Anatomical description of the arteries of the human body : illustrated by several coloured engravings, selected and reduced from the Icones of Haller ; exhibiting the parts as they appear on dissection.

Contributors

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ANATOMICAL DESCRIPTION

OF

THE ARTERIES

OF THE

HUMAN BODY,

ILLUSTRATED

BY SEVERAL COLOURED ENGRAVINGS, SELECTED AND REDUCED FROM THE ICONES OF HALLER.

EXHIBITING THE PARTS

AS THEY APPEAR ON DISSECTION.

FROM THE LAST LONDON EDITION.
Corrected and Improved.

BOSTON:

PRINTED BY THOMAS B. WAIT AND CO. FOR THE PROPRIETOR.

1813.

Josiah F Flagg.

DISTRICT CLERK'S OFFICE.

DISTRICT OF MASSACHUSETTS, TO WIT :

BE it remembered, That on the twentieth day of December, A. D. 1813, and in the thirty-eighth year of the Independence of the United States of America, JOSIAH F. FLAGG of the said district, has deposited in this office the title of a book, the right whereof he claims as proprietor, in the words following, to wit:

"Anatomical Description of the Arteries of the Human Body, illustrated by several coloured engravings, selected and reduced from the Icones of Haller. Exhibiting the parts as they appear on dissection. From the last London edition. Corrected and improved."

In conformity to the act of the Congress of the United States, entitled, "An Act for the encouragement of learning, by securing the copies of Maps, Charts and Books, to the authors and proprietors of such copies, during the times therein mentioned;" and also to an act entitled, "An act supplementary to an act, entitled, an act for the encouragement of learning, by securing the copies of Maps, Charts, and Books, to the authors and proprietors of such copies, during the times therein mentioned; and extending the benefits thereof to the Arts of Designing, Egraving, and Etching Historical, and other Prints."

WILLIAM S. SHAW,
Clerk of the District of Massachusetts.

ADVERTISEMENT.

Having been requested to examine this description of the arteries, and also a copy of one of the engravings, executed on wood; I undertook this task without hesitation, because a publication on this part of anatomy seemed very desirable here. On comparing the engravings in the English edition with the originals in the invaluable work of Haller, they were found to be as faithful and satisfactory imitations, as could be executed on a small scale, and also to be better calculated than any similar, to assist in obtaining a knowledge of the situation of all the important arteries. An impression from the engraving on wood was compared with the copper-plate impression of the London edition; and appeared to me, though inferior in beauty, yet fully equal in utility. Some of the impressions from the engravings done in this country, seem to convey even more distinct notions of the parts they represent, than those of the English work. Being thus satisfied, that the work proposed would be a very valuable acquisition to surgical practitioners, at an easy rate, I agreed to afford every assistance in the prosecution of it, which circumstances would admit.

The references to the plates in the London edition, are made with singular negligence. The arteries alone being designated, while the parts, they are connected with, are wholly neglected. As a knowledge of the existence of these vessels,

without that of the parts to which they are related, would be of little practical use, the first object attended to was the arranging these references anew. This was done by comparing them with the great work of Haller.

The English text is printed from a work of established merit; but with so little attention that errors in letters are exactly reprinted. The text is defective also, in common with most of our descriptions of the arteries, in passing rather slightly over most of the great arteries: while a very great number of small branches are enumerated. Every one becomes sensible in practice that an acquaintance with these minute branches is absolutely useless; and that on the other hand, there is no description of the large vessels that is minute enough to enable him to avoid or to search for a great artery with calmness and confidence. It was proposed to remedy this defect, as far as it can be remedied in descriptions, by collecting from the works of Haller, Soemmering, Boyer and Bichat, the most particular and satisfactory accounts of the relations of these arteries to the parts near which they are situated. This has been in some degree effected with regard to the aorta, carotids, right and left subclavians, iliac, inguinal and femoral arteries; but after this had been done, certain circumstances rendered it necessary for the proprietor of the work to complete its publication in the course of a few days. For this reason the complete execution of the plan was necessarily interrupted; and also my inspection of the newly printed sheets.

The general description of the arteries, which serves as an introduction, was prepared for the American edition—The division of these vessels is adopted from Bichat.

JOHN C. WARREN.

Boston, December 1, 1813.

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DIVISION IV.

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OF THE

ARTERIES IN GENERAL.

THE arteries are vessels which receive blood from the heart and distribute it to all parts of the body. They were formerly described as being of a conical form; but this description is not correct, for on a careful examination it appears that an artery does not diminish in size between one branch and the next below, but preserves a cylindrical form during that space. The arteries may therefore be considered as chains of cylinders, of sizes gradually lessening, and connected together.

As the arteries are constantly sending off branches in their course from the heart, and these send off others of smaller size, it is necessary to employ different terms to express the different sizes of these vessels. The two largest arteries, the aorta and pulmonary artery,

from which all the others spring, are called the great trunks. These send off other large vessels which are branches, and the branches send off other smaller branches or ramusculi. We usually, however, apply the term of large artery to vessels of the second order; while those of the third, are denominated branches, and those sent off by them are ramusculi. As for example, the carotid artery sends out its facial, lingual, and temporal branches, and each of these gives many ramusculi.

At those places where branches, &c. are given off, there is a peculiar arrangement for favouring the entrance of blood into the collateral vessel. At the opening of the latter are observed two edges, or semicircular arches, one of which is near the heart and the other distant from it. The first is continuous with the principal vessel, while the latter is very sharp and prominent, extending apparently into the canal of the vessel in order to oppose the passage of blood through it, and to give a part of the fluid a lateral direction.

The arteries terminate principally in minute vessels called capillaries; these are found in infinite numbers in every organized part of the body and constitute a considerable portion of each organ. Into these little vessels, the arteries carry their blood, which having circulated in them and undergone a remarkable change, is transmitted to

the veins. The anatomists of the present day, do not indeed seem to be decided, whether to consider the capillary vessels as a system separate from that of the arteries. But as these capillaries seem to be governed by laws in some degree distinct from those which regul. te the arteries, we think it best to treat them as forming a distinct system. Then the first and principal termination of the arteries is in the capillary vessels. Another termination of the arteries is by anastomosis, which is the opening of one artery into another. This anastomosis, or communication of arteries with each other, is common in every part of the body, and most so, in those parts which are most exposed to pressure. It is of great importance in the animal economy, because it allows the circulation of the blood to be carried on by the communicating branches, when the principal ones are obstructed. Thus when the femoral artery is tied, the life of the limb below the ligature is supported by means of branches from the upper part of the thigh anastomosing with those near the knee. Arteries terminate also in cells; such as those which constitute the spongy substance of the penis. Into these the arteries pour their blood, which is carried thence by the veins. Lastly, arteries terminate in glands, that is, in the secretory parts of those organs; the parts which per-

form a peculiar process on the blood, and produce from it some new substance, such as the bile, urine, and saliva.

STRUCTURE OF ARTERIES.

The arteries have three coats, besides a loose coat of cellular membrane called the sheath of the artery. This sheath is composed of layers of cellular membrane more or less condensed. The artery lies loosely in this sheath, so as to be capable of being drawn backward and forward a little way; for it is connected with this sheath by a yielding cellular membrane. The three proper coats of the artery have been called cellular, muscular and cuticular.—It is best, however, to denominate them external, middle and internal coats. The external coat is composed of many thin layers of membrane closely connected together, but capable of being separated by the knife and by putrefaction. It is the strongest of the three coats; so that a ligature applied over it ruptures the middle and internal coats, while the external remains entire. The second coat is composed of many layers of circular fibres, none of which form a complete circle. These fibres are of a yellowish colour. They are united to each other by dense membrane. This coat is strong in a circular direction, but weak longitudinally. When therefore the outer coat is removed, the artery

may easily be torn if pulled in the direction of its length; but not in the direction of its breadth. This coat is considered by some anatomists to be peculiar to the arteries, and different from any other structure in the body. The internal coat is thin; of a reddish colour; extremely fragile. Its external surface is united to the middle coat by a thin layer of common membrane. Its internal face is smooth; shining, being moistened with an unctuous substance, which serves to facilitate the passage of blood through the vessel. Its texture is very close, to retain the blood in its canals more perfectly.

The coats of the arteries have small arteries and veins, except the internal coat, which does not exhibit them. No nerves can be traced running into them, although many are seen on their outer coat.

GENERAL VIEW OF THE DISTRIBUTION OF THE ARTERIES.

The arteries all originate from two great trunks, the pulmonary artery which goes to the lungs and is described with that organ, and the aorta which supplies the rest of the body. The aorta arises from the left ventricle of the heart, and at its origin supplies that organ with two small arteries called coronary or cardiac. There the aorta rises and forms an arch, from which are sent off

three great arteries. On the right side a vessel called arteria innominata, which after running an inch is divided into the right subclavian and right carotid arteries. On the left are sent off the left carotid and left subclavian arteries. The subclavian artery goes out of the chest to the lower part of the neck, where it gives seven or eight principal branches to the neck, breast and shoulder, it comes down under the clavicle and takes the name of axillary artery. From the axillary are sent six or seven considerable vessels to the outer part of the thorax and the shoulder. Having crossed the axilla or armpit to the upper part of the arm, the artery is then called brachial. It runs along the inside of the arm, giving one principal and many smaller branches to the muscles of the arm and to the elbow; below which it divides into two vessels, called radial and ulnar arteries. The former takes its course near the outer edge of the arm, becomes very superficial at the wrist, sends an artery on the back of the thumb, and passes itself to the palm of the hand, where it terminates in the superficial palmer arch; from which are sent arteries to the thumb and fingers near it. The ulnar artery at its beginning sends down two considerable branches, one along the middle of the arm on its fore part, another along the middle of the arm on its back part, both of which ultimately get to the back of the hand,

where a sort of arch is formed. The ulnar artery runs near the inside of the arm to the wrist, gives many branches to the muscles of the fore-arm, passes on the palm of the hand and forms the deep palmar arch, which gives arteries to the inner fingers; each finger receiving two arteries.

The carotid artery, arising from the aorta on the left, and from the arteria innominata on the right side, goes out at the upper part of the thorax near the trachea. It is seen at the lowest part of the neck very near the side of the trachea, and then ascending the neck it gradually quits the trachea, running a little outward toward the angle of the lower jaw. In this course it sends out no branches; but when come near to the angle of the jaw, it divides into two arteries called external and internal carotid arteries. The external carotid artery is no sooner formed, than it is divided into about eight branches, which supply blood to the upper part of the neck, the face, mouth, tongue, throat, and all the external parts of the head. The internal carotid is larger than the other, it runs backward and upward to the inferior part of the skull, passes by a circuitous course through the carotid canal to the base of the brain, and is wholly distributed to this organ, except a branch sent into the orbit of the eye from behind.

After the aorta has formed its arch and given the great arteries to the head and arms, it descends, runs from left to right, to get near the spine, along which it passes through the thorax, distinguished by the name of thoracic aorta. In this course small arteries are given to the bronchiæ, pericardium, œsophagus, and mediastinum, and ten or twelve branches run along the ribs and are distributed to the muscles of the back, breast, and to the intercortal muscles. The aorta, passing through the diaphragm, quits the thorax, enters the cavity of the abdomen, and is then called abdominal aorta. It gives arteries to the diaphragm, renal capsules, kidneys, testis, muscles of the back and abdomen; and from its fore part sends three large, unpaired vessels, the cœliac, superior and inferior mesenteric, to supply all the viscera of the abdomen. At the third lumbar vertebra it divides into two vessels, one of which goes to the right the other to the left. This division is called the bifurcation of the aorta, and the arteries which are produced by it, are the common iliac arteries. As the common iliac passes near the brim of the pelvis it is divided into external and internal iliac arteries. The latter which is sometimes called the hypogastric, descends into the pelvis, and first gives four or five vessels to the organs contained in that cavity and is afterwards expended in four large branches, which terminate out of the

pelvis, in the muscles of the thigh and external organs of generation.

The external iliac artery, soon after quitting the internal, leaves the abdominal cavity, giving at the place of its exit a branch to the muscles within the upper part of the pelvis and a remarkable branch called epigastric, which ascends the abdomen on the inside of the muscles that cover the fore part of that cavity. No sooner does the external iliac appear at the upper part of the thigh, than it is called the femoral artery. This vessel gives superficial branches to the skin of the external parts of generation, and to the upper part of the thigh: when it has passed a very little way down the thigh, a large vessel almost equal to the femoral in size is sent downward, inward and backward among the deep muscles of the thigh, which it supplies with blood quite to the ham. The femoral artery itself goes down the inside of the thigh getting gradually deeper and supplying branches to the muscles, without being greatly diminished in size. Some distance above the knee it perforates the muscle triceps and turns to the back part of the thigh, where it receives the name of popliteal artery. The knee obtains its vessels, five or six in number, from this artery. At the head of the tibia the artery divides into two, which are the anterior and posterior tibial arteries. The anterior tibial passes from the back

part to the fore part of the leg, goes down between the two bones to the upper part of the foot, where it is still a considerable vessel, and at last disappears near the root of the great toe, where it forms an important communication through the foot with the arteries on the inferior part. The posterior tibial, first sends a branch called the peroneal artery to the fibula, the outer bone of the leg, along which it descends to terminate about the outer ankle. The posterior tibial, which is the largest of the two principal arteries of the leg, runs down behind the tibia to the depression behind the inner ankle, supplying the muscles as it passes. From the ankle it turns under the foot and divides into the external and internal plantar arteries. The first of these makes a circuit round the outer edge of the foot and near the roots of the toes turns to cross the foot in an arched form and meets with the artery it had before quitted, the internal plantar. From the arch formed by the two, the toes are supplied, each with two arteries. The internal plantar seems to form that part of the arch which supplies the great toe and the inside of the second, while the remainder of the arch appears to be a continuation of the external plantar artery.

AORTA.

THE AORTA commences at the left ventricle of the heart. From the fleshy substance of the parietes of this ventricle it receives its origin, not by a continuation of the substance of the ventricle into the artery, but by a substance wholly different. The internal coat alone of the artery is actually continuous with the membrane which lines the ventricle. At its orifice are placed three membraneous projections, resembling the semicircular festoons of a curtain, which are the semilunar valves of the aorta. They are formed from the membrane which lines the aorta and the ventricle.

At its origin the aorta is quite concealed by the pulmonary artery placed before it; but after passing half an inch to the right, it is seen on the right side of the latter, along which it rises curving to the left. In this first part of its course it is enclosed in the

pericardium. The pulmonary artery and its right branch nearly surround it. Then it comes to the middle of the spine, where it is placed on the trachea, a little above the bifurcation of the bronchiæ; then it goes on curving to the left, above the left trunk of the pulmonary artery. This is called the curvature or arch of the aorta.

When the aorta has reached the left trunk of the pulmonary artery, it enters the pleura between that membrane and the spine; changes its direction and goes perpendicularly downward, through the posterior mediastinum. In this course, it is placed on the bodies of the vertebræ, but a little to the left of their middle line, while the œsophagus is on the right of the same line; and of course on the right side of the aorta, together with the thoracic duct and vena zygos. Before it, is the division of the bronchiæ, then the pleura, where its two largest unite from the posterior mediastinum. On the left side it is in contact with the left pleura.

Quitting the thorax, the aorta passes between the appendices of the diaphragm and enters the abdomen. It still lies on the vertebræ, along which it descends through the abdomen to the fourth or fifth lumbar vertebræ, where it is divided into two vessels, the common iliac arteries. In its abdominal course, the aorta has the spine behind it, the vena cava inferior on its right side, the peritoneum before it and on its left.

In examining the arteries, which spring from the aorta the following divisions are necessary to a methodical arrangement.

I. Arteries from the origin of the aorta.
II. Arteries from the curvature of the aorta.
III. Arteries from the thoracic aorta.
IV. Arteries from the abdominal aorta.
V. Arteries which terminate the aorta.

I. ARTERIES FROM THE ORIGIN OF THE AORTA.

1. The RIGHT CORONARY—is larger than the left, it runs between the auricle and ventricle to the flat surface and apex of the heart, inosculating freely with the left coronary both by its branches and the extremity of its trunk.

These branches are,
One running on the right of the aorta, and on the left to the pulmonary artery.

A number going to both sides of the right auricle—to the two venæ cavæ—to the aorta—and to the pulmonary veins.

Branches winding on the convex surface of the heart; the longest of which unites with the left coronary branches beyond the septum, near the apex.

Branches passing over the plain surface and right ventricle, as far as the apex of the heart.

2. The LEFT CORONARY—after going out between the pulmonary artery and the left auricle, divides into two branches—

An anterior branch, running upon the convex surface of the heart, towards the septum, in a winding direction, to the apex, where it is reflected on the posterior surface of the heart.

This gives,

A circumflex Posterior Branch, which, winding between the left auricle and the ventricle to the rounded extremity of the heart, terminates towards the apex, upon the flat surface.

II. ARTERIES FROM THE CURVATURE OF THE AORTA.

The curvature of the aorta gives origin to three great arteries from its convex side. 1. The arteria innominata, which immediately divides into the right carotid and right subclavian. 2. The left carotid. 3. The left subclavian.

The arteria innominata rises from the aorta in front of the trachea, runs upward and out-

ward on the side of that tube and after a passage of an inch, divides. It is covered by the left subclavian vein, by the sternum and the sterno-thyroid muscle; behind, it corresponds with the trachea and the longus colli muscle, which separate it from the spine.

The left carotid is nearly on a level with the innominata, but a little farther back. It rises at right angles with the aorta, and ascends perpendicularly on the side of the trachea.

The left subclavian is farthest back of the three. It rises from the aorta just before this penetrates between the two pleuræ.

Thus the arteria innominata and the left carotid embrace the trachea, on which the former partly lies. The right carotid and subclavian are shorter than the left, by the length of the arteria innominata.

COMMON CAROTID ARTERIES.

The two great carotid arteries, originating in the manner just mentioned, ascend a little obliquely outwards on the sides of the neck. They are of equal sizes. They run near the edges of the trachea, and continually diverge

from each other, till they reach the level of the superior part of the larynx. Here they are divided into external and internal carotids.

The relations of the common carotids to the parts, near which they pass, constitute a most important part in surgical anatomy. They are as follows.

On the fore part, the left carotid being longer than the right is covered at its origin by the left subclavian vein, the thymus gland and the clavicle. Both the carotids afterwards correspond to the interval between the muscles sterno-mastoideus on the outside, sterno and thyreo and omo-hyoideus on the inside. These muscles separate the carotid artery from the platysma-myoides, especially at the lower part of the neck. At the upper part, the artery is near to the platysma-myoides.

On the back part, each of the carotids corresponds with the spine, from which they are separated, only by the muscles rectus anterior and longus colli, and low down, by the inferior thyroid artery.

On the inside, the carotid correspond with the trachea, larynx and thyroid gland. The

latter sometimes extends over them, especially in females.

On the outside, the carotid has the internal jugular vein, the nerves par vagum and inferior branch of the superior cervical ganglion, behind the jugular. Numerous lymphatic glands, situated along the course of the sterno-mastoideus; the jugular vein and the nerves also surround this artery.

