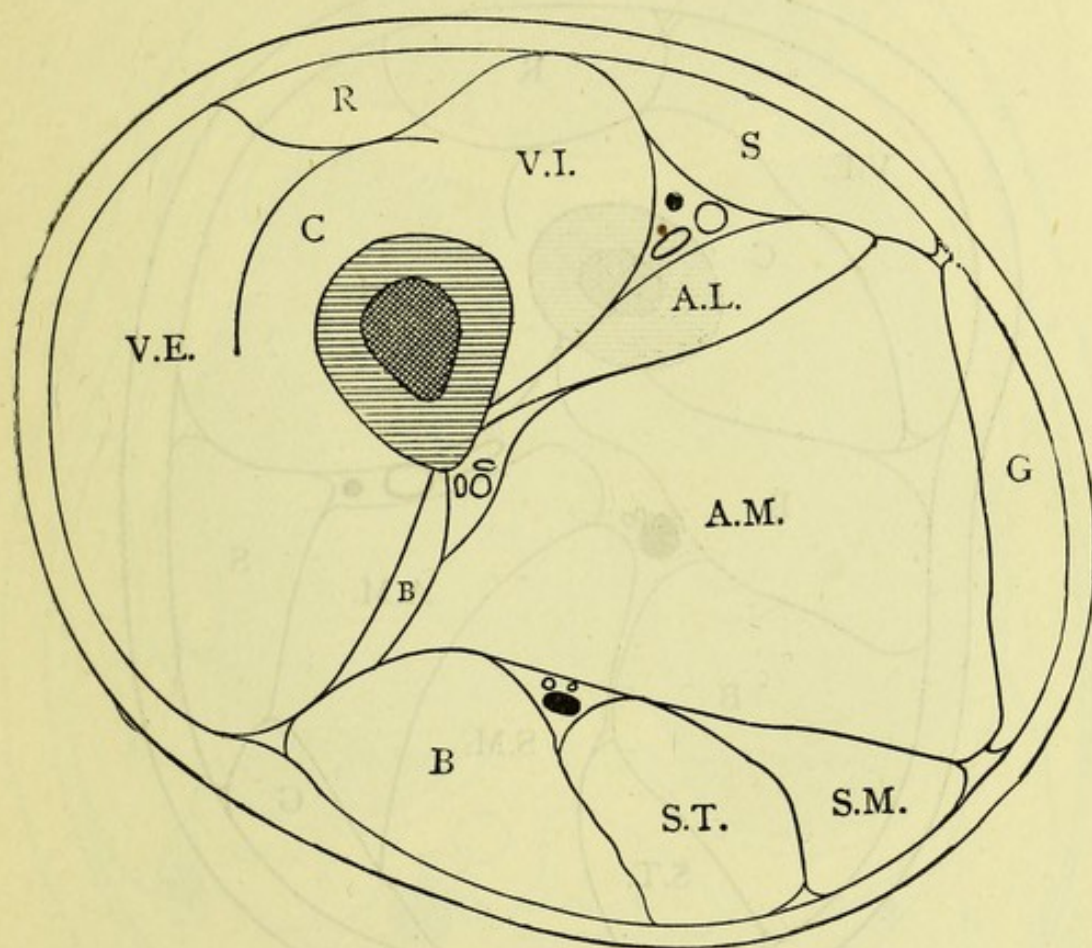


Fig. 30.

vein being external to the artery, and the nerve internal to it.

The **Great Sciatic nerve** and the **Comes Nervi Ischiadici**, lie between the two heads of the Biceps and the Semi-membranosus.

Fig. 32 represents a transverse section through the condyles of the femur.

B. P. indicates the position of the Bursa Patellæ.

C. indicates the position of the Capsule.

L. M. indicates the position of the Ligamentum Mucosum.

S. M. indicates the position of the Synovial Membrane.

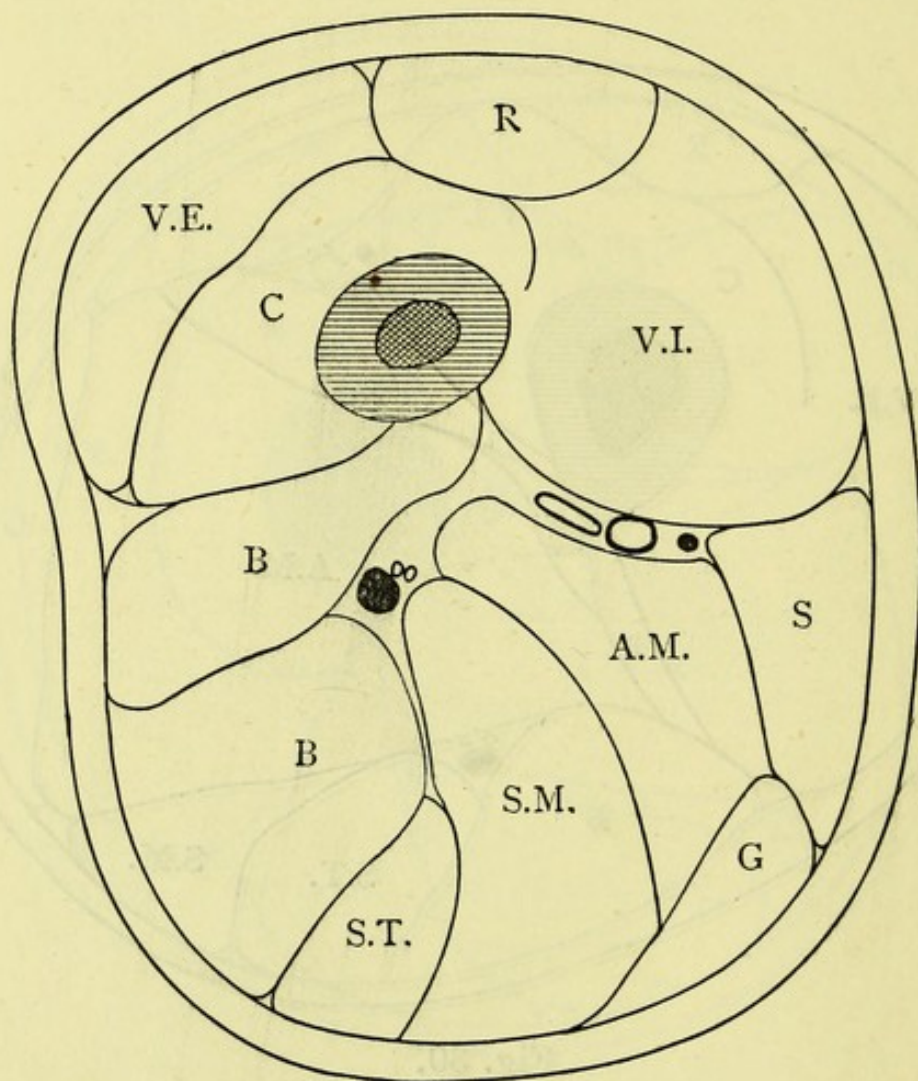


Fig. 31.

E. L. L. indicates the position of the External Lateral Ligament.

I. L. L. indicates the position of the Internal Lateral Ligament.

The Popliteal artery, vein, and Internal Popliteal nerve, lie between the two heads of the Gastrocnemius, the Ex-

ternal Popliteal nerve behind the Biceps, and the Internal Saphenous nerve beneath the Sartorius.