The external and internal carotids, which are the divisions of the common carotid, arise from it near the superior edge of the thyroid cartilage. The external belongs wholly to the face and cranium; the internal to the brain and eye. Their proportional size varies at different ages. In infancy, when the bulk of the cranium exceeds that of the face, the internal carotid is largest. In the adult, when the cranium and face are nearly equal, there is no great difference between the two arteries.

Originating together, they ascend parallel to each other till they reach the digastric muscle. In this short course they are covered by the sterno-mastoid muscle, the inferior part of the

parotid gland, and by many lymphatic glands. The internal carotid is more superficial at this part than the external.

Below the digastric muscle, these two arteries change their direction. The internal runs backward to enter the cranium. The external makes a curve below the digastric, approaches the angle of the jaw, then ascends vertically between the side of the jaw and the external ear, being covered completely by the parotid gland.

EXTERNAL CAROTID ARTERY.

This artery gives out a great number of branches. The smaller ones are distributed to all the surrounding parts. The principal and the only branches that are constantly found are in number eight; viz.—

1. Superior Thyroid. 2. Sub-Lingual. 3. Facial. 4. Ascending Pharyngeal. 5. Occipital. 6. Posterior Auricular. 7. Temporal. 8. Internal Maxillary.

1. The SUPERIOR THYROID, issuing near the origin of the trunk, and descending in a winding course to the superior margin of the thyroid gland, gives out

The Superficial Ascending Branch, running above or below the os hyoides, and there forming an arch with the branch from the opposite side. This again divides into

The Superficial Descending Branch, running downwards, and dividing into several branches, with various communications. These are distributed to

The sterno mastoid, platysma-myoideus, the thyroid cartilage, the hyo and crico thyroidei muscles, and the middle and lowest constrictor muscles of the pharynx.

The Laryngeal Branch.—Larger, and often proceeding from the superficial ascending branch. It hides itself, with its attending nerve, between the cricoid and the thyroid cartilages; or penetrates the membranous interstice between the thyroid cartilage and the os hyoides; or even sometimes runs to the interior part of the larynx, through a passage peculiar to itself in the thyroid cartilage, and at last sends off

The Thyroid Branch—inosculating in the substance of the gland itself with the thyroid branch of the inferior thyroid artery, and also by various twigs with the branch from the opposite side.

2. The LINGUAL, OR SUBLINGUAL ARTERY, winds above the os hyoides, forwards, upwards, and inwards, to the tongue. At its commencement, it either passes over, or is covered by the hyoglossus; then is concealed by the genioglossus. It gives off,

The *Sublingual*—the superficial branch of the divided trunk, rising to the symphysis, between the sublingual glands and the geniohyoideus, often penetrating the mylohyoideus, and losing itself in the integuments of the chin. If larger, it often supplies the place of the submental artery. In this course it sends off many irregularly disposed branches; of which the most remarkable are,

Ranina—a large branch, going off at an obtuse angle from the trunk. It runs tortuously between the fibres of the genio-glossus to the surface and point of the tongue, passing along the middle, on the inferior side.

3. The LABIAL, EXTERNAL MAXILLARY, FACIAL, OR ANGULAR—Concealed by the stylohyoideus, and the tendon of the digastric. Ascends, in a tortuous manner, forwards, through the depression, for the maxillary gland, and, winding above the maxilla, follows the anterior margin of the masseter;—afterwards branches out, under the zygomatic muscles, in serpentine windings, upon the face and the sides of the mouth and nose. The numerous branches proceeding from this artery are divided into two classes: the first, comprehending those arteries that leave the trunk before it reaches the maxilla; the second, the branches distributed on the face itself.

The Ascending Palatine—covered by the styloid muscles—lies upon the sides of the pharynx, near the external margin of the internal pterygoid muscle. Twigs being sent from it to these muscles, to the tongue, the tonsils, and the Eustachian tube, it is divided, near the sides of the levator palati, into

The Tonsillar Branch—sometimes wanting—near the insertion of the stylo-glossus penetrates the lateral parts of the pharynx to the tonsils, and exhausts itself in numerous small branches, spreading on their surface, and reaching to the tongue.

The Pterygoid Branch—often double—distributed to the internal pterygoid, the mylohyoideus, the superior constrictors, the constrictors of the isthmus of the fauces, and sometimes to the tongue.

The Submental Branch—goes out near the bend of the trunk, above the maxilla, between the anterior part of the digastric, the mylohyoideus, and the margin of the maxilla, almost to the symphysis of the chin. When it supplies the place of the sublingual, it distributes a great abundance of twigs, and commonly

The Masseteric Branch—United with a branch of the temporal artery of the same name upon the surface of this muscle.

The Inferior Labial, or Superficial Branch—rises, often double, from the trunk, goes forwards, and, having sent branches to the buccinator, the depressors of the angle of the mouth and lips, and the orbicular, distributes others, uniting with the inferior labial of the opposite side, with the inferior coronary, and the inferior maxillary; and then passes under the depressor of the angle of the mouth to the inferior lip, dividing into two, and sometimes producing the inferior coronary of the lip.

The Coronary of the Inferior Lip—goes off near the angle of the mouth, and, covered by the depressor of the angle and the orbicular, proceeds towards the cavity of the mouth, in a winding and transverse direction, under the membrane of the mouth, to its fellow of the opposite side, with which it inosculates. From this are distributed,

The Coronary of the Superior Lip—like the preceding, but larger and more tortuous, passes under the greater

zygomatic and the orbicular muscles, runs along the margin of the superior lip, and gives

Two or three branches, uniting, under the levator labii superioris proprius, with the infraorbital, and other smaller branches perforating this levator muscle, and uniting also with the palpebral arteries.

4. The ASCENDING PHARYNGEAL ARTERY of Haller—issues near the lingual, or from the bifurcation of the carotid, but more posteriorly from the trunk. The auricular excepted, it is the smallest of the branches. It is united by the tela cellulosa to the long anterior rectus muscle, and rises anteriorly towards the foramen lacerum, through which it passes to be lost in the dura mater. The branches which go off in its ascent may be divided, in regard to their situation,

1st. Into those passing inwards, viz.

An Inferior Pharyngeal Branch—stretching down, and and supplying the lower part of the muscular sac.

A Middle Pharyngeal Branch—distributing many twigs in the region of the larynx, pharynx, and Eustachian tube, after having united itself with the superior thyroid artery.

A Higher Pharyngeal or Palatine Branch—distributing some twigs to the superior constrictors, the stylopharyngeus, the Eustachian tube, and the pendulous velum; others to the rectus minor, the cuneiform bone, the cartilage occupying the anterior part of the foramen lacerum—and others to the internal parts of the nostrils and the pterygoid canal.

2d. Those passing Outwards.—Of which the most remarkable are,

Branches to the first intercostal ganglion and the par vagum.

Branches to the sternomastoid and the conglobate glands of the neck.

A branch passing through the opening with the jugular vein, and extending its minute twigs even to the cavernus sinus.

5. The OCCIPITAL ARTERY—passes transversely before the jugular vein, above the rectus lateralis, proceeding between the transverse process of the atlas and the mastoid process, to the back part of the neck, and rises, in many wandering branches, to the occiput. In its course it is covered by the digastric, the trachelomastoid, the splenius, and complexus; and becomes subcutaneous as it reaches the occiput. Its branches are,

One to the digastric and stylohyoideus.

Branches to the glands of the neck and the sternomastoid, inosculating with the ascending thyroid artery.

A Meningeal Branch—which enters the cranium along with the jugular vein, and is distributed to the surface of the dura mater of the cerebellum.

An Auricular Branch—distributed to the lesser lobe and the helix, and sometimes behind on the concha.

The artery, having now bent towards the vertex of the head, branches go off in a retrograde course to the splenius and complexus; whilst other branches are so extensively ramified, that a great number of them inosculate with the higher twigs of the temporal artery. Of these, one perforates the occipital ridge, and another the posterior mastoid hole—both of them going to the dura mater.

6. The POSTERIOR AURICULAR, OR STYLOMASTOID.—This artery rises from the trunk in

the parotid gland, above the digastric muscle, and before the styloid process, and passes transversely to the ear. As it ascends in a curved direction behind the ear, it inclines to the posterior part of the squamous bone, inosculating, first with the temporal, and then with the occipital arteries. It divides into

Numerous branches, going to the parotid gland, the digastric and sternomastoid muscles.

A branch, passing through a particular opening in the meatus auditorius of infants, is distributed to its membrane.

The Stylomastoid Branch—passing outward to the stylomastoid hole, where it enters, and exhibits the following branches :—

Minute branches to the sternomastoid muscle, the skin, and vertexof the head.

Branches behind the ear to the posterior auricular, the occipital and splenius muscles, and distributed more deeply to the mammillary process, the pericranium, and the occipital bone.

A branch, winding on the posterior part of the concha of the ear, and sending twigs to the cartilage, to inosculate with the ramuli of the anterior auricular artery.

Higher branches, spreading under and above the aponeurosis of the temporal muscle, and inosculating before with the temporal, and behind with the occipital branches.

7. The TEMPORAL, OR SUPERFICIAL TEMPORAL.—This artery, concealed at first in the parotid gland, rises in a straight line above the zygomatic arch, between the maxilla and meatus auditorius, and is at last extensively ramified on the

aponeurosis of the temples and the neighbouring parts. In this course are sent off

A number of branches to the parotid gland, equally irregular in size and number.

The *Articular Artery of the Maxilla*—running to the posterior part of the meatus auditorius; sending branches to the articular cartilage, and transmitting two twigs along the portio dura, through the fissure of the articulation, where they reach the muscle of the malleus, and, inosculating with the stylomastoid, form the other half of the coronary artery of the tympanum.

The *Transverse Artery of the Face*—rising under the zygoma from the parotid gland, it proceeds transversely to the face along with the salivary duct. In this course, if double, it gives branches to the parotid gland, the articulation of the maxilla, the masseter, the skin, the zygomaticus, and the orbicularis palpebrarum. It inosculates with the alveolar, palpebral, infraorbital, and coronary arteries of the upper lip; and sometimes gives rise to masseteric branches.

The *Middle* or *Deep Temporal* Branch—sent off below the zygoma. This branch passes over the zygomatic arch, and is immediately covered by the aponeurosis of the muscle, where it extends to the anterior part of the temporal muscle, to the external angle of the orbit, and inosculates with the palpebral artery.

The *Anterior Auricular* Arteries—rising above the origin of the middle temporal. Some of these perforate the meatus auditorius, and form a retiform plexus with the posterior auricular artery; others go to the helix and antihelix, the anterior auricular muscle, and meatus auditorius.

The *Orbicular* Branch—rising often from the temporofrontal artery, passing above the zygomatic arch, sends a small branch, in a tortuous direction, to the external canthus of the eye, which, running under the orbicularis,

reaches the internal angle of the orbit. In this course, it inosculates with the palpebral and frontal branches, and, with the frontal, forms the superciliary arch.

The *Temporo frontal*, or *Internal Anterior* Branch—distributed extensively towards the forehead, and sometimes reaching as far as the glabella. It sends branches which rise almost at right angles from the trunk, to the orbicular, corrugator, frontal muscles, and aponeurosis.

The *Temporo-occipital*, or *External Posterior* Branch—bending towards the ear, backwards and behind it, forming, as it were, a continuation of the trunk—is distributed, in numerous ramifications, to the occipital and lateral parts of the head; inosculates with the occipital about the lambdoidal suture with the temporo-frontal before, and above with the branches stretching from the opposite side.

8. The INTERNAL MAXILLARY.—This artery is larger than the temporal: it rises above the lateral ligament of the maxilla, about the middle of the ramus of the inferior maxillary bone, before the external pterygoid; and, bending inwards, forwards, and downwards, is concealed under the maxilla. It then rises obliquely upwards and forwards, to the space lying between the tuber maxillare and the pterygoid process; and as it proceeds in a tortuous manner, it is lost here in three or four branches, or rather in the spheno-maxillary fissure. In this course it gives

The *Deep Auricular* Artery—going to the posterior part of the meatus auditorius, and giving twigs to this and the neighbouring glands. It is sometimes wanting.

The Artery of the *Tympanum*—which, having sent ramuli to the fat of the maxillary articulation, passes through the fissure of Glasserus to the anterior muscle of the malleus.

The *Small Meningeal* Artery—running towards the basis of the skull, parallel to the middle meningeal. It gives in its course branches to the external pterygoid, to the palatine muscles, and to the third branch of the fifth pair of nerves. It then passes through the foramen ovale, to the membranes of the receptacle, between the pterygoid process and the circumflex muscle.

The *Middle Meningeal* Artery—passing in a straight direction to the foramen spinosum, where it enters this hole; and is there so ramified upon the surface of the dura mater, that some branches are carried transversely under the temporal bone to the occipital, others to the posterior sinus of the falx, while others bend a little more anteriorly. All of these have frequent anastomosings with one another, as also with the posterior meningeal branches rising from the vertebral and occipital arteries, and with the anterior branches from the ophthalmic. Before reaching the foramen spinosum, it sometimes gives branches to the sphenoid bone, and through that bone to the dura mater, and others to the external pterygoid, and the muscles of the Eustachian tube. Having passed the foramen spinosum, it sends

The meningeal artery which sometimes sends off the *lachrymal* artery within the cranium.

The *Inferior Maxillary* Artery—going down, in company with the nerve of the same name, to the inframaxillary canal. As it enters the canal along with the nerve, it sends branches to the internal pterygoid and the mylohyoideus; and is so distributed on the canal of the bone, that some posterior branches go to the dentes molares and the bone itself, while anterior twigs enter the alveolar process of the incisores: then passing through the infra-

maxillary hole, it inosculates with the labial branches, and is distributed to the adjacent muscles and lip.

Pterygoid Branches—varying in number—and distributed, both superficially and more deeply, on the pterygoid and buccinator muscles.

The *Deep External Temporal* Artery—before the trunk is concealed by the zygoma, gives a branch, which, in its ascent, rests upon the tendon of the temporal muscle, and terminates in this muscle and adjoining parts; while another, which some call the *masseteric*, is sent outwards and forwards between the processes of the maxilla, to the external pterygoid and masseter muscles.

The *Deep Internal Temporal* Artery—rising in that part where the trunk proceeds transversely near the antrum Highmorianum, terminating in the temporal muscle, and transmitting a twig through the cheek-bone, to supply the fat and periosteum of the orbit.

The *Buccal* or *Artery of the Cheek*—irregular in its origin, arising, sometimes from the external deep temporal artery, sometimes from the alveolar, and sometimes from the infraorbital—penetrates the buccinator; and, winding on its surface, gives branches to the zygomaticus, the levator, the glands, and the adipose substance.

The *Alveolar* Artery—proceeding in a tortuous direction, above the alveolar processes and the superior maxillary bone, towards the cheek and face—where it gives

The *Infraorbital* Artery—rising in the spheno-maxillary fissure, near the infraorbital groove; and, passing along this canal, emerges at last upon the face through the infraorbital hole. Before the trunk reaches the canal, branches are distributed to the fat and dura mater of the orbit, to the lachrymal gland, and to the inferior oblique muscle of the eye. From the canal,

The *Superior Palatine*, *Descending*, or *Pterygopalatine* Artery—rising, often double, from the trunk, that is divided into three branches at the sphenomaxillary fissure. It enters the pterygopalatine canal; and there, if not sooner, divides into two branches;

A Posterior Branch—turning backwards through the posterior palatine hole, going to the extremity of the palatine bone and the velum palati, and communicating with the ascending palatine branch. An Anterior Branch—larger than the last, passing forward under the roof of the mouth, and forming a vascular plexus in the palate. A single twig ascends through the foramen incisivum to the inner side of the nose, or inosculates with the nasal branch as it passes down.

The *Highest Pharyngeal* Branch—rising in the place already mentioned; stretching behind the sphenoidal sinuses to the upper, posterior, and lateral parts of the pharynx—where it gives

A branch, going to the pterygoid hole, and inosculating with a branch, rising either from the internal carotid, the pharyngeal, or the middle meningeal arteries.

The *Nasal* Artery—the last branch of the trunk, and often double, passing through the spheno-palatine hole, and dividing, at the superior and posterior part of the nose, into

A small branch, going to the posterior ethmoid cells.

Branches to the sphenoidal sinuses.

Larger branches to the septum of the nose.

A large branch, passing through the superior and inferior spongy bones to the bottom of the nose; giving twigs to the antrum and the membranes of the nostrils, and inosculating with the anterior palatine branch as it passes through the foramen incisivum.

DISTRIBUTION OF THE INTERNAL CAROTID, OR CEREBRAL ARTERY.

THIS artery, as it rises to its canal, is connected before, by means of cellular substance, to the par vagum and intercostal nerves; and

behind, to the rectus anticus muscle. Sometimes it forms above the vertebræ a larger or a smaller projecting curvature. In this course no branches are, in general, given off. At last it enters the foramen carotideum; and, passingalong this canal, undergoes many remarkable inflections. On its first entering the foramen, where it forms an obtuse angle, the artery proceeds upwards, inwards, and a little forwards. As it begins to rise from the canal forwards and upwards, the second curvature appears very obtuse. Having at last reached the posterior part of the sella turcica, it is so inflected in the cavernous sinus or receptacle, as to run in a horizontal direction to the anterior clinoid process. It here rises perpendicularly, perforates the internal surface of the dura mater, and proceeds, near the bottom of the brain, backwards to the cerebrum. Through this course, the following branches are chiefly remarkable:

One to the pterygoid canal, inosculating with a branch of the highest pharyngeal from the internal maxillary.

A branch, spreading out in the canal itself, going to the cavity and promontory of the tympanum, and anasto-

mosing with a branch of the meningeal, passing under the fissure of the aqueduct.

The POSTERIOR ARTERY of the RECEPTACLE or CAVERNOUS SINUS—rising from the transverse part of the carotid concealed in the receptacle, and going to that part of the dura mater which covers the posterior clinoid processes and the cuneiform occipital process; inosculating with branches of the vertebral artery rising without the cranium, and entering it through the foramen magnum.

Many branches, distributed extensively on the dura mater.

Branches to the 4th, 5th, and 6th, pairs of nerves.

Branches to the pituitary gland, its periosteum, and the cuneiform bone.

The ANTERIOR ARTERY of the RECEPTACLE —rising above the root of the intercostal nerve. Some anatomists, from supposing the intercostal to have its origin from the first branch of the fifth pair, have mistaken this artery for a nerve.

Branches to the 3d, 4th, and the three divisions of the 5th pair, with which they go out.

Many branches to the dura mater of the receptacle, near the sphenoidal fissure, and some to the pituitary gland.

The OPHTHALMIC ARTERY—rising in the angle where the carotid artery leaves the sphenoid bone, near its anterior clinoid processes, and running with the nerve which accompanies, and rests

upon it, through the optic hole, to the orbit of the eye. In mentioning its branches, and their subdivisions, I shall observe the order which Nature generally points out in sending them from the trunk. After lying by the external side of the optic nerve, it passes obliquely forwards over the nerve; and reaching the internal angle of the eye above its adductor muscle, divides into two branches; and these again into the following smaller branches:

The *Lachrymal*—rising from the opthalmic artery, about two lines after it enters the orbit, between the abductor and the levator; and then running above the abductor, proceeds to the lachrymal gland. It sometimes goes off from the middle meningeal artery.