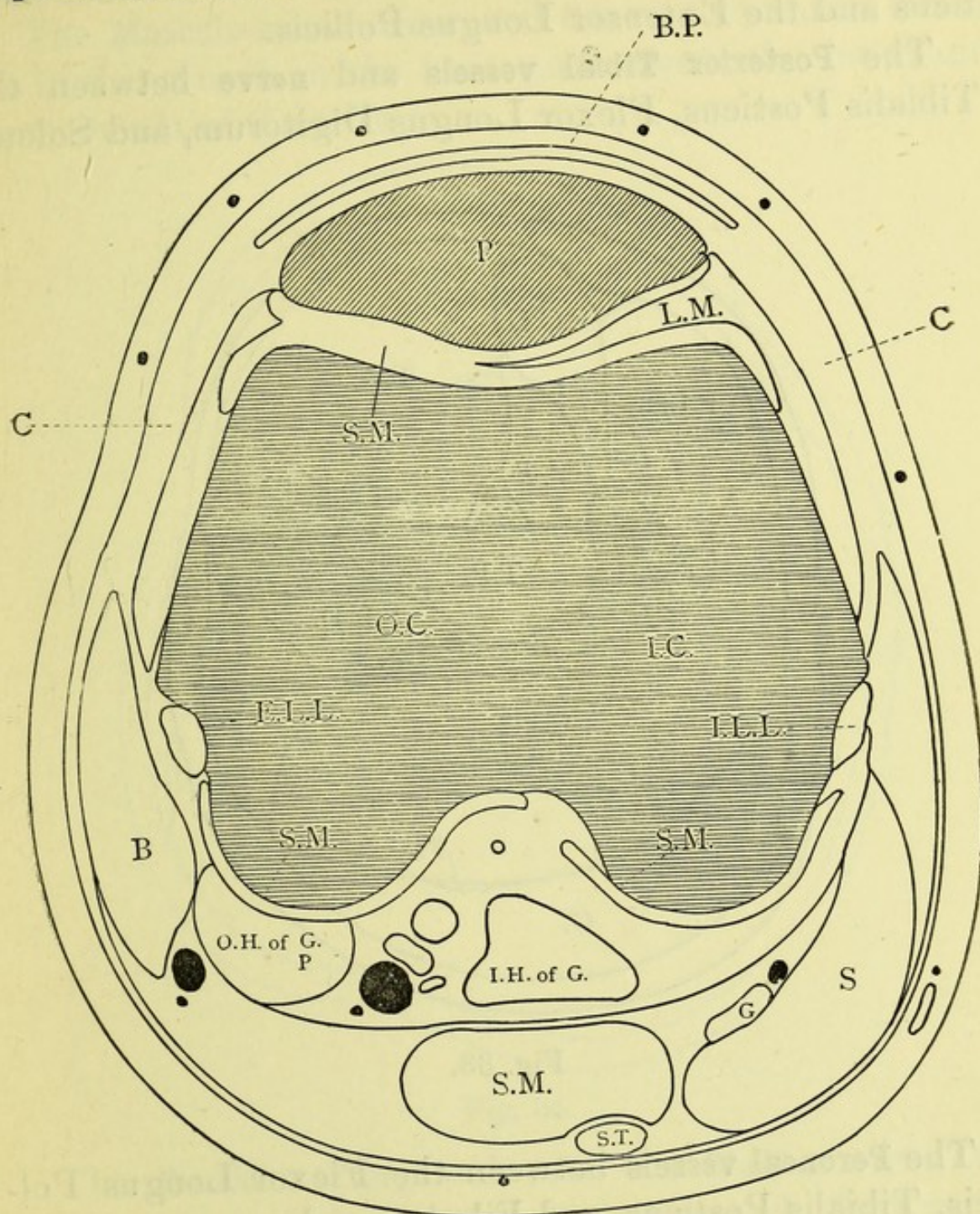


Fig. 32.

The Internal Saphena vein, and the several Cutaneous nerves, are seen in the Superficial Fascia.

Fig. 33 represents a transverse section through the middle of the leg.

The **Anterior Tibial vessels and nerve** are seen lying on the Interosseous Membrane, between the **Tibialis Anticus** and the **Extensor Longus Pollicis**.

The **Posterior Tibial vessels and nerve** between the **Tibialis Posticus**, **Flexor Longus Digitorum**, and **Soleus**.

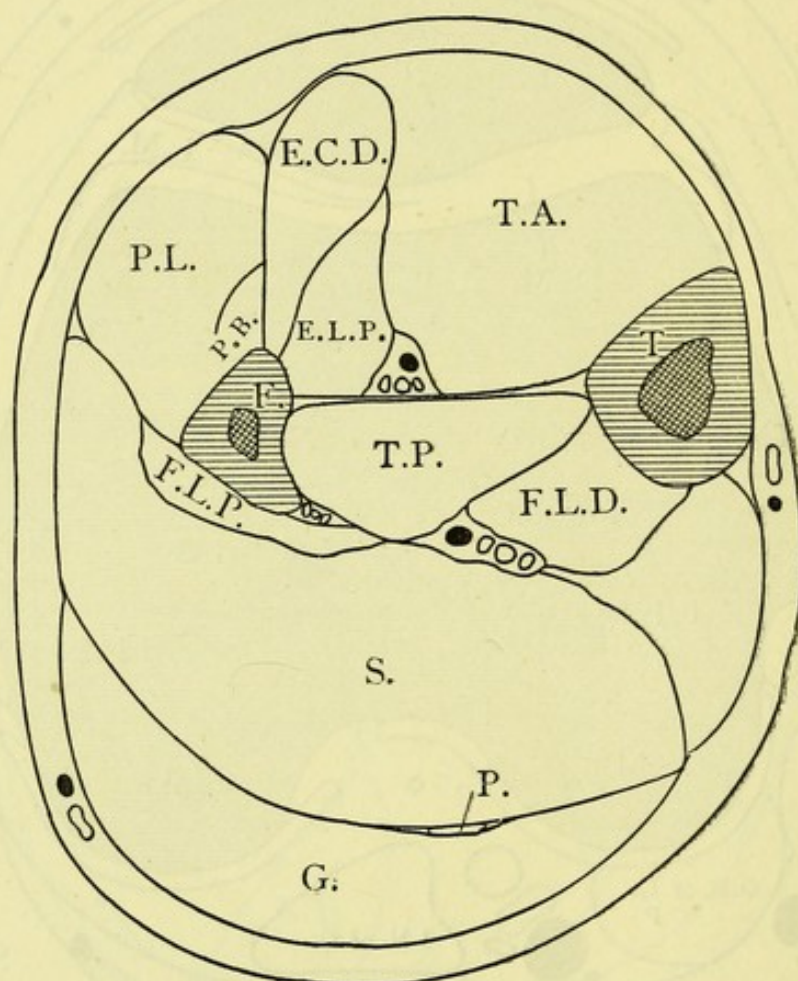


Fig. 33.

The **Peroneal vessels** between the **Flexor Longus Pollicis**, **Tibialis Posticus**, and **Fibula**; and

The **Internal and External Saphenous veins and nerves** in the **Superficial Fascia** in the inner and outer aspects of the leg respectively.

Fig. 34 represents a transverse section through the centre of the upper arm.

The **External Cutaneous nerve** lies between the Coraco-Brachialis and Biceps.

The **Musculo-spiral nerve** and **Superior Profunda artery** lie in the groove on the humerus between the inner and outer heads of the triceps.