The *Supraorbital*, or *Superior Muscular* Branch—rises, while the trunk crosses the nerve, under the periosteum of the orbit; then bending to the levator palpebræ, proceeds forwards, and, after passing through the supraorbitary hole, is distributed upon the forehead, in two separate branches.

The *Central* Artery of the *Retina*—rising from the inferior side of the ophthalmic trunk as it lies upon the optic nerve; or sometimes from the ciliary arteries. It then sinks into the nerve; runs along its axis; penetrates, often double, the medullary expansion of the retina; and, branching into many new divisions, is extensively ramified on its internal surface. Of these, some extending as far as the corpus ciliare, form a circle between it and the vitreous humour, giving twigs to the crystalline lens; while a particular branch passes through the centre of the vitreous humour to the posterior side of the lens.

The *Long Internal Ciliary* Artery.

The *Inferior Muscular* Artery—rising from the trunk

at the interior margin of the optic nerve, very often between the ciliary arteries, and transmitted, either under the eye, or above the adductor muscle, to the inferior palpebra.

The *Inferior Ciliary* Artery.—This is wanting sometimes.

The three ciliary arteries mentioned above, commonly arise from the ophthalmic artery, in such a way, that the external follows the external margin of the nerve; the internal, the inner margin; while the inferior, with similar windings, runs near the inferior muscular, along the lower margin of the nerve. There are sometimes six ciliary arteries, which, whether they arise from the ophthalmic or its branches, spread into several ramifications, and enter the sclerotic coat.

The *Posterior Ethmoidal* Artery—running between the levator and adductor muscles, above the greater oblique; enters the posterior orbitary hole; passes through the cribriform plate into the cranium; and, reaching near the dura mater, inosculates with the anterior ethmoidal branches. The rest of the trunk is distributed to the nose.

The *Anterior Ethmoidal* Artery—rises where the trunk, as it passes over the fourth pair of nerves, reaches the trochlea. It then enters the anterior orbitary hole, and proceeds into the cranium through a peculiar opening near the ethmoid cells, distributing some ramuli, to the nose.

The *Inferior Palpebral* Artery—rising often along with the superior palpebral, at that place where the trunk generally leaves the tendon of the superior oblique.

The *Superior Palpebral* Artery—to the upper eyelid,

The *Nasal* Artery—rising over the superior part of the lachrymal sac and the ligament of the eye-lids, goes to the nose.

The *Frontal* Artery—at first subcutaneous—passes over the orbicular muscle, and then sinks in the corrugator.

The COMMUNICATING ARTERY.—This, along

with the deep branch of the vertebral artery of the cerebrum, forms the circle of Willis. It is tortuous; but when it leaves the tunica arachnoides, proceeds in a straight line backwards and inwards, along the sides of the corpora mammillaria, near the infundibulum, where it reaches the artery already mentioned, and there forms an obtuse angled quadrangular space.

The ANTERIOR CAROTID ARTERY, or ARTERIA CALLOSA.—The internal carotid, at that place where the anterior lobe of the brain is separated from the posterior, divides into two branches of nearly equal size; of which the anterior proceeds immediately inwards, and a little forwards; then bends above the corpus callosum, between the hemispheres, to the posterior lobes of the brain: in which course it gives

Branches to the optic and olfactory nerves.

A Communicating Branch—inosculating with its fellow of the opposite side. This branch is short and transverse.

Branches to the inferior side of the anterior lobe, and to its flat and internal surface, where the falx separates the two hemispheres. They run in circuitous windings, penetrate deeply the substance of the brain, and in many places inosculate with the posterior carotid.

Many branches to the corpus callosum and adjacent cerebrum, sinking into the posterior lobe, forming inosculations with the posterior carotid and vertebral arteries, and extending even to the tentorium.

The POSTERIOR CAROTID, or the ARTERY of the FOSSA SYLVIANA.—This second division of the trunk enters the fossa Sylvii that se-

parates the anterior and posterior lobes, and gives to each numerous superficial branches, spreading on the circumvolutions of the cerebrum, and several deep ones, ramified backwards.

Branches to the optic nerves and choroid plexus. Branches to the pia mater, covering the basis of the brain.

SUBCLAVIAN ARTERY AND ITS BRANCHES.

The lower part of the neck, the shoulder and upper extremity receive their blood from the subclavian artery. This large vessel is continued from the clavicle, which gives it its name, through the axilla and arm to the elbow in a single trunk; yet in this course, it receives the three names of subclavian, axillary and brachial.

The subclavian arteries of the right and left sides do not arise exactly in the same manner; for the right comes from the arteria innominata, at the side of the trachea; while the left arises from the aorta itself, near the termination of its curvature.

Their *position*, *length*, *direction*, and *relations*, differ. These differences, in an artery

so considerably, and which is sometimes the subject of most important operations, should not be neglected.

Position. The right subclavian rises from the arteria innominata after that vessel has passed an inch from the aorta. It is the most superficial, as the arteria innominata itself comes from the arch of the aorta at a point more anterior than that where the left subclavian rises.

The left subclavian rises from the aorta a primitive trunk. It is situated very deeply, because that part of the curvature, which gives it origin is the most profound.

Length. The right is shorter than the left, by the whole length of the arteria innominata.

Direction. The right runs obliquely outwards and upwards, as far as the interval between the scaleni muscles. The left ascends vertically even till it comes close to these muscles; then it turns suddenly outward to pass between them.

Relations. The right is partially covered at first by the clavicle, by the sterno-thyroid

muscle and by the right subclavian vein. It is afterwards crossed by the nerve par vagum. Posteriorly, it lies over the spine and the muscle longus colli, yet at a little distance from them. Internally, a triangular space separates it from the common carotid. Externally, it is near the apex of the lungs.

The left subclavian is covered on the fore part by the lung at its origin, then by the nerve par vagum which lies in the same direction, instead of crossing it. It corresponds remotely with the first rib, with the clavicle, and lastly with the sterno-thyroid muscle, from which it is separated by a distinct interval. Posteriorly, it lies immediately on the spine and the muscle longus colli. Internally, it runs parallel with the common carotid. Externally, it corresponds directly with the left lung.

When they have reached the scaleni muscles, the two subclavians are situated alike. Both suddenly take a transverse direction, in order to enter between these muscles. Then they change their name and take that of

axillary. Immediately before this occurs, the subclavian gives out its principal branches.

These are in number six,

Two inferior, the internal mammary and superior intercostal; two superior, the vertebral and inferior thyroid, and two external, the deep cervical and superficial cervical. The superior scapular is often given off from this artery also.

A. The INTERNAL MAMMARY ARTERY—going off from the lower and interior part of the trunk, at the highest part of the pleura, where, ascending gradually, and again bending downwards to the sternum, it reaches the margin of the first rib, under which it passes; and, running between the pleura and middle part of the cartilages of the ribs, descends between the internal intercostal and the sterno-costal muscles, as far as the diaphragm. It then passes between the diaphragm and the ribs, and, dividing into many twigs, is lost under the rectus of the abdomen. From its origin to the third rib, it bends towards the sternum, then gradually inclines outwards. Its branches are,

A Recurrent Branch—passing in the direction of the clavicle to the muscles of the neck, and distributing to these muscles small irregular ramuli.

The *Thymic* Branch—which is often double, and varies very much in the distribution of its twigs to this gland; which also receives arteries from those of the mediastinum and pericardium.

The *Superior* and *Posterior Pericardiac* Branch—

rising sometimes from the mammary, and sometimes from the subclavian artery; sometimes from the aorta or from the common carotid; and as it winds to the upper and back part of the pericardium, distributes itself upon the trachea, the glands, the coats of the pulmonary artery, the pericardium, and œsophagus.

Many Mediastinal Branches—rising between the third and sixth ribs; some of which go to the thymus gland, and a larger one to the diaphragm. Sternal Branches—spreading variously on the back of the sternum, and uniting with branches from the opposite side.

Smaller branches to the pericardium and glands, lying on the vena cava.

Many branches *to the adjoining surface of the* LUNGS.

The *Phrenico-pericardiac* Branch—descending above the pericardium to the diaphragm, and sometimes stretching near the ensiform cartilage to the rectus muscle.

The *Musculo-phrenic*—rising in a large Branch at the sixth interstice of the ribs, turns outwards, between the cartilages and the sternacostal; then proceeds obliquely to the interstices of the seventh, eighth, and ninth, ribs, where it forms inosculating rings with the inferior intercostal arteries; and here sending many twigs to the diaphragm, at last spreads at the tenth rib on the transverse muscle of the abdomen.

A branch, winding on the surface of the ensiform cartilage, and inosculating with the branches of the opposite side, or going down as far as the rectus muscle. Sometimes passes through the ensiform process.

The *Epigastric* Branch.—A continuation of the trunk; as it leaves the thorax by the side of the ensiform cartilage, at the seventh rib, is covered by the abdominal muscles, and divided into

An Iternal Branch—going down to the rectus muscle, often as far as the umbilicus, and inosculating with twigs of the *epigastric*.

An External Branch—going to the transversalis, and

inosculating with the epigastric, intercostal, and lumbar arteries; sometimes sent from the musculo-phrenic; and if that be smaller, this supplies it with many branches.

B. The SUPERIOR INTERCOSTAL ARTERY—rises more externally than the *vertebral*, from the upper and posterior surface of the trunk; then ascends with it to the hollow that is formed by the anterior scalenus, the surface of the first rib, and bodies of the vertebræ. It is there suddenly reflected; and, proceeding to the roots of the first and second ribs within the thorax, gives,

Ascending branches, irregular in number and size, to the scaleni, the longus colli, and the nerves.

Branches to the intercostal muscles of the first and second interstices, which run along the margins of the ribs, forming circular inosculations with the *higher thoracic* branch and the branches of the *internal mammary*.

Numerous *Oesophageal* Branches—

Branches sent through the openings for the nerves to the hollow of the spine, and there distributed both to the *involucra* and the medulla.

Branches passing over the third rib, and inosculating with twigs of the *first inferior intercostal*.

Deep branches, passing through the intercostal spaces to the deep muscles of the back and neck.

C. The VERTEBRAL ARTERY—larger than the former, rises from the superior side of the *subclavian;* and, ascending a little backwards, covered by the ganglions of the intercostal and the cellular membrane, reaches the perforations of the

transverse processes of the cervical vertebræ. Through these it penetrates, and, rising perpendicularly from the sixth, or sometimes from the fifth or fourth opening, reaches the aperture of the atlas, where it bends a little outwards; and having passed through, undergoes another more extensive flexion backwards and inwards, by which it is carried transversely in a groove, between the occipital bone and the atlas, to the foramen magnum. Through this opening, having at last entered the cranium, it proceeds upwards and forwards, and at the basilar apophysis, under the medulla oblongata, meets, at an acute angle, with the vertebral artery of the opposite side, forming the *basilar artery* to be distributed to the cerebrum and cerebellum. It gives, in this course,

Larger branches, passing through the intervertebral openings for the nerves, to the coverings of the medulla, and inosculating with the anterior and posterior spinal branches.

A branch going, with various twigs, from the first bend of the artery to the rectus posticus major and minor, the obliquus major and minor, the trachelomastoid, and complexus; and inosculating with branches reaching from the occipital artery.

Posterior Meningeal Branches—proceeding from the second and third flexures, and winding forward upon the dura mater of the cerebellum, as far as the clinoid processes and receptacle, and backwards towards the occiput.

Before the formation of the *basilar artery*, there are sent off in the cranium itself—

1. The *Inferior Artery of the Cerebellum*—issuing at a right angle from the trunk, near the medulla oblongata,

between the tenth and accessory nerves. It not only distributes many branches to the lower surface of the cerebellum, but, being concealed between the medulla oblongata and the crura of the cerebellum, is so sent backwards and upwards as to terminate in the vermiform process of the cerebellum and fourth ventricle.

2. Branches sinking into the furrow that separates the corpora pyramidalia from the tuber annulare.

3. The *Posterior Spinal* Artery—rising often from the inferior artery of the cerebellum; and, bending from the anterior to the posterior surface of the medulla oblongata, descends tortuously on the spinal marrow, and inosculates freely in its descent with its fellow and with other branches, as they pass to the medulla through the openings for the nerves. It terminates on the surface of the medulla at the second lumbar vertebra; and through its whole course supplies, with minute twigs, the medulla, and its several nerves, as they pass out.

4. The *Anterior Spinal* Artery—rising, at an acute angle from the trunk, near its fellow, and, descending in a retrograde course, proceeds in a winding direction upon the anterior surface of the medulla, inosculating by transverse branches in the region of the neck and back with the artery of the opposite side, to which it is parallel. The two arteries at last uniting near the termination of the medulla, form a trunk, which is sent to the extremity of the os sacrum; and which, if emptied of its blood, assumes the appearance of a nerve: whence the ancient error as to a *Nervus Azygos*. It distributes numerous branches to the neighbouring parts, and to the nerves as they go out, and enters into frequent anastomoses with the spinal branches, penetrating the interstices of the vertebræ.

The BASILAR ARTERY, being formed as above, occupies the depression in the middle of the tuber annulare, and at its anterior part divides into four

parallel branches, proceeding from the trunk at right angles. Of these, the posterior go to the cerebellum; and the two anterior, ramified on the cerebrum, unite with the *communicating arteries* of the carotid, and form the Great Circle of Willis.

The *Deep Arteries of the Cerebellum*—Right and Left—winding behind the crura of the cerebrum to the superior part of the cerebellum, and there exhibiting,

The *Deep Artery of the Cerebrum*—larger than the last, and separated from it by the third pair of nerves. Turns upwards along with the former, between the cerebellum and posterior lobe of the cerebrum; and gives,

1. *Communicating* Branches—forming the circle of Willis, and frequently of unequal size. They proceed forwards, almost at a right angle, to meet the *communicating artery* of the carotid, and give minute twigs to the adjacent parts.

2. A branch, going to the sides of the crura of the cerebrum and the lateral ventricle, and distributing small branches above the thalami, to the corpora quadrigemina, the pineal gland, the choroid plexus covering these parts, to the fornix, the corpora striata, and the third ventricle.

3. A branch, the greatest part of which is sent, immediately with its very numerous twigs, into the sulci of the posterior lobe; from which, again, smaller ramifications arise, to be distributed, to the corpus callosum and septum lucidum.

D. The INFERIOR THYROID, or ANTERIOR CERVICAL ARTERY—rising from the fore part of the trunk, near the mammary and vertebral arteries; and being covered by the sternomastoid, and

bent a little upwards and outwards, immediately divides into four principal branches—

1. The *Transverse Scapular*—the lowest branch of the thyroid artery, but sometimes of considerable size—is covered at first by the sternomastoid, and passes transversely to the scapula, under the trapezius. The *superficial cervical* sometimes supplies the place of its superior scapular branch.

Branches going separately to the sternomastoid, the sternohyoid, the omohyoid, and the subclavian muscles, the coats of the arteries and veins, and the skin of the neck and breast.

The *Superficial Scapular* Branch—giving twigs to the integuments on the top of the shoulder and surface of the trapezius and deltoid.

Branches to the posterior part of the trapezius.

Branches to the levator scapulæ and the serratus.

Thus is the artery often wholly expended. At other times, it sinks deep under the trapezius, in many tortuous windings, where it properly takes the name of *superior scapula*, or *dorsoscapular;* and is chiefly divided into two smaller trunks, sending previously off

Branches to the subclavian and adjoining part of the trapezius muscle.

Branches to the lesser portion of the serratus major anticus, and adjoining rhomboid, near the superior angle of the scapula.

A branch, running upon the surface of the supraspinatus to the concave side of the acromion; inosculating, near the coracoid process, with the *humeral thoracic* of the axilla, and again communicating, at the superior angle, with the *superficial artery* of the *base*.

A branch, passing over the outer surface of the spine of the scapula; and, after giving twigs to the bone and the neighbouring muscles, inosculating with the *inferior circumflex scapular* in the infraspinal cavity.

Under the Trapezius, it divides into

The *Superspinal*—the first branch of the divided artery, passing through the *semilunar notch*, and distributing many twigs to the supraspinatus, is continued onwards, in two branches, under the acromion process and supraspinatus, where it begins to send branches to the scapula itself, the capsular ligament, the infraspinatus, the teres minor, and at last inosculates with the *inferior circumflex scapula.*

The *Superficial* Branch of the base of the Scapula—larger—proceeds near the lower part of the levator scapulæ to the base, and, going down between the serratus major and the rhomboid, reaches the inferior angle of the scapula. In this course, it gives many branches to the rhomboid and serratus; and through them to the trapezius, the serratus posterior, the skin, and subscapular muscle: afterwards forms, near the inferior angle, with the *inferior scapular* branch, a beautiful circle upon the surface of the serratus; from which branches descend to the latissimus dorsi.

2. The *Transverse Cervical*—running, by the side of the neck, transversely and upwards, to the cervex, where it is concealed by the trapezius. Its various branches sometimes arise from the *superficial cervical* artery.

Branches to the sternomastoid and skin.

Branches to the trapezius, levator scapulæ, and splenius.

A large branch, ascending between the splenius and trapezius, giving ramuli to both these and the complexus, and at last inosculating freely amongst the muscles with the descending branch of the principal *occipito-cervical* artery.

A branch descending to the trapezius, rhomboid, complexus, and supraspinatus muscles, and inosculating with the *superficial cervical* and the *transverse scapular* branches.

3. The *Ascending Thyroid* Artery rising between the rectus anterior and scaleni muscles, upon the fore-part of the transverse processes, as high as the second vertebra;

varying in size and in the number of its branches. It sends,

Deep branches, which are sunk between the vertebral interstices as the artery ascends. Of these are reckoned,

Branches to the intertransversarii, scaleni postici, and the origin of the splenii muscles.

Branches passing through the openings for the intercostal nerves to the *involucra* of the spinal marrow, and inosculating with twigs of the vertebral artery.

4. The *Thyroid Branch of the Thyroid Artery.*—In this the whole is expended. It bends under the carotid to the side of the larynx; and, after repeated windings, reaches the inferior part of the thyroid gland. It sinks into the gland; and while it divides into many ramifications, is partly distributed to the whole gland, and partly inosculates with the *superior thyroid.*

E. The DEEP, or POSTERIOR CERVICAL ARTERY—Irregular in its origin, size, and extent, and, like the *superficial cervical*, or *transverse scapular* of the thyroid, spreads, sometimes more, and sometimes less extensively, with its branches. It is sometimes the smallest of all, and proceeding from the *superior intercostal.* It generally issues from the *subclavian*, beyond the margin of the scalenus, though sometimes sooner under this muscle. It then winds upwards and backwards, between the deep muscles of the neck and the sixth vertebra; and is at last so dispersed among the muscles, as to bestow its ultimate branches on the complexus, near the occiput. It usually gives,

Branches winding on the surface of the bodies of the vertebræ.

Branches distributed to the scaleni muscles.

Branches to the spinal muscles of the neck, the trachelomastoid, splenius, and intertransversalis.

Branches to the complexus, often interwoven with the occipital branches.