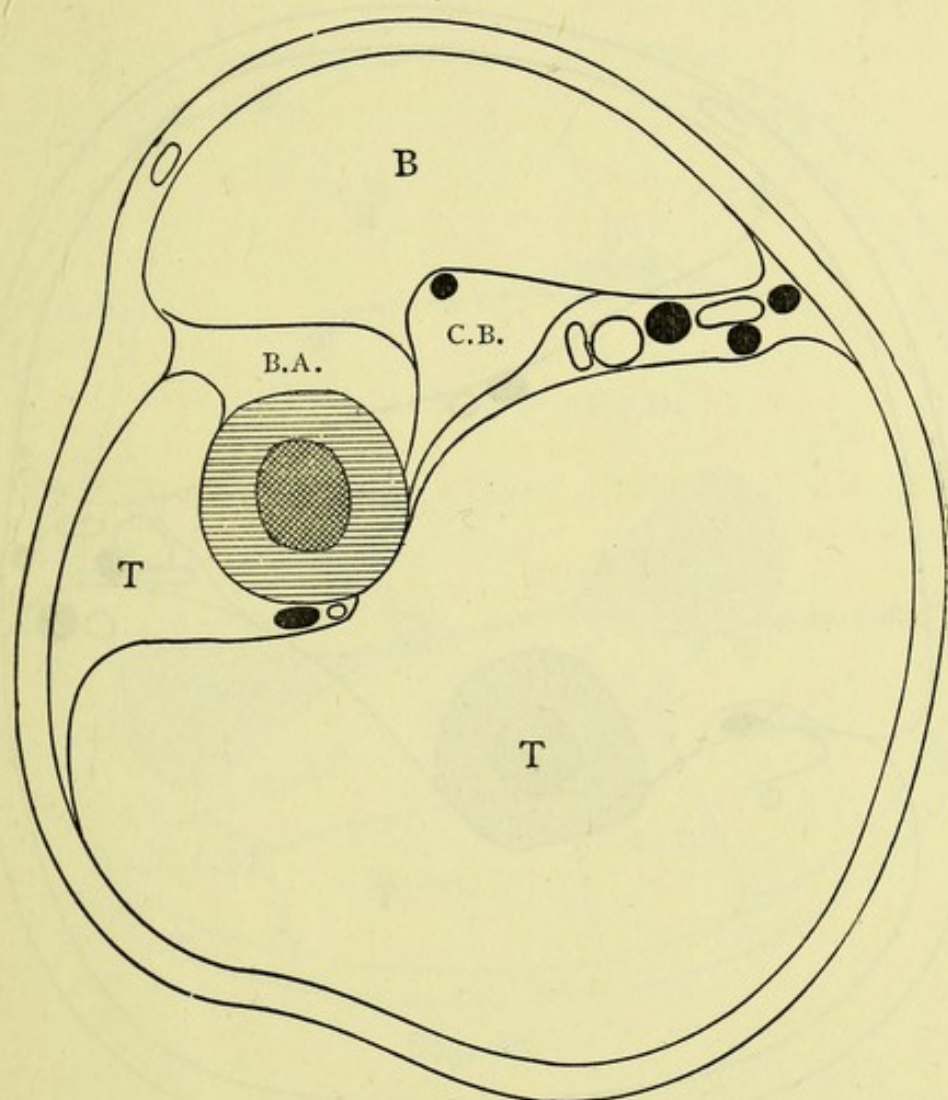


Fig. 34.

The **Brachial artery and vein**, the **Median nerve**, the **Basilic vein**, and the **Internal Cutaneous and Ulnar nerves** lie between the Coraco-Brachialis, Biceps, and Triceps.

The **Cephalic vein** in the Superficial Fascia, on the anterior portion of the outer aspect of the arm.

Fig. 35 represents a transverse section through the middle of the lower third of the upper arm.

The **External Cutaneous nerve** lies between the **Biceps** and the **Brachialis Anticus**.

The **Musculo-Spiral nerve** and **Superior Profunda artery** lie between the **Brachialis Anticus** and **Triceps**.