F. The SUPERFICIAL CERVICAL—rises about half an inch, or an inch from the first scalenus, at the upper and anterior side of the subclavian where it begins to bend downwards; immediately hides itself among the brachial nerves; and spreading out afterwards, towards the superior costa of the scapula, divides into many irregular branches.

DISTRIBUTION OF THE AXILLARY ARTERY.

THE Subclavian Artery, as it bends from its first situation, between the breast and scapula, to the humerus, assumes the name of AXILLARY. Passing out under the arch of the clavicle, it is surrounded by the nerves of the brachial plexus, the veins, glands, and a quantity of fat; lies in the hollow of the axilla, between the subscapular and the serratus major: and, protected externally by the pectoral muscles, it soon approaches forwards to the arm and the interior margin of the biceps.

At last proceeding from the axilla to the inferior border of the tendon of the latissimus dorsi, it takes the name of HUMERAL ARTERY. It sends off,

A. SMALL BRANCHES to the scalenus, first rib, coracoid process, the adjacent muscles and nerves.

B. The HIGHEST THORACIC BRANCH—arising above the second rib or at the inferior margin of the first, and distributed in the upper region of the thorax, between the serratus and small pectoral—

C. The LONG, or SUPERIOR THORACIC, or EXTERNAL MAMMARY—running down as far as the fifth costal interstice. It sometimes arises from the *circumflex* or from *inferior scapular*.

Branches to the glands of the axilla and mamma, running sometimes to the nipple.

Many branches, irregular in series and situation, to the serratus major and minor; and, passing the second and fourth interstices, to the great pectoral and mamma, anastomosing with the *highest thoracic*.

Branches, sinking deeper, forming double circles with the *internal mammary* and the *inferior intercostal*, as low as the interstice of the fifth rib, and sending branches to the intercostal muscles.

D. The HUMERAL THORACIC—rising from the anterior part of the trunk, between the second rib and the coracoid process, to the upper margin of the lesser pectoral; penetrates the interstice of

the deltoid and pectoral muscles; and in its course sends

A deep branch to the serratus major.

Branches to the deltoid, to the great pectoral and subclavian muscles, and rising, above the clavicle, to the neck.

A branch, running along the subclavian muscle to the pectoral; and, in the space between this and the deltoid, distributing its branch to the pectoral muscle, the clavicle, and skin, and at last inosculating with the *transverse scapular*.

E. The ALAR THORACIC—This artery sometimes wanting, though at other times it is large, and sends numerous branches to the axillary gland, and some also, spreading extensively in various directions, to the subscapular, pectoral, and serratus.

F. Two or more large branches, rising near the upper and inferior margin of the scapula, sending twigs to the nerves, serratus, levator scapulæ, latissimus dorsi, and particularly the subscapular; inosculating, partly with the *superficial thyroid scapular* of the base, and partly disappearing among the muscles.

G. The INFERIOR SCAPULAR, or INFRASCAPULAR, or SUBSCAPULAR—rising at the inferior margin of the subscapular muscle, divides into conspicuous branches, which run in various directions. Arises, also, sometimes among the thoracic branches, when, bending downwards, it sends

A branch to the surface of the subscapular, the capsular ligament, and the muscles attached to the coracoid process.

A Deep Branch—winding, with its twigs, through the subscapular to the naked scapula, after giving twigs to the teres major and latissimus dorsi.

A Muscular Branch—large, and sometimes rising separately. Sending branches to the subscapular, extending as far as the base of the scapula; and distributing extensively large branches to the teres major, the serratus, the latissimus dorsi, and axillary glands.

A Conspicuous Branch—running closely along the margin of the subscapular, and forming, at the inferior angle of the scapula which it traverses, a large circle with the *superficial thyroid scapular* of the base. It rises sometimes from the muscular branch.

A branch, parallel to the inferior costa, and extending to the teres, the long extensor and the glands.

The *Scapular Circumflex.*—The branches already enumerated having supplied the inner part of the scapula, this large trunk bends between the inferior costa of the scapula and teres major, to the infraspinal cavity, near the cervix, and proceeds under the teres minor and infraspinatus to the spine; giving

H. The POSTERIOR CIRCUMFLEX ARTERY—issuing between the subscapular and teres major; it sinks between them, winds rounds the neck of the humerus, under the long extensor, and afterwards bends transversely, under the deltoid, backwards and outwards, from the inner side of the arm. It sometimes gives rise to the *anterior circumflex*, and the deep branch of the humerus, or *humeral profunda;* and sends

A branch to the capsule and the circumflex nerve, which it accompanies.

A branch to the coracobrachial, internal triceps, and the teres minor.

A branch, variously ramified on the capsule, the anconeus, and periosteum; anastomosing freely with branches from the *subscapular*, and running transversely, in a circular course, to the deltoid.

I. The ANTERIOR CIRCUMFLEX ARTERY—of smaller size—sent out near the former, above the teres major, proceeds round the humerus, under the biceps and coracobrachial, to the outer part of the arm, where it either disappears under the deltoid, or enters this muscle; and sends

Many branches to the subscapular, the latissimus dorsi, and the long extensor. They are often wanting.

Branches to the biceps, capsule, coracobrochial, and deltoid.

A branch, sunk in the bicipital groove; and, at the capsular ligament, inosculating by an ascending twig, with the superior branches of the *posterior circumflex*, and by a descending twig, with the deep branch of the *humeral profunda*, in the bicipital groove.

DISTRIBUTION OF THE BRACHIAL OR HUMERAL ARTERY.

THE AXILLARY ARTERY is first known by the name of HUMERAL or BRACHIAL, where it proceeds from the axilla to the internal side of the arm. Having left the cavity of the axilla, and passed to the internal surface of the

tendon of the teres major, it continues its course above the internal brachial to the inner side of the biceps, and gradually runs along the middle of the arm to the anterior surface of its extremity; where at last, concealed under the aponeurosis of the biceps, it divides, near the bend of the fore-arm, into ULNAR and RADIAL Arteries.

A. A BRANCH—going down, near the tendon of the teres major, under the coracobrachial, to the bicipital groove and giving recurrent twigs to the head of the humerus and capsule.

B. BRANCHES to the head of triceps and coracobrachial.

C. Many BRANCHES going out, in various places to the biceps, the internal brachial, and bone.

D. The DEEP BRANCH of the HUMERUS, the LARGE COLLATERAL, or LARGE HUMERAL PROFUNDA—sometimes double rising, from the inner side of the trunk, at the inferior margin of the teres major; but sometimes sooner, from the *inferior scapular*, or *posterior circumflex*. It proceeds backwards, with a gentle curve; and, accompanying the long extensor, runs to the cavity between the anconei muscles, where, in the passage of the spiral nerve, it divides into two branches, at the upper junction of the external anconeus and internal brachial. It gives

A branch to the long and external head of triceps.

A branch to the biceps, coracobrachial, the periosteum, the tendon of the teres major, and the deltoid; inosculating with twigs of the anterior circumflex, and with other branches of the *humeral* artery.

Many distinct branches, sent off from the trunk in its descent; some of them ascending to inosculate with branches of the humeral and scapural arteries, and others descending to be ramified on the muscles.

The *Large Communicating Radial*, or *Profunda-radial*—The internal branch of the divided trunk, which winding between the external head to the spine of the condyle, forms, around the external or *extensor* condyle, anastomotic arches with the *radial recurrent*, the *lesser profunda*, and *superior interosseal perforant*.

The *Large Communicating Ulnar*, or *Profunda-ulnar*—the interior and deeper branch of the divided trunk, bending between the internal anconeus and brachial, to the internal or *flexor* condyle; and sending

E. A BRANCH to the coracobrachial and internal brachial.

F. A BRANCH—descending on the surface of the internal anconeus, and communicating, near the bend of the elbow, with the *ulnar recurrent*, the *great anastomotic*, or sometimes with both.

G. A BRANCH—which, after having sent off twigs to the adjoining anconei and coracobrachial muscles, proceeds upon the inner surface of the arm, as far as the olecranon, and inosculates with branches of the *Ulnar recurrent* and *dorsal arch*.

H. BRANCHES ramified on the biceps and coracobrachial, irregular both in number and origin, and distributing their twigs both upwards and downwards.

I. The LARGE NUTRITIOUS ARTERY of the humerus—arising at the inferior part of the coracobrachial, bending outwards, and sending off

A branch to the external anconeus and skin; inosculating with the other branches distributed to that muscle.

A deep branch to the internal brachial, at last terminating in the deltoid.

Branches entering the bone in several places.

Branches, inosculating, at times, with the *large anostomotic* or *lesser profunda.*

K. The LESSER PROFUNDA—rising externally from the trunk; penetrating the internal brachial, and winding between the supinator and the radial extensor, to the outer or *extensor* condyle. By its ascending twigs, it inosculates with the *nutritious*, and by its descending, with the *radial recurrent.* These likewise pass sometimes to the articular ligaments.

L. The LARGE ANOSTOMOTIC—rising, sometimes double, from the internal side of the trunk, a few inches above the joint; but immediately dividing, it passes, in a transverse course, upon the surface of the internal brachial, to the flexor condyle, where, perforating the intermuscular ligament, it runs upwards to the cavity, between the condyle and olecranon, covered by the tendon of the triceps and the ulnar flexor of the carpus. It sends off

An *Ascending* Branch—sinking in the anconeus, and anastomosing with the *large communicating ulnar*.

A *Descending* Superficial Branch—to the pronator, sublimis, and internal brachial. It inosculates with superficial twigs of the *ulnar recurrent*; and, after perforating the muscle, again anastomoses, upon the periosteum and capsule of the fore-arm, with branches of the *radial recurrent*, where it forms, around the articulation, the *anterior arch*.

A Deep *Descending* Branch, anastomosing, anteriorly, with the *ulnar recurrent*, and posteriorly with the same *recurrent* and *interosseal* artery.

A *Transverse* Branch—which, with the *profunda-ulnar*, the *profunda-radial*, the *lesser profunda*, and all the *recurrents* forms, above and below the condyle, the *posterior dorsal arch* of the humerus. This arch distributes many branches to the joint, and the neighbouring parts.

THE ULNAR ARTERY.

The *humeral artery* sometimes undergoes the division already mentioned at the middle of the humerus, or even higher. This, however, is the largest artery which arises from the trunk at the bend of the arm. Scarcely has it arisen, when it sinks deep into the cavity that is occupied by the tendon of the biceps, the nerve, blood-vessels, and fat. It then bends, near the interstice of the bones,

under the pronator teres, radial flexor, palmaris longus, and sublimis, to the ulnar side of the fore-arm, proceeding gradually, with many deflections, between the sublimis, the profundus, and ulnar flexor, to the wrist. Passing over the wrist, it forms the *superficial arch* of the hand, which gives beautiful arteries to the fingers, and finally inosculates at the palm with the radial artery. The more remarkable branches which it sends off are,

A. A BRANCH to the pronator teres and the common head of the flexors.

B. The HIGHEST INTEROSSEAL PERFORANT going first to the internal brachial and capsule, where it forms the *anterior arch*, by a branch inosculating with the *anastomotic* and the *radial* and *ulnar recurrents*. After perforating the interstice of the bones, it sends, under the small anconeus, a number of recurrent branches upwards to the *dorsal arch*, and downwards to the extensor muscles. The whole artery often rises from the *common interosseal*.

C. The ULNAR RECURRENT—sent off from the ulnar side of the trunk, a little above the *common interosseal;* and, having passed through the flexor muscles, is reflected to the posterior part of the internal condyle. In which course are distributed,

A branch to the capsule, the flexor muscles, and ulna.

D. The NUTRITIOUS ARTERY of the ULNA—running on the anterior surface of the bone, near the origin of the profundus.

E. The COMMON INTEROSSEAL—rising at the higher extremity of the profundus—running on the interosseous ligament, between the flexor pollicis and profundus, to the pronator quadratus, and there dividing into two arteries,

Branches to the radial flexor of the carpus pronator rotundus, profundus, and sublimis.

A small Perforant Branch—to the supinator brevis and capsule.

A branch to the flexor of the thumb and tendon of the biceps.

A Nutritious Branch of the Ulna—entering the middle surface of this bone.

The *Highest Posterior Interosseal Perforant*—rising, sometimes wholly, from the ulnar, sometimes double, when its largest division communicates, by its recurrent twigs, with the former; but sends off at the same time, a large descending branch, running with the extensor of the little finger, by which it is covered, as far as the extremity of the fore-arm, where at last in inosculates with the posterior *dorso interosseal.* It gives

Reflex branches to the supinator brevis and the origin of the common extensor.

Branches ramified on the radial and ulnar extensors of the carpus.

Branches to the extensors of the thumb, the common extensor, and abductor.

A large branch to the profundus, winding extensively downwards on this muscle.

The *Nutritious Artery of the Radius.*

Many branches—going in the descent of the trunk, to the profundus and the flexor of the thumb.

Small Interosseal Perforants—from four to seven in number; rising separately from the trunk; perforating, in different places, the interosseous ligament; and passing into the common extensor, supinator brevis, ulnar extensor of the carpus, the extensors of the thumb, fore finger, little finger, and periosteum, they all enter into various inosculations with one another; and the superior are larger than the inferior,

The *Posterior Dorso-Interosseal*—the larger branch of the divided artery; rising at the inferior margin of the pronator quadratus; and, having passed over the interosseous space, branching out at the posterior extremity of the ulna and wrist, divides into three branches.

A branch, anastomosing with the *highest interosseal perforant.*

The *Ulnar* Branch—the first artery of the divided trunk, bending to the posterior surface of the ulna, along with the tendon of the ulna extensor; and inosculating with the perforating branches of the radial artery, the *middle branch* and the *dorsal* of the *hand.*

The *Middle* Branch, larger than the rest; sinking under the ligament of the carpus to the tendons, the ligaments, and skin; forming a plexus with the perforating branches, the *dorsa carpal*, and its fellows.

The *Radial* Branch, accompanying the second tendon of the radial extensor, and inosculating with the preceding twig under the ligaments, as also with the first metacarpal branch of the *dorso-carpal*, and the *radial perforants.*

These three, in conjunction with the *dorso-carpal* and *dorsal* of the *hand*, form a beautiful plexus around the carpus.

The *Vola-interosseal*—the other branch of the trunk covered by the pronator, running to the naked ligaments of the carpus, where, after supplying with many twigs the ulna, radius, and the articulation of the wrist, it forms a vascular plexus with the recurrent branches of the *deep volar arch*. In this course it forms other minute inosculations with the *radial* and *ulnar*.

F. MANY BRANCHES—rising from the descending trunk; irregular in number and situation, and going to the long flexor of the thumb, the radial nerve, the radial and ulnar flexors, the palmaris, sublimis, profundus, and skin.

G. The DORSAL OF THE HAND—rising at the lower side of the ulna, near the pronator quadratus, at the distance of an inch from the pisiform bone; winding under the ulnar flexor, to the back of the hand, and proceeding to the *ulnar* side of the little finger. From this are sent

A branch to the pronator quadratus, inosculating with a twig of the radial.

The *Dorso-ulnar of the Little Finger*—terminating in the first phalanx, as it unites with the *volar branch* of the same finger. It is often, however, expended much sooner about the carpus.

H. A BRANCH, distributed extensively above these to the flexor tendons.

I. BRANCHES to the pisiform bone, the palmaris brevis, and the internal ligament of the carpus.

These rise from the trunk, as it proceeds between the pisiform bone, and the carpal ligament to the hand.

K. BRANCHES to the abductor of the little finger, its flexor, abductor, and palmaris brevis, communicating with the *dorso-ulnar* of the same finger.

L. The ULNAR PROFUNDA, or DEEP ULNAR BRANCH of the HAND—rising at the inferior margin of the carpal ligament; concealed between the abductor and flexor of the little finger; and, proceeding to the *deep volar arch*, gives

Branches to the skin, palmaris brevis, and adjacent muscles.

A *Deep Circumflex* Branch—uniting with the radial artery, and forming, under the tendons, the *deep volar arch*. Even when double, it exhibits a continuation of the trunk, and supports a communication between the two arches.

M. The VOLA-ULNAR of the LITTLE FINGER—rising near the former, and, having distributed branches to the metacarpal, adductor, abductor, and the fourth lumbrical, and others communicating with the *ulnar profunda* and the fifth interior *volar perforant*, runs to the other extremity of the fifth metacarpal bone, where it inosculates with the *dorso-ulnar* of the little finger.

N. The FIRST VOLA-DIGITAL—rising near the fifth finger, from the trunk as it bends transversely above the flexor tendons, where the superficial arch is formed, divides, at the root of the fingers, into

the *digito-radial* of the little finger, and the *digito-ulnar* of the ring finger. Each of these runs tortuously along the sides of the fingers, as far as the apex. This *digital* likewise gives

Branches to the third and fourth lumbricals, and the tendons of the flexors.

A branch, forming a small arch upon the points of the fingers with the *volar artery* of the opposite side.

O. The SECOND VOLA-DIGITAL—divided into the *digito-radial* of the ring finger, and the *digito-ulnar* of the middle finger. From this proceed,

P. The THIRD VOLA-DIGITAL—divided into the digito-radial of the middle, and the *digito-ulnar* of the fore finger. The last of which inosculates, on the concave surface, with the *digito-radial* of the fore-finger. It gives

Branches to the first and second lumbricals.

Branches inosculating with the *deep arch* and its *perforants.*

Q. BRANCHES to the first lumbricals, the abductor, adductor, and flexor of the thumb, the tendons of the flexors and the skin.

R. A LARGE ANASTOMOTIC BRANCH—uniting with the radial artery, near the superior margin of the adductor of the thumb. From this inosculation a trunk is formed, which gives out the *vola-radial* of the fore finger, and the *vola-ulnar* of the thumb, or sometimes the *vola-ulnar* only.

S. MANY MINUTE BRANCHES—issuing from the concave surface of the arch, and ramified upon the tendons; afterwards sinking deeper to the wrist, inosculating with many twigs of the *vola interosseal.*

THE RADIAL ARTERY.

THE smallest of the two branches which proceed from the division of the HUMERAL. It runs down in a straight line, upon the surface of the pronator and gradually inclines towards the radius, between the long supinator and radial flexor, resting on the flexor of the thumb. At the lower extremity of the radius, where it is easily felt between the styliform process and the trapezium, on the back of the hand, it bends under the abductor and extensor of the thumb, near the first radial extensor; then penetrating the abductor or semi-interosseous of the fore finger, between the metacarpal bone of the fore finger and thumb, bends while there concealed, to the palm, between the fibres of the adductor pollicis and forms, in the hollow of the hand, under the flexors, and above the interosseous muscles, the *deep volar arch*, in which it terminates.

A. A BRANCH, dividing upwards and downwards to the supinator longus and the radial extensors, sometimes inosculating with the small *humeral profunda.*

B. The RADIAL RECURRENT—reflected round the tendon of the biceps, to the external condyle; concealed between the long supinator, the short radial extensor and internal brachial, where it forms, like the *ulnar recurrent*, important inosculations, and gives

Branches to the pronator rotundus, short supinator, and radial extensors; which, in their descent, inosculate with other *recurrent ramuli.*

Branches proceeding, at various places from the trunk to the radial extensors long supinator, the extensors of the fingers, the ulnar extensor, and skin. Of these, the branches reflected to the extensors inosculate with the *highest posterior interosseal perforant.*

The *Superficial Anostomotic* Branch—inosculating on the surface of the internal brachial with the *small humeral profunda*, and the *profunda-radial* of the arm, as they wind near the spine of the condyle, under the superior fleshy part of the supinator and the radial extensor.

A branch sunk in the internal brachial, and forming, round the joint on the capsule and pereosteum, the *anterior arch* with the large anostomotic branch of the *humeral.*

The *Deep Anastomotic* Branch—running extensively between the long supinator and the bone, or betwixt the radial extensor and triceps, to the posterior surface of the external condyle, where it inosculates with a branch of the *small profunda* and the *profunda-radial* of the arm.

C. MANY BRANCHES—as the trunk runs

superficially on the pronator rotundus to the radial extensors, the supinators, the pronator rotundus, and radial flexor. Some of these usually inosculate with twigs of the *common interosseal.*

D. BRANCHES—rising from the artery as it leans on the radius, sinking into the sublimis, flexor of the thumb, radial flexor, and palmaris longus, and in many places inosculating with branches of the *ulnar*, going to the same muscles.

E. A BRANCH to the pronator quadratus, inosculating with twigs of the *vola-interosseal.*

F. BRANCHES to the tendons of the supinator, radial, abductor of the thumb, and bone of the radius; uniting with the *dorso-interosseal.*

G. BRANCHES running on the hand to the tendons of the flexors.

H. The SUPERFICIAL VOLAR—rising at the inferior extremity of the radius, where the trunk begins to bend to the back of the hand, and proceeding, near the os trapezium, beyond the tendon of the radial flexor, runs to the palm, under the skin, and above the short abductor of the thumb. This artery is sometimes large, and presents many varieties; and, at other times is so small as not to pass the abductor. If large, it commonly sends

A branch, inosculating with the *dorso radial* of the thumb.

An *Anastomotic* Branch—uniting with the ulnar artery, near the termination of the flexor of the thumb, to which it gives twigs. It is sometimes wanting.

The *Vola-ulnar of the Thumb*—rising sometimes from

the trunk (as below); at other times exhibiting, beyond the abductor, a continuation of the trunk on the ulnar side of the thumb, where it inosculates, near the apex and articulation, with the *vola-radial.*

I. A BRANCH—ramified on the ligament of the carpus, the bone of the radius, and flexor tendons.

K. BRANCHES to the tendons of the abductor, and radials, inosculating with the *dorso-radial* of the fore finger.

L. BRANCHES to the neighbouring bones and their articulations.

M. A BRANCH to the abductor brevis, and opponens pollicis.

N. The DORSO-RADIAL of the THUMB—rises from the trunk as it bends to the back of the hand, near the os trapezium, and accompanies the metacarpal bone of the thumb, running along the external insertion of the opponens.

Branches to the tendons of the extensors, abductor, and opponens of the thumb, forming in many places above its metacarpal joint, a vascular arch with the *pollicar*, or principal artery of the thumb.

A branch—uniting at the last phalanx of the thumb with the *vola-radial.*

O. The DORSO-ULNAR of the THUMB—rising near the os trapezoides, under the tendons of the abductor and long extensor.

Branches to the abductor and articulation of the fore finger or index, inosculating with the *dorso-radial* of the index.

A branch terminating in the first phalanx of the thumb, and inosculating with the *vola-ulnar* and the *dorso-radial.*

P. The DORSO CARPAL—issues from the trunk, near the tendons of the radial, and proceeds transversely above the carpus, and under the tendons of the extensors, to the ulnar side of the wrist, where it forms an extensive plexus with the branches of the *dorso-interosseal*, and completes the *dorso-carpal arch* with the *dorsal* of the hand. At the same time sends off

The *First Metacarpal* or *Dorso-interosseal*—descending beyond the carpus, upon the surface of the first interosseous muscle, between the fore and middle fingers; and inosculates with the third *vola-digital* at its bifurcation.

Branches to the bones of the carpus and joint, inosculating with the branches of the *dorso-interosseal.*

The *Second Metacarpal*, *Dorso-interosseal*—running in the interosseous space to the roots of the third and fourth fingers.

The *Third Metacarpal*, or *Dorso-interosseal*—running, like the last, in the fourth interval of the fingers, and forming similar inosculations with the adjoining arteries. Sometimes one or other of the *metacarpals* is produced from the *perforants.*

Q. The DORSO-RADIAL, or LARGE, or RADIAL INTEROSSEAL of the INDEX—rising between the first and second metacarpal bones, while the trunk penetrates the inferior margin of the abductor or semi-interosseous; and, following the course of the interosseous, inosculates on the index with the *volar* artery of the same finger.

R. The POLLICAR, or PRINCIPAL ARTERY of the THUMB—rising from the radial trunk, where it sinks among the muscles to the palm of the

hand between two metacarpal bones; and, dividing into two branches, runs to the volar side of the thumb, between its abductor and adductor muscles. It generally gives

Many branches to the back of the metacarpal bone and abductor of the thumb.

The *Digito*, or *Vola-radial of the Index*—running to the radial side of the fore-finger, and uniting, beyond the adductor of the thumb, with the interosseal of the index, or a superficial branch of the ulnar.

The *Digito*, or *Vola-radial of the Thumb*—the outer branch of the trunk, as it divides at the lower extremity of the metacarpus, sends many twigs to the back of the thumb from its radial side, and inosculates upon its apex with

The Digito, or *Vola-ulnar of the Thumb*—the internal branch of the same trunk, rising often from the superficial *vola-radial*, reaching to the thumb, and inosculating with the *superficial* arch.

S. The SUPERIOR VOLAR PERFORANTS—three in number, proceeding from the concave margin of the *deep volar arch* as it rests on the interosseous muscles; and, penetrating near the superior extremity of the metacarpal bones, at the back of the hand, they produce, as it were, *middle metacarpals*, interwoven with the branches of the *dorso-carpal.*

T. The INFERIOR VOLAR PERFORANTS, or VOLAR INTEROSSEALS—rising six or seven in number, from the convex margin of the deep arch. They occupy the metacarpal interstices;

and, winding round the radial and ulnar sides of each bone, inosculate, at the roots of the fingers, with the *metacarpal* and *vola-digital* branches.

U. Two or three recurrent branches to the carpus, anastomosing with ramuli of the *vola-interosseal*, and with some twigs of the *radial* and *ulnar*.

V. A branch, completing the *deep arch*, by inosculating near the little finger, with the *ulnar profunda* of the hand.

III. ARTERIES FROM THE THORACIC AORTA.

Through its whole descent, the thoracic aorta inclines to the left; though near the lesser or inferior diaphragm it seems gradually to approach the middle of the vertebræ. The numerous branches which it sends out, though not large, are yet worthy of notice. These are

I. The superior and posterior pericardiac artery—rising from the concave surface of the arch; most commonly, however, from the *subclavian* or *internal mammary*—which see.

II. The common bronchial artery—rising from the fore part of the thoracic aorta, and immediately divided into the right and left *bronchial* arteries. Both of these, as they go down

the anterior part of the trachea, are ramified on the bronchi, their glands, and vessels: the left on the posterior surface of the lungs; and the right on the œsophagus also. Sometimes this artery is wholly wanting, or supplies the functions of the following arteries.

III. The RIGHT BRONCHIAL ARTERY—rising sometimes from the aorta; at other times from the *superior*, of the *inferior intercostals;* sending its twigs both before and behind the right bronchus, to the air-vessels, and adjoining glands; and giving others to the neighbouring lobes of the lungs, the pleura, the posterior part of the pericardium, the pulmonary sinus, and finally, to the œsophagus.

IV. The LEFT, or SUPERIOR BRONCHIAL rising transversely to the left *bronchus*, or left division of the trachea, and giving branches similar to the former.

V. The INFERIOR BRONCHIAL—issuing from the aorta at the fifth vertebra, and accompanying the bronchi, in the course of the pulmonary vein to the internal part of the lungs; distributing twigs similar to the former *bronchial.*

N. B. Although the BRONCHIAL ARTERIES deserve our attention from their inosculations in the substance of the lungs with the small branches of the pulmonary artery; yet like other smaller vessels they exhibit new varieties in almost every *subject.*

VI. ŒSOPHAGEAL ARTERIES—five or six in number—slender—issuing at different places, from

the trunk under the *bronchials*, or sometimes from the *bronchials* themselves. They wind on the surface of the œsophagus, running afterwards to the posterior mediastinum and the pericardium. Of these, the largest enters the abdomen with the œsophagus, and generally inosculates with the *coronary œsophageal*, or ascending coronary branch of the *cœliac* and *phrenic* arteries.

VII. The INFERIOR, or AORTIC INTERCOSTALS—from eight to ten in number—rise from the posterior and lateral sides of the trunk, and, bending to the interstices of the ribs, run along their inferior margins. As the branches of the right side must pass over the bodies of the vertebræ, they are longer than those of the left. The four or six superior ones are smaller, and ascend a little; while the inferior proceed transversely. The *first superior*, rising at the fourth vertebræ, and running in the third or fourth costal interstice, inosculates with the *superior intercostal* of the subclavian. The last, rising behind the crura of the diaphragm, passes over the quadratus lumborum; and following the margin of the last rib, is distributed to the aponeurosis of the transverse muscle of the abdomen. They all send,

A. *Three Branches*—running near the heads of the ribs, to the spinal cavity: the *first* entering the bone; the *second*, the dura mater; and the third where the costal nerve comes out entering the spinal marrow.

B. Deep Dorso-muscular Branches—sent to the dorsal muscles; and forming a plexus on the back.

N. B. The preceding twigs sometimes unite into one trunk.

C. A number of branches to the intercostal muscles; and, after penetrating these, distributed to the serratus anticus, pectoralis, latissimus, and external oblique.

D. The *Superior Costal* Branch—the smaller division of the trunk—winding from the angle of the rib to its superior margin, and sometimes forming, as it runs along, the *superior ring* or inosculation.

E. The *Inferior Costal* Branch—exhibiting a continuation of the trunk; uniting above with the *thoracics* and *internal mammary;* below, on the fore-part of the abdomen, with the *epigastric* and *lumbar* branches. It forms the *principal ring* with the mammary; and in its course gives every where twigs to the neighbouring parts.

IV. ARTERIES FROM THE ABDOMINAL AORTA.

The Ventral Aorta is the lowest part of the common trunk. It passes from the thorax, through the inferior muscle of the diaphragm, to the right side of the œsophagus, in a straight direction, inclining rather to the left; and, proceeds gradually through the abdomen, upon the surface of the vertebral column to the fifth lumbar vertebra, or thick ligament connecting the fourth and fifth. The inner or long crura of the diaphragm, variously interwoven behind the œsophagus, separate,

anteriorly on the aorta, allowing a passage, through which it descends, resting posteriorly on the vertebral column. This passage is considerably larger than the trunk, loose cellular substance, connecting the pleura and peritoneum, being interposed. The aorta at this place is separated from the vena cava by the left lobe of the liver, a part of the diaphragm, and a large quantity of cellular substance; but in the space between the kidneys and the liver, these two vessels approach so near, that the right margin of the artery is partly covered by the vein that afterwards send some of its branches anteriorly across.

The Abdominal Aorta is divided at the vertebra, mentioned above, into two branches of equal size, forming an acute angle as they run towards the brim of the pelvis. These, anatomists have called *iliacæ communes*, or Common Iliacs. The branches of the ventral aorta are best described in the order in which they occur.

I. The PHRENIC ARTERY—*Right* and *Left*—very irregular in origin and division. Sometimes

a single trunk, rising above the *cœliac*, divides into the *right* and *left phrenic*. Sometimes again, and indeed most frequently, the *right* rises from the *cœliac*, and the *left* from the aorta; while, at other times, they have been observed rising together, both from the *cœliac*, or both from the aorta. Sometimes the single trunk, or *common phrenic*. being larger than usual, constitutes the fourth branch of the *cœliac*, and then forms the *superior coronary* branch of the stomach. There are sometimes three or four phrenic arteries, which, as soon as they arise, bend obliquely outwards, before the crura of the diaphragm, to the inferior margin of its tendenous alæ; and, while they here wind tortuously under its fleshy fibres, distribute various twigs upwards, outwards, inwards, and downwards. Bending at last to the external margin of the tendon, and passing between the muscular layers, they run forwards, and inosculate upon the costal muscles, with the *thoracic* vessels, and the artery of the opposite side. At the bend of the artery, however, they send a larger branch to the posterior and inferior portion of the diaphragm as it rises from the ribs. Besides the branches of the diaphragmatic tendon and muscle, the following likewise merit attention.

A. Branches going to the two sides of the renal capsules, and adipose substance lying on the kidneys. See a description of these arteries below.

B. Branches—uniting, after penetrating the diaphragm,

with the accompanying branch of the phrenic nerve, and the other *phrenics* rising from the mammary.

C. Branches—some passing on the right side to the pancreas, liver, and vena cava, others accompanying the vena cava to the pericardium, the posterior surface of the liver, and its suspensory ligament; inosculating, in many places, with the hepatic arteries. Upon the left, they run to the left lobe of the liver, the ligament of the spleen, the œsophagus, and cardia.

N. B. The diaphragm sometimes receives wandering branches from the *cœliac*, *inferior intercostals*, the *capsulars*, and the *lumbars*, particularly from the *second lumbar*.

II. The CŒLIAC ARTERY—short, but of large diameter—rising between the crura of the diaphragm, above the eleventh dorsal vertebra, from the anterior part of the aorta, and at the superior margin of the pancreas, between the papillary lobule, or lobule of Spigelius, and the left side of the lesser arch of the stomach. It then descends in a tortuous manner, forwards, and to the right, and running about the third of an inch, ultimately separates into three branches, in such a manner, that the two on the right seem to arise from a common base; while the left is more distinct at its origin. These are

A. The *Superior Coronary*, or *Great Left Gastric*, or *Superior* or *Left Gastro hepatic*—smaller than the other branches if reflected only to the stomach, but almost squal in size to the *splenic*, if, as sometimes happens, it sends a branch also to the liver. It appears sometimes to issue from the *splenic;* ascends to the left, and forwards to the

cardia and lesser arch of the stomach; then bending downwards, and to the right, reaches the margin of the stomach, where it distributes extensively its circuitous branches, forming a corona to both sides of the stomach. Of these, the principal are

A *superior* Branch—running transversely upon the anterior surface to the greater arch of the stomach, and that place where the œsophagus is dilated into a sac.

The *Inferior*, or *Right Coronary*—sometimes double—descending, by the lesser arch of the stomach, towards the pylorus;

The *Left Hepatic*.—This artery, when present, terminates the trunk. Sometimes the *gastric*, after the former branches are sent off, runs immediately upwards, and to the right; and sinking between the lesser arch of the stomach and the left lobe of the liver in the *transverse fossa*, is variously ramified to the left lobe, the lobule of Spigelius, the umbilical *fossa* and the *venous duct*, at other times these branches arise from the *cœliac hepatic*.

B. The *Hepatic*.—This artery, which in adults is smaller than the *splenic*, but children larger, rises from the right side of the *cœliac*, or, as sometimes happens, from the *superior mesenteric;* when, turning upwards near the outer point of the lobule of Spigelius it is concealed by the pancreas; then proceeding forwards, upwards, and to the right, behind the right extremity of the stomach and the duodenum, it observes the same obliquity as the lesser arch; and, after running an inch, or an inch and an half, divides, below the neck of the gall bladder, into the *right transverse* and *left ascend-*

ing hepatics; entering, at last, with the other hepatic vessels, the transverse fissure or fossa of the liver. Enclosed in the capsule of Glisson, it occupies a middle space between the biliary ducts and the vena porta. Before its division, it sends

Many small pancreatic branches.

Minute branches to the lesser omentum and vena porta.

The *Duodeno-Gastric*, or *Gastro-duodenal*, or *Pancreatico-duodenal*—rising at a right angle from the trunk, and, behind the pylorus, proceeds forward between the commencement of the duodenum and the head of the pancreas, and without forming a connection with this gland, reaches the last curvature of the duodenum: then inclining to the larger arch of the stomach on the left, and entering the web of the omentum, it inosculates, in the middle of the great arch of the stomach, with the *left gastro epiploic.* From this are sent

Small Pancreatic branches.

The *Inferior Pyloric*—passing to the right, and distributing its branches under the duodenum, to the space between the curvatures of the stomach, and the first flexure of the intestine; some of which inosculate with the *superior pylorics*, and others with the *right gastro-epiploic.*

Small Duodenal Branches—passing from the trunk behind the commencement of the duodenum. Sometimes wanting.

The *Right Superior Duodenal*—sometimes double or triple, and frequently issuing from the *hepatic.* Passing the choledic duct, it winds on the posterior surface of the first transverse and descending flexion of the duodenum; when turning to the right margin of the pancreas, and the lowest posterior part of the second flexion of the duodenum, it inosculates on the left with the inferior mesenteric duodenal. It sometimes winds, in a similar manner, on

the posterior surface of the duodenum; and upon its anterior with the pancreatico-duodenal.

The *Pancreatico duodenal*—traversing the inner curvature of the duodenum in the form of a semicircle, and sending numerous branches outwards to the perpendicular and second transverse portions of the duodenum; and inwards to the head of the pancreas; at last inosculates with the *duodenals* of the *mesenteric.*

The *Transverse Pancreatic*—rising, near the inferior margin of the first flexion of the duodenum; and passing to the left over two thirds of the posterior surface of the pancreas, gives every where twigs to the substance of the gland and mesocolon. It sometimes rises from the *mesenteric*, and sometimes from the *splenic.*

The *Right Gastro Epiploic*, or *Right Gastric*, or *Inferior Coronary*—exhibiting a continuation of the trunk, as it bends to greater arch. Passing obliquely downwards, behind the pylorus, to the posterior side of the stomach, it is connected by means of the omentum, to the greater arch; and traversing its margin to the left, at last disappears in the *left gastro-epiploic.*

The *Superior Hepatico-Pyloric*, *Small Right Gastric*, or *Lesser Coronary.*—According as the hepatic divides, soon or later, this artery arises from its trunk, or its left branch: and reflected, with a very acute angle to the lesser arch, there inosculates, in various places with the *pyloric* or *coronary* artery;

The *Left Hepatic*—the lesser branch of divided trunk, and often wanting when the *hepatic* rises from the *coronary.* It first proceeds, with the trunk, parallel to the vena porta; then mounting over the trunk, enters the *umbilical fossa;* where it sends,

Branches to the substance of the liver near the venous duct, to the lobule of Spigelius, the left lobule, and lobulus anomymus.

The *Right* or *Biliary Hepatic*—covered by the biliary ducts, conceals itself in the right extremity of the transverse fossa—sometimes rises from the *superior mesenteric*—is sometimes double.