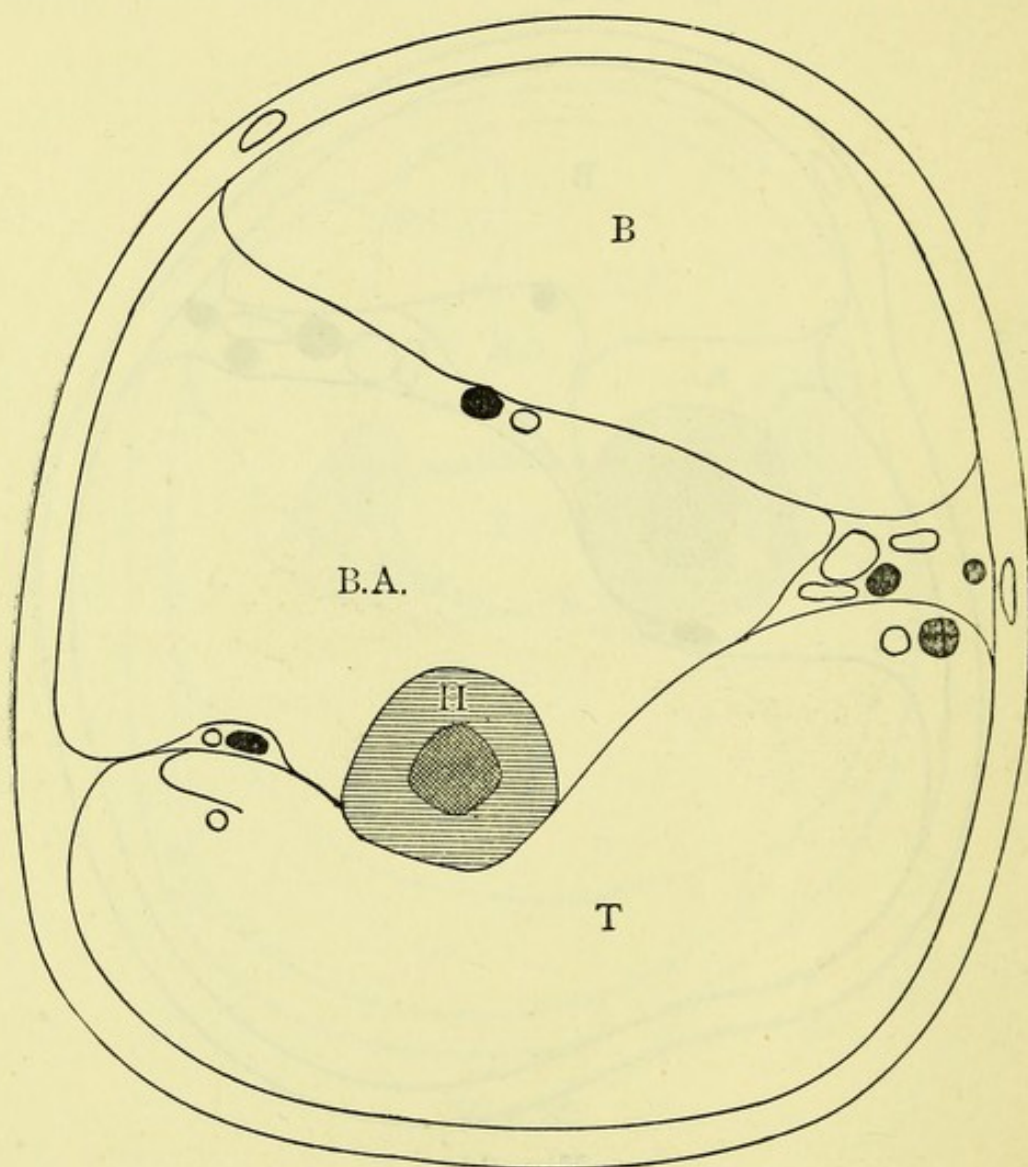


Fig. 35.

The **Ulnar nerve** and **Inferior Profunda artery** lie behind the **Internal Intermuscular Septum**.

The **Brachial artery** and **Venæ Comites**, the **Median** and the **Internal Cutaneous nerves**, lie between the **Brachialis Anticus**, **Triceps**, and **Biceps**.

The **Basilic** and **Cephalic veins** lie in the **Superficial Fascia**.

Fig. 36 represents a transverse section through the centre of the forearm.