C. The *Splenic*.—While this artery runs along the upper surface of the pancreas, and passes transversely to the depression of the spleen, it exhibits large and repeated flexions, upwards and downwards, bending in a circular or spiral form. Approaching the substance of the spleen, it divides into many branches, which are equally tortuous: and of those that sink into the spleen, some smaller ones return through its substance to the diaphragm or stomach. Its most remarkable branches are,

The *Great Pancreatic*—irregular both in size and direction. The whole branch is sometimes covered by the pancreas; and, passing to the right extremity of this gland, supplies it with twigs; sending others, at times, to the adjoining duodenum and mesocolon. If the trunk divides, another branch, bending to the left, supplies the place of the *transverse pancreatic*. It inosculates with the *pylorics* and *duodenals*.

Small pancreatics—descending from the *splenic*, in great numbers, through its whole extent.

Posterior Gastrics—two or four in number—sometimes wanting—rising from the middle of the trunk as it passes to the spleen, and ascending with the omentum to the posterior surface of the large extremity of the stomach.

The *Left Gastro epiploic*, or *Left Gastric*—often double, rising near the commencement or left extremity of the pancreas, where the trunk begins to divide, bends downwards and to the right, with its two branches to the fundus, and

larger arch of the stomach; and, like the *right gastric*, with which it inosculates, follows the large curvature of the stomach.

Pancreatic Branches.

Large Epiploics—three or four in number; one of which is usually larger than the rest, but all distributed to the omentum and colon.

Gastric Branches,—inosculating with the *coronaries* on the surface of the stomach.

The *Vasa Brevia*, or Short Branches—three or four in number—issue from the trunk as it reaches the depression of the spleen; and distribute their ramuli to the fundus of the stomach, where they spread in various directions, on its surface, and inosculates with many of the neighbouring branches.

III. The SUPERIOR MESENTERIC—the largest of the abdominal or ventral branches, rising between the crura of the diaphragm, three or four lines below the *cœliac*, from the anterior part of the aorta, and under the lower edge of the pancreas; proceeds between this gland and the inferior transverse flexion of the duodenum. Passing over this portion of the intestine, it bends to the right under the mesocolon; where, received near the vertebræ into the folds of the mesentery, it first inclines to the left and then to the right; where the whole artery, advancing to the right ilium, assumes the form of the Roman S, with the concave side of its large curvature looking to the right. After giving off smaller branches, the trunk sends from its right side only two branches to the large intestines; but from the left it gives a greater number of branches to the small intestines. These are,

A. *Posterior Pancreatics*—numerous—penetrating the right and left side of the pancreas, and inosculating with the *pancreatico duodenal*, *transverse pancreatic*, and the *splenico-pancreatics*. Some of these pass through the mesocolon to the colon itself.

B. The *Left Inferior Duodenal*—two or three of them—rising from the left side of the trunk, and stretching to the inferior and left curvature of the intestine. While some twigs are reflected, upwards and backwards, in the form of arches, the rest inosculate variously with the *superior duodenals*, the *pancreatico duodenal* before this gland, and with their fellows. These branches, however, are very irregular.

C. The *Superior* or *Medio-colic*—rises sometimes above the *duodenal* branches; but generally below them under the duplicature of the mesocolon, and runs along the transverse mesocolon from the left, forwards and to the right, to the right colon and adjoining part of the transverse colon. It sometimes rises double; but more frequently, after running a short way upon the mesocolon, divides into two branches, viz.

The *Transverse Colic*—passing, in the duplicature, along the middle of the mesocolon to the concave side of the transverse colon, after having first divided, sooner or later, about three inches from the edge of the intestine, into two diverging branches.

The *Superior Right Colic*—sometimes rising, by a separate trunk, from the *mesenteric*; proceeds transversely and to the right, in the duplicature of the mesocolon, to the *hepatic flexure* of the colon; and where it approaches the intestine, gives

D. The *Ileo Colic*—This artery rises single from the right side of the trunk, about an inch or two below the last, and below the transverse mesocolon. It afterwards proceeds behind the right mesocolon, and descends beyond the psoas muscle to the junction of the ileum and cœcum. Its principal branches, are

A Curved Ascending Branch—distributing twigs to the right colon, and uniting with the descending branch of the *superior right colic.*

Inferior Right Colics—rising sometimes from the former, and running, with a double branch to the adjoining intestine.

A *Cæcal* Branch—larger than the former, and directing its course, with its trunk the *ileo-colic* to the cœcum. It gives out,

The *Anterior Cæcal*—passing along the anterior fold between the ileum and cœcum, and distributing its branches upon the anterior part of the cœcum.

The *Posterior Cæcal*—running to the posterior surface of the cœcum, giving branches to the root of the verniform process, and inosculating, near the right of the cœcum, with the former artery and with the appendicular.

The *Appendicular*—reaching, behind the cœcum, to the small mesentery of the vermiform process; and, as it runs along this, giving straight and short twigs to the process.

An *Iliac* Branch—winding to the left, and forming an arch near the ileum, with the extremity of the mesenteric trunk, from which the ileum receives new branches.

Branches, varying in number, from twelve to twenty, rise close to one another, from the left convex side of the superior mesenteric, distributing ramuli to the ileum and jejunum. Of these the superior are short and slender; the middle long and thick; the interior shortest; and the last branch of all, as observed above, inosculates with the *ileo-colic.* Running near and parallel to each other, they first proceed transversely; then rising between the layers of the mesentery, divide into smaller branches, which so diverge, that in whatever direction they go, they are soon after divided into two. These branches, as they meet, form various arches, from whose convex margin, new parallel branches arise; which again soon dividing, inosculate with the adjacent branches, forming smaller

and more numerous arches. From the convexity of these arches other branches arise, forming a third series of arches; and where the branches are longest, even a fourth or fifth series; till the last branches near the intestines, dividing into anterior and posterior, encircle these viscera, and, gradually penetrating their coats, form most beautiful arborescent ramifications on their cellular membrane. These arches, by means of their twigs, not only form various inosculations among themselves, but also with the arborescent ramifications of the two surfaces. The inner intestinal coat is so covered by these branches and the veins, as to give it the appearance of being wholly vascular. The trunks of these *arborescents* lie on the roots of the *valvulæ*. The arches are polygons; and the first series larger than the rest. The lymphatic glands, and coats of the vessels, are surrounded with numerous and various twigs, as variously distributed.

N. B. The more slender branches of the *mesenteric* generally inosculate freely with the *spermatic* arteries, near the duodenum and commencement of the small intestines, and with the *capsular* and *adipose* branches.

Singular, likewise, is that inosculation, which the *mesenteric* forms with the *epigastric* in the fœtus.

IV. The INFERIOR MESENTERIC, or LEFT COLIC.—This artery rises between the renal and common iliacs, from the anterior and left side of the aorta; descends behind the peritoneum to the left side of the trunk; and, having reached that place where the aorta divides into two remarkable crura, forming the *iliacs*, sends off a large branch; and, after passing the iliac artery, sinks behind the rectum into the pelvis. As it here rises forward and to the right, it enters the duplicature of the

mesorectum, and accompanies the intestine as far as its internal sphincter. It sends out

A. One or two branches, near its origin, distributed to the lumbar glands and the peritoneum, and inosculating, upon the left side, with some branches of the *spermatics*.

B. The *Left Colic*—a thick, but very short artery; often about two lines in length, and issuing from the place just mentioned, runs in the duplicature of the left mesocolon to the left side, and divides into three widely diverging branches, viz.

The *Ascending* Branch—rising to the left angle of the transverse mesocolon;

The *Transverse* Branch—running often double or triple, to the left colon; but first dividing, and sending a branch, which inosculates upwards with the *ascending*, and downwards with the *descending* branch.

The *Descending* Branch—running to the last portion of the left colon, and its *iliac flexure;* varies in the size and number of its branches, according as the curvature of the intestine is greater or less. It is often divided into three branches, which form anastomotic arches among themselves, and with the former.

N. B. The *Left Colic* gives out also branches, forming a plexus with the *lumbar* branches, and with smaller twigs of the *spermatics*.

C. The *Internal Hæmorrhoidal*.—This name is given to the trunk when it reaches and runs along the posterior part of the rectum. It gives out

One or two branches to the lower part of the colon.

Branches encircling the rectum, and uniting anteriorly, without forming an intermediate arch.

Branches which, with the *middle hæmorrhoidal*, the lowest *vesical* or *uterine* branch of the *hypogastric*, inosculate freely at the inferior part of the intestine, which this artery does not reach.

V. CAPSULAR, or ATRABILIARY—Right and Left. These are distinct small arteries, which, though never wanting, as they distribute many branches to the capsular gland, yet, in almost every individual, they present irregularities in number, size, or direction. They do not, like the vein, issue from one common trunk, but from the various branches, coming together near the seat of the gland; and may therefore be divided into three classes.

A. The *Superior Capsular* Branches—from two to four in number—rising from the inferior phrenics, from their common trunk, or from the transverse branch; spread variously upon both sides of the gland, and supply the fat which surrounds the kidneys, with various twigs.

B. The *Middle Capsulars*—very often double—sent from the aorta, between the *phrenics* and *superior mesenteric*. These small branches, proceeding transversely to the gland, soon divide; and give

Anterior and posterior branches to the gland.

Small *Phrenic* and *Adipose* Branches.

Branches, running upon the right side, to the nearest part of the liver, the vena cava, the coverings of the duodenum, and the right mesocolon; and upon the left to the surface of the spleen and adjoining mesocolon. They frequently unite with the arteries belonging to those viscera.

C. The *Inferior Capsular*—two or three in number—rising from the superior edge of the renal artery. They ascend outwards; and, after reaching the gland, if they be of considerable size, communicate wandering, but numerous branches to the neighbouring viscera, the renal fat, and the adjacent arteries, particularly the *spermatics*.

VI. The RENAL, or EMULGENT ARTERY—Right and Left. It is unnecessary to enumerate the varieties which anatomists have observed, as to the number, origin, and magnitude of this artery. It generally rises single from the side of the aorta; between the superior and inferior mesenteric arteries, from which it descends transversely at less than a right angle. The *left*, which is rather shorter than the *right*, and more posterior in its origin, turns, near the kidney, over its concomitant vein; while the *right*, which is longer, is covered by its concomitant vein. Approaching the renal depression, it divides into two or four branches; which, sinking separately before and behind the pelvis of the kidney, are again divided, and distribute their spreading branches to the papillary cones. These, as they encircle the convex margin of the papillæ, form arches with the adjoining branches, and seem to separate the cortical from the tubular substance. From the convex and concave margin of each arch, rise innumerable small arteries; of which the former encircle the cortex, and with some of their branches pass through its substance and disappear on the fat; while the rest are chiefly dispersed and exhausted upon the tubular part. Before entering the kidney, the renals give out,

A. The *Inferior Capsulars*.
B. *Small Phrenics* to the crura of the diaphragm.
C. Many *Adipose* Branches. See below.
D. The *Superior Ureteric*. See below.

E. *Spermatic* Arteries, inosculating sometimes with the spermatic branches.

F. Smaller branches, distributed to the mesocolon of each side.

VII. The SPERMATIC ARTERY—Right and Left—This artery is very slender, but considering the smallness of its diameter, is the longest that rises from the lateral part of the aorta. It generally has its origin between the *renal* and *mesenteric* arteries, though the right and left do not always issue from the same place; the left often rising higher, and proceeding frequently from the renal or the inferior capsular. I have observed, at times, two on each side. It descends from the aorta somewhat tortuously, at a very acute angle, behind the peritoneum, and passes before the vena cava on the right side. It is more tortuous in women than in men, in whom it passes through the abdominal ring. It joins its concomitant vein upon the surface of the psoas muscle. Received by the spermatic cord, it is divided, at some inches before reaching the testes, into five branches: two of which go to the head and opposite extremity of the epididymis; while the rest running down to the testicle itself, penetrate the tunica albuginea, and send off new branches in every direction; which, proceeding in a winding course, and reflected to the inferior margin of the testes, are partly exhausted on its substance, and partly on the convolutions of the seminiferous ducts. With-

out any perceptible diminution of diameter, the artery sends out in this course,

A. Middle and Inferior *Adipose* Branches—traversing the middle region of the kidney. See below.

B. *Superior Ureterics.* See below.

C. Branches to the duodenum, the vena cava, and liver on the right; and to the mesocolon on the left.

D. Branches to the lumbar glands, peritoneum, and the spermatic veins.

E. Branches terminating in the spermatic cord, and chiefly in the cremaster muscle, and the sceptum of the scrotum.

In females the artery does not pass through the ring, but enters the broad ligaments.

VIII. ADIPOSE ARTERIES.—Right and Left —These vessels distributed to the adipose substance round the kidneys, are, on account of their number and origin, divided, like the capsular, into certain classes.

1. *Superior Adipose* Branches, rising from all the capsulars, viz. the *phrenic*, *aortic*, *renal*, and *first lumbar*, running extensively upon the superior, posterior, and exterior adipose substance of the kidney.

2. *Middle Adipose* Branches—sent out below the *renal* artery, from the *renal spermatic* and the aorta, to the middle adipose substance of the kidney.

3. The *Inferior Adipose* Branch—rising from the *spermatic*, below the lower extremity of the kidney; and bending to its posterior and inferior adipose substance, inosculates with the *superior adipose* branches, the *ileocolics*, and twigs from the *spermatic*.

IX. The URETERIC ARTERIES—which may be reckoned among the smallest branches of the aorta, approach the ureter in different places; and may likewise be divided into,

1. *Superior Ureterics*—rising from the *renal* artery, the *inferior capsulars*, and *spermatics*, run to the pelvis of the kidney, and the upper part of the ureter.

2. *Middle Ureterics*—issuing from the aorta, a little above its bifurcation, or from the common iliac or spermatic, run, with minute twigs, extensively, upwards and downwards, upon the middle part of the ureter, proceeding to the peritoneum of the pelvis and the lumbar glands.

3. The *Inferior Ureteric*—rising from the *inferior vesicals* or *uterine*, near the insertion of the ureter into the bladder, inosculates, upon the bladder, with the former branches, sending off, in every direction, minute ramuli through the whole of the canal.

X. The LUMBAR ARTERIES—Right and Left. —Five in number, issuing from the lateral and posterior part of the aorta, at nearly a right angle. The *first* runs transversely under the first vertebra of the loins. The *fifth* between the last vertebra and os sacrum, and the rest between the vertebral interstices; while all of them after being reflected round the spine, sink into the intervening spaces of the vertebræ. The *right* are longer than the *left*. The superior proceeding in a straight line, while the inferior incline a little downwards. Two sometimes arise from a single trunk; and all, except the first, are covered by the psoas muscle.

They agree in this, that each sends to the adjoining intervertebral space,

A. Two Spinal Branches—rising sometimes separately, but most commonly by one trunk, and running in the course of the nerve, as it comes out from the spinal marrow. The *first* is larger, entering the involucrum that lines the vertebræ, forming a plexus with the neighbouring arteries, and constituting arches that encircle the membrane. The *second*, after sending a branch to this membrane and the bone, sinks into the medulla.

B. Muscular Branches—which are again divided into

Anterior Branches—distributed to the psoas, lumbar, quadratus, and abdominal muscles; and interwoven anteriorly with the intercostals, the epigastrics, and the adjoining arteries of the same class.

Posterior Branches—ramified on the posterior lumbar muscles, inosculating upon these and the surface of the bones; and running, with various twigs to the skin.

The FIRST LUMBAR passes behind the crura of the diaphragm, and, penetrating the psoas, bends anteriorly between the transverse muscle and the internal oblique. Besides the *spinals* already mentioned, it gives

1. A *Phrenic* Branch—inosculating with the former *phrenics* and *adipose* branches

2. Branches to the quadratus, psoas, and dorsal muscles.

3. Branches to the abdominal muscles, where they reach the *inferior intercostals* and the following *lumbars*.

The FOURTH LUMBAR sometimes goes out from a common trunk with its fellow. Of its anterior branches, one winds around the crest of the ileum, and is exhausted upon the transverse and the internal iliac muscles, where also it inosculates with the branches of the *ileo-lumbar*.

The FIFTH LUMBAR, shorter than the others, arises from the *common iliac*, or sometimes from the *ileo-lumbar ;* gives *posterior branches* similar to those of the preceding arteries ; but its *anterior* branches go only to the internal iliac muscle, and inosculate with the *sacro-lateral* artery.

V. ARTERIES WHICH TERMINATE THE AORTA.

THE aorta on reaching the fourth lumbar vertebra terminates in two great vessels called

THE PRIMITIVE ILIACS.

THESE arteries are equal in size and length. They run obliquely outwards, downwards and a little forwards, gradually quitting the fifth lumbar vertebra on which they are at first placed. They pass before the lateral parts of the base of the sacrum and near the sacro-iliac

symphyses divide into two considerable vessels, named external and internal iliac.

In this short course, the two primitive iliacs run along the inner edge of the psoas muscles; and are separated from each other by a quantity of cellular membrane. On the fore part, the right is in a great measure covered by the vena cava inferior; the peritoneum alone covers the left. No branch is given off by them: except at the place of their bifurcation, where an artery is sent off called

I. The SACRO-MEDIAN—of the same size as the *lumbar;* it is an azygos artery; and, rising from the bifurcation, or a little higher from the middle of the aorta, or from one of the *lumbars*, or sometimes from the *iliac*, runs down along the middle of the anterior surface of the os sacrum, as far as the coccyx, where it forms, with the *sacro-laterals*, an arch that is convex downwards. In its descent it gives

Transverse Branches; three or four in number; running outwards in undulating lines, and communicating, upon the surface of the sacral vertebræ, with the *sacro-laterals*. The first generally inosculates with the last *lumbar* and *ileo-lumbar*.

A Branch, rising to the rectum, so large as at times to supply the place of the *hæmorrhoidal*, and reach to the bladder.

Branches sent in a radiated form, from the *small arch*, and distributed to the neighbouring muscles and membranes.

II. The INTERNAL ILIAC OR HYPOGASTRIC. Five times larger in the fœtus than the *external;* but after a year, only equal in size; for while the *umbilical* continues pervious, exhausting almost the whole blood of the trunk it seems continued in this artery, forming an arch that is convex downwards, and from whose circumference the other small arteries of the pelvis are sent off. About to pass the brim of the pelvis, behind the peritoneum, it lies, with a more obtuse angle, in the middle between the ileum and sacrum; thence bending gradually downwards between the pelvis and its viscera. When the *umbilical* artery decays, the trunk distributes its numerous branches in so various directions, that none of them seem to follow its course, or to represent its continuation. As the *common pudic*

and *ischiadic*, however are the lowest, and those which run most directly downwards, they have generally been considered by anatomists as the terminating branches. Its branches, though constant, are often irregular in their origin; sometimes issuing from the trunk, at other times from the larger branches.

Of these, some remain within the pelvis, and are regularly distributed to its viscera; while others, emerging from the pelvis, run to its external and adjoining parts.

A. The ILEO-LUMBAR, or SMALL ILIAC—rising from the posterior part of the trunk, before or after the *sacro laterals*, bends upwards, and concealing itself near the crest of the ileum, between the psoas and internal iliac muscles, sends

Branches to the psoas.

An *Ascending* Branch—between the last lumbar vertebra and the ileum.

A *Transverse* Branch—running under the psoas, to the hollow of the ileum.