The **Radial vessels and nerve** lie between the **Supinator**

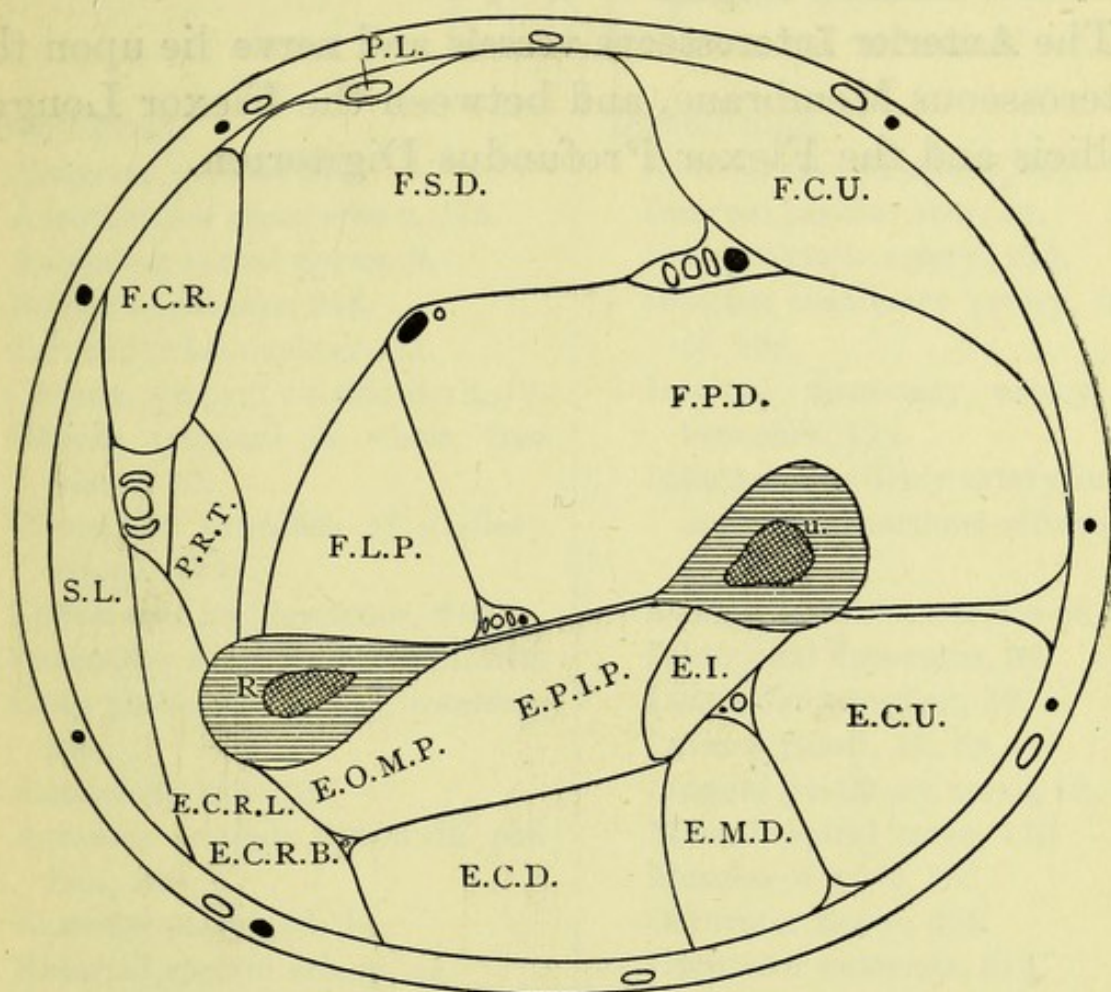


Fig. 36.

In this diagram read E. S. I. P. with E. P. I. P. The **Extensor Indicis** had an unusually high origin in the subject from which this diagram was obtained.

Longus, the **Pronator Radii Teres**, and the **Flexor Carpi Radialis**.

The **Median nerve** and the **Comes Nervi Mediani** lie between the **Flexor Sublimis Digitorum** and the **Flexor Profundus Digitorum**.