B. The SACRO-LATERAL ARTERIES—irregular in origin and number. Sometimes only one, sometimes more, even to five, come off from the trunk, from the *posterior iliac*, or the *ileo-lumbar*. If only one be present, it goes down, near the

foramina of the sacrum, as far as the coccyx, and there forms the arch already mentioned. If more, the superior inosculate among themselves; while the inferior terminates in the *sacro-median*. They always give

Anterior Branches—running to the bodies of the vertebræ, inosculating with the *sacro median* and other neighbouring arteries; and ramifying on the adjoining muscles and nerves.

Spinal Branches—four or five in number, each of them entering the sacral holes, and distributed to the spinal cavity.

C. The UMBILICAL ARTERY—which, in the fœtus, was the real trunk of the *hypogastric*, reflected upwards to the umbilicus, is, in the adult, converted almost wholly into a soft spungy ligament, lying in the folds of the peritoneum. A certain portion of it, however, nearest to the trunk, continues open. After having issued from the anterior part of the *internal iliac*, it runs down, transversely and inwards, to the lower part of the bladder; but gradually closes as it is reflected on its posterior side. The ligamentous part which remains, rises still higher upon the sides of the bladder; inclines gradually to its fellow of the opposite side, and at last is inserted, along with the urachas, in the umbilicus. The portion of the artery which is open in the male, sends out

The *Vesicals*—two or three in number; winding upon the inferior middle and superior part of the bladder, and inosculating with the other *vesical* arteries.

Branches to the ureters and vas deferens, anastomosing with the *pudics*.

Hæmorrhoidal Branches to the lateral parts of the rectum.

In the female,

Branches, variously distributed, to the sides of the bladder, uterus, and vagina.

A few straight branches to the rectum.

D. The INFERIOR VESICAL ARTERIES—varying in number, according as the other branches of the bladder are more or less ramified upon it. One, at least, is always present, rising often from the *hypogastric*, near to the *umbilical*; which, after running forwards to the lower part of the bladder towards the urethra, sends smaller twigs to the rectum, or to the vagina of the female. This artery is larger in men where the uterine is wanting; or if two be present, either both, or one at least, arises from the *middle hæmorrhoidal*. The illustrious Haller has observed that they have sometimes given origin to the *pudic*, *ischiadic*, and *obturator*.

A branch to the vesiculæ seminales, vas deferens, and prostate gland—running up between the bladder and rectum, and inosculating both at the vesiculæ and beyond the prostate gland, with the *profunda penis*, or *deep perineal*, and the branch from the opposite side.

A branch going to the bulb, and anastomosing with branches of the *common pudic*.

E. The MIDDLE HÆMORRHOIDAL ARTERY—irregular in its origin, and sometimes wanting; but in general, rises between the *pudic* and *posterior iliac*, or the *pudic* itself. After various flexions near the bladder and the vagina, it attaches itself to the rectum, on the anterior surface of which it runs as far as its sphincter muscle. Sometimes it is so large as to give off both the *uterines* and *sacro-lateral*. In men it gives,

Numerous branches, winding on the rectum through its whole descent, and inosculating often with the *mesenteric hæmorrhoidal* and the branches of the opposite side.

Branches, running down to the external sphincter, the levator, and the skin, and anastomosing freely with the *external hæmorrhoidals*.

Branches, distributed upon the bladder, urethra, seminal vesicles, and prostate gland, as the artery runs between the bladder and the rectum. If the *middle hæmorrhoidal* only send branches to the rectum, these sometimes form a single trunk.

In women, it gives,

Intestinal branches.

Conspicuous Branches, distributed to the vagina, where it lies upon the rectum. These often form a particular *vaginal* trunk.

F. The UTERINE—a large artery, peculiar to the female. It issues, in such a manner, from the *hypogastric* trunk, near the *hæmorrhoidal pudic*, or *umbilical*, as to have often the appearance of being a branch of one of them. Between the cervix uteri and the bladder it touches these viscera; tra-

verses the sides of the uterus, and, finally winds upon its posterior surface. It gives

A *Vesical* Branch—distributed, often double, to the bladder, where it rests upon the commencement of the vagina.

A Descending Branch—straight; often consisting of many twigs, spreading extensively upon the vagina, and sending forwards some small *vesicals*. If many *vaginal* branches be present, they here inosculate with its various twigs.

An Ascending Branch—giving out numerous serpentine branches, running between the outer coat of the Fallopian tube, ovarium, and uterus. These inosculate freely with the *spermatics*, and often with the artery of the opposite side.

N. B. The artery frequently rises by itself from the *hypogastric*, and chiefly from the *middle hæmorrhoidal;* which, under the name of *vaginal*, is extensively distributed upon the vagina, as far as its external parts. In that case, the *descending* branch of the former artery is wanting; and some twigs of this one, ascending to the cervix, inosculate with the *uterine*. In other cases the vaginal branches are much smaller than those that go to the uterus.

G. The OBTURATOR ARTERY—rising sometimes from the *epigastric* branch of the *external iliac*, and running down towards the pelvis; sometimes and indeed more frequently, issuing from the trunk of the *hypogastric*, the *posterior iliac*, the *ischiadic*, or *ileo-lumbar*. It runs downwards and forwards, connected with the bones of the pelvis, by cellular membrane, following the superior

edge of the obturator internus; and, passing through the sinuous depression of the thyroid hole, runs to the thigh with its concomitant nerve and vein. In the pelvis, it gives

Branches to the glands situated among the iliac vessels; but which are often wanting.

Branches to the levator ani, iliacus internus, psoas, and bone—also often wanting.

Branches to the inferior part of the bladder, rectum, seminal vesicles, and prostate gland, inosculating with the *pudic*. These also are often wanting, though at times they are of considerable size, and divide into many smaller branches, running as far as the corpora cavernosa penis.

A *Coronary* Branch—running along the superior and internal margin of the os pubis; proceeding under the periosteum, and inosculating with its fellow of the opposite side. From this, branches ascend to the abdominal muscles, especially the recti, and to certain ramuli of the *epigastric*.

Branches shooting out to the obturator internus, in its passage through the thyroid hole.

Beyond the pelvis, it divides into

The *External* Branch—run down betwixt the two obturator muscles, following the external margin of the foramen, and bending to the tuberosity of the ischium: afterwards descending to the back part of the thigh, between the acetabulum and tuberosity, under the femoral quadratus. Gives out

Branches to both the obturator muscles, and to the capsule of the joint.

A Deep Branch—sinking into the acetabulum, and distributed to the inter-articular fat, the round ligament of the joint, and periosteum.

A branch, which, after inosculating with the internal branch, is spent upon the large femoral abductor.

A branch, inosculating and forming a *coronary plexus*, near the tuberosity of the ischium with the *internal* branch.

A branch, distributed to the posterior part of the capsule, the periosteum of the tuberosity, the abductor magnus, and the quadratus.

Many *anastomotic* branches, interwoven with the *descending* branch of the *internal circumflex* on the quadratus; with the *ischiadic* near the quadratus; and with the *external hæmorrhoidals* of the *pudic* at the tuberosity of the ischium.

Branches—sometimes wanting—distributed, after perforating the quadratus, to the higher extremity of the semitendinosus, biceps, semimembranosus, and surface of the tuberosity of the ischium.

The *internal* branch—running first backwards, under the obturator externus to the inner margin of the foramen, and inosculating, by its extreme branches beyond that muscle, with the branches of the *internal circumflex*. From this go

Branches to the obturator muscles.

A branch, extending beyond the obturator, above the adductor brevis, to the gracilis, and symphysis pubis, and disappearing upon the skin of the genitals. This branch inosculates with those of the *pudic*.

Branches, distributed to the capsule, long adductor, and quadratus, after the artery, has passed the obturator, and inosculating, on the triceps, with the *internal circumflex*.

A branch, forming a coronary arch with the *external* branch at the tuberosity of the ischium. From this are sent twigs to the adductor magnus and biceps, anastomosing with the *common pudic*. The remaining trunk, which here runs into the *circumflex*, is sent to the quadratus, and the heads of the abductor. But this artery is throughout very irregular.

H. The POSTERIOR ILIAC, or GLUTEAL—the largest of all the arteries, issuing from the *hypogastric*. It rises early from the back part of the trunk, below the *sacro-laterals* and *obturator*; passes deeply, upwards and backwards, to the superior edge of the pyriform muscle, till, concealed by the two trunks of the ischiadic nerve, it leaves the pelvis; then winding externally round the pyriformis, it distributes its branches among the gluteal muscles. Within the pelvis, it sometimes gives rise to the *ileo-lumbar*, *obturator*, *sacro-laterals*, *ischiadic*, and *common pudic*. Before leaving the pelvis, it gives

1. Branches to the rectum; though often wanting.

2. A Nutritious Branch to the ileum and internal iliac muscle.

3. A branch, ramified on the pyriformis, middle and lesser gluteus, and inosculating with the *ischiadic*.

On leaving the pelvis, or soon after, the trunk is divided into

The *Superficial* Branch—running down betwixt the pyriformis, and middle gluteus, under the great gluteus; and again divided into

An *Ascending* Branch—bending upwards around the margin of the middle gluteus, and distributing its ramuli, to the middle gluteus, the superior part of the great gluteus, the os sacrum, and adjoining part of the ileum. It inosculates at the sacrum with the *posterior sacrals*, and on the surface of the *ileum* with the *deep branch*. Some branches perforate the gluteus, and become cutaneous.

A *Descending* Branch—which soon ramifies—running between the middle and great gluteus; then to the great

gluteus; which, having perforated, it terminates in the skin.

The *Deep* Branch—concealed under the middle gluteus, where it divides into two branches.

I. The ISCHIADIC—smaller than the former artery, but observing the same course with the *hypogastric*. It passes from the pelvis, between the lower edge of the pyriformis and the levator ani, and descends under the great gluteus, parallel with the larger ischiadic ligament. I have observed the trunk divided into two, sending off the *middle hæmorrhoidal* and *pudic*.—Within the pelvis, it gives

Many, but irregular, branches to the rectum, uterus, bladder, and obturator internus.

Branches to the pyramidalis, inosculating, at the passage of the trunk, outwards with the *pudic* branches.

Without the pelvis,

The *Coccygeal*—concealed by that portion of the great gluteus which is attached to the sacrum, coccyx, and the large sacro-sciatic ligament, and running under this ligament to the coccyx. It is singularly ramified, and gives origin to

Branches, perforating the fibres of the ligament and great gluteus, running to the coccygeus and fat around the levator.

A Deep Branch—distributed to the coccygeus, the bone, and the levator ani; inosculating with the *pudic*.

Many *Anastomotic* Branches—forming inosculations with the *sacro-laterals* on the outer side of the sacral holes; or, passing through the holes, in the cavity of the pelvis.

The *Concomitant Ischiadic*—first approaching the great gluteus, and then running extensively on the surface of

the nerve, till, at last, it meets with similar arteries, arising below the quadratus from the *internal circumflex*, or the *first perforant*, with which it inosculates.

Branches, anastomosing, beyond the tuberosity of the ischium, with the *common pudic* and *internal circumflex*.

A branch, which is often divided a second time, bending, downwards and forwards, between the gemelli and pyriformis, to the trochanter, distributing its twigs to the lesser and middle gluteus, obturator, gemelli, pyriformis, the nerve, the quadratus, trochanter, articular capsule, and the periosteum of the acetabulum. Of these, some generally inosculate, beyond the pyriformis, with the deep branch of the *posterior iliac*, and still deeper, under the muscle, with the *posterior trochanteric* of the *internal circumflex*. Sometimes a smaller trunk, sends off a few arteries; of which the most regular and constant are those which lie deep and anastomose.

A Deep Branch—running down before the obturator to the tuberosity of the ischium, sending twigs to the tuberosity and its muscles, and inosculating with *pudic* and *obturator*.

Gluteal Branches—numerous—terminating in the great gluteus and the adjoining adipose substance. These exhaust the rest of the trunk.

K. The COMMON PUDIC—the PUDIC—CIRCUMFLEX, INTERNAL, MIDDLE, or EXTERNAL PUDIC—rising, often, from a common trunk, with the *ischiadic*, but is easily distinguished by its smaller size, by its bending more forwards and inwards while in the pelvis, by its passing out between the pyriformis and the posterior part of the levator ani, and by its greater distance from that extremity of the pyriformis which is attached to the sacrum.

No sooner has it passed from the cavity of the pelvis, than it is concealed by the great sacro-sciatic ligament, under which it runs to the spine of the ischium, and enters the space between the lesser and greater sacrosciatic ligaments. Having passed the spine, it next runs to the surface of the tuberosity of the ischium which looks inwards to the pelvis; where, being attached to the bone by the aponeurosis of the obturator internus, and following the curved margin of the ischium, it bends forwards to its ramus. The artery is here exhausted by two branches sent off near the transverse muscle of the perineum.

Its branches form three classes.

The *first*, comprehending those arteries which rise from the trunk as it descends within the pelvis, viz.

Small branches to the rectum and its conglobate glands.

Vesical Branches—to the lower part of the bladder; and if the branch be large, to the prostate gland, the seminal vesicles, or the vagina. These, as well as the former, are often wanting.

A branch to the obturator internus.

The *second* class, the branches issuing from the trunk while situated between the two ligaments, and afterwards traversing the curved margin of the tuberosity of the ischium. These are,

Branches passing before the ligament to the pyriformis and great gluteus.

A branch descending beyond the gemelli and obturator,

and inosculating with the *internal circumflex* and *obturator*. It is often wanting.

A branch—running transversely, along the margin of the superior gemellus, to the trochanter and its periosteum; sending off two ramuli, to be distributed under the obturator internus on the ischiadic portion of the acetabulum; others inosculating with the *obturator* and *circumflex;* and still others, sinking into the gemelli, obturator, and trochanter. This branch sometimes rises from the *ischiadic* as was mentioned.

Branches going outwards, in the course of the artery, under the ligaments, to the obturator, the periosteum of the tuberosity, and beyond that to the origin of the semitendinosus and triceps magnus. These also generally inosculate freely, around the tuberosity with the *internal circumflex* and the *obturator*.

Branches, issuing from the inner side of the artery; running deep to the coccyx, and inosculating with the *ischiadic coccygeal*.

External Hæmorrhoidal Branches—a number of them spreading inwards on the levator ani, the surrounding fat and the sphincter. Some twigs having perforated the levator, reach the rectum, and inosculate with the *middle hæmorrhoidal*.

A branch, rising from the inner margin of the trunk, and divided, near the transverse muscle, to the sphincter, perineum and transversus perinei.

The *third* class comprehends those branches issuing from the trunk as it bends forwards, without the pelvis, to the ramus of the ischium. Near to the transverse muscle of the perineum the *pudic* artery divides, and sends out

The *Superficial Perineal*—running, in men, beyond the transversus perinei, in the triangular space between

the bulbo cavernosus or accelerator urinæ, and ischio-cavernosus or erector penis, where it ascends under the skin, or between the muscular fasciculi; and at last disappears, in many branches, upon the surface of the genitals—proceeding, in females between the ischio-cavernosus, and the constrictor cunni or vaginal sphincter.

The *Deep Perineal*, or Deep Artery of the Penis or Clitoris—in males, after lying deep under the transversus perinei, between the bulbo cavernosus and the ischio cavernosus, it passes upwards, attached by cellular membrane, to the bone, between the ramus of the ischium and pubis and the corpus cavernosum; at last reaching the synchondrosis pubis and the penis, at the junction of its cavernous bodies, is there divided. In females, it runs between the vaginal sphincter, the erector of the clitoris, and its cavernosus substance; passing afterwards between this and the os ischium and pubis to the body of the clitoris.

In this course are sent off in males,

Two large branches running into the urethra and its cavernous substance; and afterwards to the penis.

Smaller branches, rising from each side of the trunk; going to the ischio-cavernosus, obturator internus, bulbo-cavernosus the crura of the corpora cavernosa, Cowper's glands, and the prostate. Those which run to the prostate inosculate with the *inferior vesicals*.

From the above division of the artery proceed

The *Dorsal* of the Penis—running superficially under the integuments, and through the whole length of the penis, surrounding it behind the glands.

The *Profunda*, or *Deep* Branch of the Penis—after anastomosing with its fellow, enters the corpus cavernosum of its own side, through which it passes, in a straight line to its other extremity. Many of its branches open into the cavernous cells of the penis; some into the cavernous substance of the urethra; and others, after perforat-

ing the septum of the penis into the cells of the opposite side. Thus are the cellular parts of the penis distended with blood during erection.

III. EXTERNAL ILIAC ARTERY.

A single arterial trunk, rising from the primitive iliac at the same place as the hypogastric supplies the whole inferior extremity with vessels. Commencing under the name of external iliac, it successively takes the appellations of inguinal, femoral and popliteal.

It descends obliquely outward along the edge of the psoas muscle, on which it is immediately placed. This muscle also bounds it on the outside. On the inside and a little behind it, lies the external iliac vein; in the rest of its course it is covered by the peritoneum. When it approaches the crural arch it becomes superficial, being placed behind the transversalis muscle. Here it is sometimes called the inguinal artery, and becomes the subject of an operation in cases of aneurism in the groin.

The place at which this vessel should take the name of INGUINAL ARTERY has not been precisely determined by anatomical writers: nor has the artery been so particularly described as its importance requires: because it was not suspected that the surgeon would ever tie this great blood vessel, within the cavity of the abdomen. If a straight line be drawn from the superior edge of the symphysis of the pubis to the superior anterior spinous process of the ilium, it will cross the great artery just as it rises, to become superficial on the brim of the pelvis. This then we shall consider as the commencement of the inguinal artery, which will therefore be placed between the line mentioned above, and the crural arch, or inferior edge of the external oblique muscle.

The superior extremity of the inguinal artery is about two inches in distance from the crural arch; about five fingers breadth from the superior anterior spinous process of the ilium, and four fingers breadth from the symphysis pubis. It is also about two inches from the inside of the anterior parietes of the

abdomen, that is from the inside of the transversalis muscle; but as it descends, it becomes gradually more superficial, so that at its termination in the femoral artery, it is in contact with the inner edge of the crural arch.

On its outside, lies the inner edge of the psoas muscle, but as it descends it gets on the fore part of this muscle.

On the inside, it is covered by the peritoneum, descending into the pelvis.

On the fore part, is the peritoneum which separates it from the intestines.

Behind, is the inguinal vein, which gradually gets on its inside.

It is covered by a lamina of membrane, thinner than that which invests the superficial arteries, and therefore easily separated. In searching for this artery it is best to make an incision on its outer edge, between the vessel and the superior spinous process of the ilium, as otherwise there would be danger of penetrating the cavity of the peritoneum; but proceeding toward the artery from the outside, this membrane is easily raised from its anterior surface.

A. The EPIGASTRIC—rising by an acute angle from the inner side of the trunk, near the external lateral margin of the abdominal ring and the inferior part of the Fallopian ligament. It first runs downwards; then, being immediately reflected, proceeds inwards, behind the internal and posterior surface of the spermatic cord and epigastric vein. Now rising a little higher, and resting upon the peritoneum as it lines the abdominal muscles, it passes the outer and superior commissure of the abdominal ring, and then proceeds inwards, under the interior part of the transverse muscle, bending to the rectus, behind which it ascends to the *umbilicus*. It at last divides into two principal branches; and, in this course, sends off in the following order,

The *Funicular* Artery—rising under the funiculus or cord; passing through the abdominal ring, and dividing upon the cellular substance of the cord.