The **Ulnar vessels and nerve** lie between the **Flexor Carpi Ulnaris**, the **Flexor Sublimis Digitorum**, and the **Flexor Profundus Digitorum**.

The **Posterior Interosseous vessels** lie between the **Extensor Indicis**, the **Extensor Carpi Ulnaris**, and the **Extensor Minimi Digiti**.

The **Anterior Interosseous vessels and nerve** lie upon the **Interosseous Membrane**, and between the **Flexor Longus Pollicis** and the **Flexor Profundus Digitorum**.

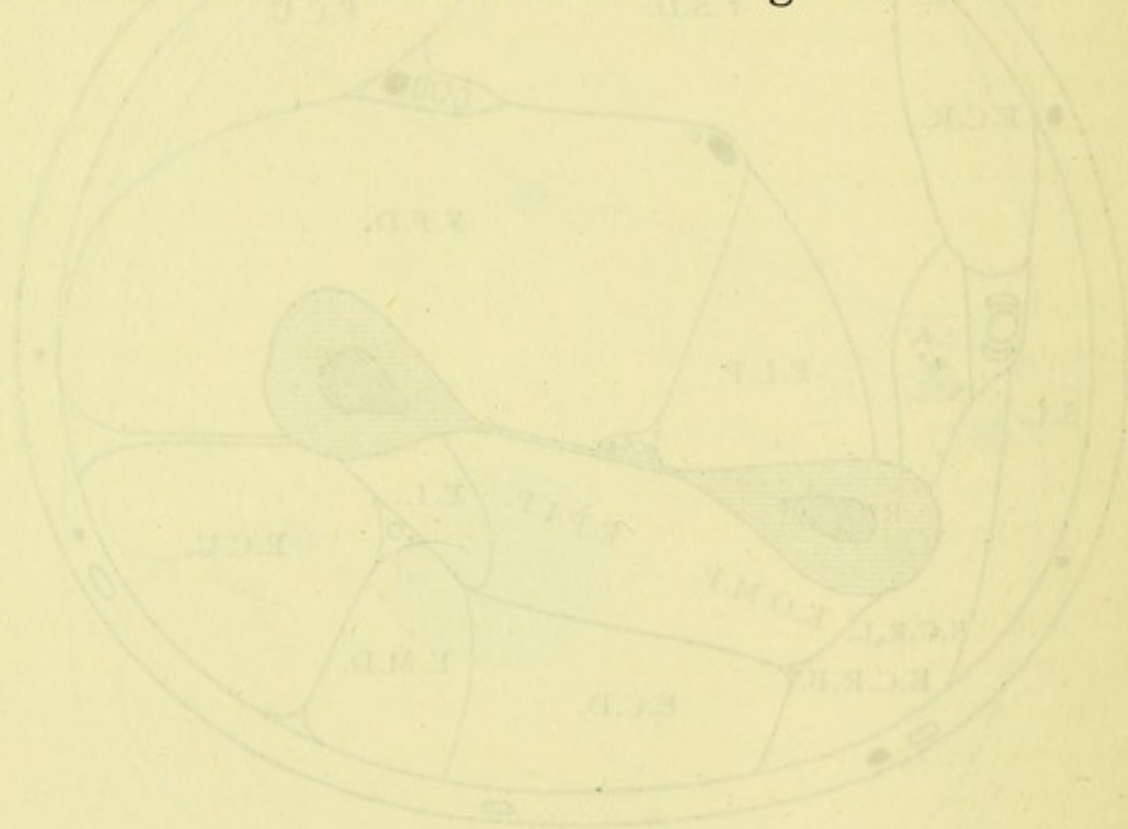


Fig. 30.

In this diagram read E. S. I. P. with E. P. I. P. The Extensor Indicis had an unusually high origin in the subject from which this diagram was obtained.

Longus, the Pronator Radii Teres, and the Flexor Carpi Radialis.

The Median nerve and the Common Nerve Median lie between the Flexor Sublimis Digitorum and the Flexor Profundus Digitorum.

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