N. B. In females, a branch is reflected from this artery to the uterus, accompanying the round ligament, and inosculating frequently with a branch from the *uterines* and the *spermatic*. Others are sent through the ring, winding upon the mons veneris and the labia.

Smaller Branches, issuing separately under the bend of the trunk; running to the transverse muscle, the posterior sheath, and inferior muscular part of the rectum.

Similar branches—wandering outwards, in the course of the artery, to the peritoneum and transversalis; and through that to the obliquus and the skin.

Several more conspicuous branches, and more deeply ramified—rising in various places from the trunk, as it passes behind the rectus.

The *External* Branch—the lesser division of the trunk commencing below the umbilicus; proceeding outwards and behind the external margin of the rectus, and running towards the ribs, between the obliquus internus and transversalis; inosculating, in this course with the external trunk of the *internal mammary*, the *musculo phrenic* and the *lowest intercostals*.

The *Internal* Branch—larger—running obliquely under the rectus to the umbilicus; and dividing into,

A *Subcutaneous* Branch—running superficially on the internal margin of the rectus; and, whilst it inosculates with the twigs of the opposite side, and the smaller arteries of the *mammary*, runs to the umbilicus, and winds as high as the ensiform cartilage.

B. The CIRCUMFLEX ILIAC, ABDOMINAL, or SMALL EXTERNAL ILIAC—generally smaller than the last, and sent off a little lower from the external side of the trunk; passes, upwards and outwards, in a retrograde course under the peritoneum; reaches the crest of the ileum; and bending, parallel to the arched circumference of this bone to the highest part of the crest, proceeds, between the extremity of the illiacus internus and transversalis as also betwixt the transversalis and obliquus internus, where it is finally expended among the abdominal muscles. From this arise,

A branch ramified on the iliacus internus, sartorius, fat and inguinal glands.

A branch to the spermatic cord; often wanting.

Branches, running from various places, to the psoas, crural nerve, and iliacus internus; inosculating frequently with the transverse branch of the *ileo-lumbar*.

Four branches, or sometimes more, of which the exterior are the largest, running to the transversalis and obliquus internus; and, after penetrating this muscle, passing under the obliquus externus, with many branches to the anterior part of the abdomen, inosculating with branches of the *intercostal*, *lumbar*, and *mammary* arteries.

A branch, forming, on the middle of the crest, a double anastonomosis with the *ileo-lumbar*.

An *Ultimate* Branch—exhausting the artery; winding anteriorly between the obliquus and transversalis. As it here subdivides into branches, rising as high as the ribs, it disappears on the skin, and forms a plexus with the adjoining vessels.

FEMORAL ARTERY.

The femoral artery commences at the inferior edge of the crural arch, about the middle of the space which separates the anterior superior spinous process of the ilium from the spinous process of the pubis; running a little obliquely to the anterior and internal part of the thigh. After it has descended about two thirds the length of the latter it enters a tendinous ring in the triceps muscle and there takes the name of popliteal artery. The femoral artery therefore extends from the crural arch to the lower part of the triceps muscle.

Its relations to the neighbouring parts are important and easy to be known.

On its fore part, the femoral artery has the fascia lata and integuments, which cover its upper portion, where the vessel lies in a triangular space, formed by the crural arch above, the sartorius muscle on the outside, and the middle portion of the triceps muscle and the gracilis muscle on the inside. It is however separated from the integuments and fascia by a great quantity of fat and by the inguinal glands. Lower down, its fore part is covered by the sartorius muscle, which crosses its course, as far as the tendon of the triceps muscle.

On the back part, the femoral is supported by the pectineus muscle, which separates it from the bone, just below the crural arch. Lower down, the pectineus and the triceps muscles lie behind it; a great quantity of fat separating them from it.

On the outside, it is at first contiguous to the crural nerve and the psoas and iliac muscles; low down, it lies against the inner

part of the crureus muscle, which separates it from the os femoris.

On the inside, it is contiguous to the femoral vein and corresponds with the middle portion of the triceps muscle, against which it is placed at its lower part.

The femoral artery is enclosed, at its commencement, in a strong and remarkable sheath of condensed membrane, which encloses it with its vein, and beginning at the lower edge of the crural arch, to which it is fixed, runs down the thigh and gradually loses its sheath-like form.

It appears that the femoral artery is near the bones in two places only; viz. at the crural arch, where it passes over the pubis, and at the inferior part of the thigh, where it lies on the inside of the thigh. At these places therefore alone is it compressible.

From the common trunk of the femoral, generally issue

A. SMALL BRANCHES—passing over the Fallopian ligament, and running extensively upwards to the skin of the abdomen.

B. INGUINAL BRANCHES—varying in number; wandering through the fat, and chiefly distributed to the inguinal glands.

C. A SMALLER BRANCH—which immediately divides into ramuli, running outwards and transversely, to the upper extremity of the sartorius, the iliacus internus, the crest of the ileum, the broad fascia, and the middle gluteus.

D. MINUTE BRANCHES—terminating in iliacus, psoas, and pectineus; inosculating with the *internal circumflex* branch, and sometimes sinking deep among the muscles.

E. The SUPERIOR EXTERNAL PUDIC—running upwards and inwards, above the genitals, to the pubes, where it is dispersed upon the subcutaneous fat and the upper part of the genitals.

F. The MIDDLE EXTERNAL PUDIC—divided into many branches; passing, in males, transversely and inwards, above the pectineous and adductor longus, to the sides of the scrotum, and running, subcutaneous, along the penis to the præpuce: but in females, proceeding to the labia and the præpuce of the clitoris.

G. The INFERIOR EXTERNAL PUDIC—rising often from the *superficial femoral* artery, and after leaving the adductor and gracillis, sinking deep into the scrotum; where it inosculates freely with the *superficial perineal*, the *hypogastric scrotals*, the former branch, and with branches of the *obturator* and *internal circumflex:* sending twigs, also, to the gland and the spermatic cord, or the labia.

H. A BRANCH to the sartorius and rectus, often accompanying the crural nerve deep amongst the muscles.

N. B. All these arteries vary often in number and distribution, and are very irregular in the order in which they are sent off.

A. NUMEROUS BRANCHES—irregular in distance, order, and situation—rising from the trunk as it runs along the anterior and inner part of the

thigh, and distributed to the inguinal glands and sartorius, and through this to the skin; also to the rectus, vastus internus, long and short adductors, and gracilis. Of these, some are larger, some less, entering the muscles, in different places from three to six.

B. The LARGE ANASTOMOTIC BRANCH—rising from the inner surface of the trunk, at the superior margin of the tendinous canal; and bending downwards, spreads, with many serpentine ramifications, on the vastus internus, into which it sinks. From this proceed,

A Branch to the sartorius and skin.

A Branch—running to the outer margin of the tendon of the sartorius before the trunk reaches the vastus internus; and passing, along with the tendon, over the joint of the knee, disappears on the fascia and skin of the leg. It first, however, gives many branches to the knee, inosculating with the *inferior articulars*, and with the recurrent branch of the *anterior tibial*. Like the following artery, it often rises separately from the *femoral* trunk.

A Branch—rising in the tendinous canal, and accompanying the tendon of the triceps which covers it, to the inner condyle of the femur, running downwards, it spreads into various ramifications. It also sends off a branch under the tendon, as it is attached to the condyle, which runs transversely upon the periosteum of the condyle, to the common tendon of the extensors and the external condyle, where it forms an arch, around this extremity of the femur, with the *superior* and *inferior externo-articulars*, and also distributes twigs to the cavity of the joint.

A Branch—running transversely, perforating the vastus near the rectus, and inosculating on the substance of this last muscle, with a branch of the *external circumflex*.

A Branch—rising in a similar manner from the vastus, and inosculating on the surface of the knee, with the *articular* branches.

A Branch—passing upwards, anastomosing, upon the vastus or cruralis, with the *small descending* branch of the *circumflex*.

C. The SUPERIOR PERFORANT—issuing from the outer side of the trunk, where it lies concealed by the tendon of the triceps, and bending transversely backwards, between the posterior surface of the bone and the inferior muscular part of the great adductor, near the origin of the short head of the biceps, penetrates the fibres of this muscle, or those of the adductor, to the flexors of the thigh—Sending off in this course,

Branches to the adjacent muscles.

A *Perforating* Branch—which soon ramifying, inosculates in the substance, or on the surface of the flexors, with *ascending* and *descending* twigs, but chiefly on the long head of the biceps with *descending* branches of the *second perforant*, and with *ascending* branches of the *inferior perforant*.

N.B. The *perforating* branch of this and the following artery is sometimes wanting; and the trunk is inflected under the biceps only to the vastus externus, where it passes into many branches, inosculating variously with the neighbouring *articular* artery.

D. The INFERIOR PERFORANT—issuing a little below the last, from the external margin of the trunk; running transversely, under the adductor magnus, at the posterior surface of the femur, to the short head of the biceps, and under that to the muscular substance of the vastus externus. It sometimes extends to the cruralis, and is often double. It gives

Minute branches to the adjacent muscles.

The *Inferior Nutritious* Branch—sent upwards from the trunk, as it passes under the short head of the biceps; inosculating, on the femur, near the linea aspera, with the *superior nutritious* branch, and distributing its last ramuli in the substance of the bone. It is sometimes sent off from the former *perforant*.

A *Perforating* Branch—running in the hollow of the ham, to the semimembranosus, and inosculating, on its surface, with the *superior perforant*. It is sometimes wanting.

Branches—uniting, on the vastus externus, with the *larger* and *lesser descending* branches of the *external circumflex*.

A Branch—bending to the vastus internus, and sometimes inosculating under the tendon of the triceps, with a lesser *descending* branch.

THE PROFUNDA OR DEEP FEMORAL ARTERY.

This vessel arises from the femoral, about an inch and a half below the crural arch. It is concealed at its origin, by the femoral, the glands, and a quantity of fat, and lies in the deep triangular cavity, between the iliacus, pectineus, and adductors; bending with a flexure, convex outwardly, over the united iliacus and psoas, it runs backwards and downwards, to the higher extremity of the vastus internus. As it reaches the bottom of this cavity, it again bends gently forwards; and passing between the long and short adductors and the vastus internus, runs downwards and backwards, near to the middle of the femur. At last, entering the space between the long and short adductors, or perforating this last muscle, it reaches the adductor magnus, and passes through it, with various branches, running among the posterior muscles of the thigh. The first direction and size of the trunk varies considerably, according as it issues, sooner or

later, from the *common femoral*, and according to the number and size of the branches which it sends off. Of these, some are of little consequence; but four of the following merit attention.

Many small branches—some of which are often wanting; rising either separately, or forming together a common trunk—distributed in various places, to the iliacus internus, capsule, skin, sartorius, vastus externus and internus, and the heads of the triceps; and inosculating, on these muscles, with small twigs of the *internal* and *external circumflex*. At times they send off some internal *pudic* branches.

A. The EXTERNAL CIRCUMFLEX—a conspicuous branch, and often the first when it arises from the common trunk; though it sometimes issues from the *superficial femoral*. It bends outwards, between the iliacus internus, the rectus and sartorius, and between the tensor of the broad fascia and the anterior surface of the middle gluteus; and passing transversely under the tendinous head of the rectus externus, disappears at last near the root of the large trochanter. In this course its principal divisions are,

A branch, sinking in the iliacus internus, and returning to the cavity of the pelvis.

Another branch, extending under the iliacus, to the inner side of the femur; inosculating near the trochanter minor, with a branch of the *internal circumflex*.

The *Large Transverse* Branch—constituting the superior part of the trunk, where it lies under the vastus; and giving out, near to its origin,

Branches to the iliacus, tensor of the broad fascia, and the higher extremity of the fartorius and rectus.

Many branches, rising from the anterior part of the trunk, bending upwards and outwards, and terminating, in various ramifications, on the tensor of the broad fascia, the middle gluteus, and sometimes on the anterior and lower portion of the great gluteus.

A Branch, winding outwards between the iliacus and lesser gluteus, and spreading on the external surface of the pelvis, where it inosculates with the *profundissima*, or *deeper branch* of the *ileum*.

The *Anterior Trochanteric* Branch—of small size (sometimes very small)—lying between the iliacus internus and the anterior margin of the vastus externus. It runs under the middle and lesser gluteus, on the anterior part of the trochanter major, where, concealed by a quantity of fat, and terminating in the trochanteric fossa, it inosculates with the *posterior trochanteric*, after sending branches to the aforesaid muscles, the bones, and the capsule.

Two or three large Transverse Branches—the last ramifications of the trunk—covered by the vastus externus; winding round the root to the back part of the trochanter, and anastomosing, upon the tendon of the greater gluteus, or beyond it near the bone, with the *transverse* branch of the *first perforant* and the *descending* branch of the *posterior trochanteric*.

The *Large Descending* Branch—rising from the trunk, where it seems continued into the *great transverse* branch already mentioned, it winds under the rectus to the anterior margin of the vastus. In its course to the patella, it is covered, near the cruralis, by the margin of the vastus externus; sending branches to the latter, but not to the

former. A little above the knee, and near the patella, it approaches so near the surface, that its last inosculation with the *external articular* is frequently seen through the substance of the muscle.

The *Small Descending* Branch—rising sometimes from the superficial, sometimes from the *large transverse branch* of the *circumflex:* first sending twigs under the rectus, to the sartorius and vastus internus; then winding inwards through the substance of this muscle, inosculates at last, under the tendon of the triceps, with the *inferior perforant* of the *superficial femoral*, or more frequently, with the *large anastomotic.* I have observed it, at other times, pass outwards to the cruralis and vastus externus.

B. The INTERNAL CIRCUMFLEX—rises, near the origin of the *external circumflex*, from the internal and posterior part of the trunk; passes to the anterior and middle part of the pectineus through the adipose substance between this muscle and the tendon of the psoas, and runs deeply and transversely backwards, above the trochanter minor. Concealed here by muscles and fat, it divides into branches, between the short and great adductor, or between the adductor and pectineus. Of these branches, the largest, considered as the trunk, approaches the neck of the femur, acetabulum, and obturator externus and proceeding outwards and backwards to the interstice between the quadratus and adductor magnus, divides into two branches, and is partly expended on the muscles attached to the femur, and partly through the interstice to the flexors of the thigh. Thus are produced in the following order,

Branches to the iliacus internus, psoas, pectineus and capsule.

Transverse branches to the pectineus, long and short adductor, and gracilis, interwoven every where upon their surface, with branches of the *superficial femoral* and *external circumflex*, and more deeply with twigs of the *obturator;* inosculating also, with *pudic* branches by a less obvious twig, running behind the gracilis to the penis.

All these branches are generally sent off before the trunk is concealed by the pectineus.

Many branches, rising separately while the trunk passes under the head of the femur, between the trochanter minor and the acetabulum; distributed to the head of the triceps, pectineus and capsule, and inosculating frequently with other branches of the *deep femoral* or *profunda.*

The *Superior* Branch, or *Superior Anterior Ascending*—of greater size, seemingly one half of the trunk—runs transversely between the short and great adductors, towards the symphysis pubis, sometimes disappearing there upon the skin—sends

The rest of the artery, after distributing, in this course various branches to the adductor, gracilis, and genital integuments, inosculates with the *internal pudics.*

The *Inferior* Branch, or *Inferior Posterior Circumflex*—exhibiting a continuation of the trunk—runs, over the lesser trochanter to the neck of the femur; distributing, in its course small branches to the capsule of the joint, the acetabulum, obturator, and great adductor.

C. The FIRST PERFORANT—running backwards from the trunk, below the small trochanter; and between the pectineus and short adductor, or between its fibres, proceeds, near the vastus internus in such a manner as to pass obliquely outwards, between the femur and that part of the great

adductor which is attached to the bone. About an inch from the great trochanter, it perforates the adductor in two places, under the covering of the great gluteus; to which, along with the flexors, it distributes its ultimate branches. From this arise,

Large branches—sometimes rising separately from the *deep femoral*—exhausting themselves upon the vastus internus and the short and great adductors.

Branches, spreading out from the concealed trunk to the adductor, quadratus, and trochanter.

An *Ascending* Branch—forming, above the superior extremity of the great adductor, an elegant inosculation with the *descending* branch of the *posterior trochanteric*.

A *Large Transverse* Branch—sometimes double—running, under the abductor, to the gluteus; and after perforating the tendon of this muscle, proceeding outwards, round the root of the trochanter, to the vastus externus, where it inosculates with the large transverse branch of the *external circumflex*.

A Branch—often double—rising, as it were, from the former; passing through the adductor to the great gluteus, and there dividing into various branches inosculating with the *gluteal* branches of the *ischiadic*.

A Nutritious Branch—running down upon the surface of the bone, and anastomosing with a nutritious branch of the *second perforant*.

A *Descending Perforant*—passing through the great adductor, and running extensively on the inner surface of the flexor muscles. As it here divides into many branches, spreading outwards and inwards, it distributes several to each of the flexors and the great adductor, and forms many superficial and deep communications on these muscles with the *internal* branch of the *inferior circumflex*, with some

recurrent branches of the *second perforant*, and sometimes, though more rarely, with twigs of the *superior perforant* rising from the *superficial*. These elegant inosculations are more frequently observed upon the semimembranosus, adductor, biceps, and on the nerve.

D. The SECOND PERFORANT—exhibiting a continuation of the trunk—passes sometimes single, and at others double, through the small space between the long and short adductor, or through the long adductor itself; then proceeding obliquely outwards and downwards, between the femur and the great adductor, and penetrating the adductor near the linea aspera, at the middle of the thigh, and inner side of the short head of the biceps, is exhausted, like the last artery among the flexor muscles by a *descending perforant* branch. To this artery are referred,

Large branches—sinking into the vastus internus and long adductor, before the immersion of the trunk.

Another Branch, partly distributed to the vastus, partly entering the bone by two twigs, and inosculating with the large nutritious artery.

A Large Branch—often double—entering, like the trunk, the long adductor, but higher, terminating in the substance of the adductor, or, as sometimes happens, sending an artery through the belly to the muscle of the flexors.

An Ascending Branch—inosculating, near the trochanter, upon the back part of the bone, with the *first perforant*.

A *Superior Transverse* Branch—running, either transversely or obliquely, a little below the tendon of the great

gluteus, between this muscle and the femur, to the substance of the vastus externus, and anastomosing with the *transverse* branches of the *large descending* branch of the *external circumflex*. Before the trunk sinks in the vastus, a branch sometimes rising suddenly from this one, beyond the great adductor, distributed to the external flexors, and known by the name of the *third perforant*.

An *Inferior Transverse* Branch—running in the same direction as the last; and about two or three inches below the tendon of the great gluteus, passes, under the short head of the biceps to the vastus externus. If the artery proceeds farther, it gives rise, like the last, to a *fourth perforant*. It gives

Many branches, winding on the adductor.

The Large *Nutritious* Branch of the Femur—running down, near the short head of the biceps, to the outer side of the linea aspera; inosculating with a small *inferior nutritious* branch from the *inferior perforant* of the *superficial femoral*, and penetrating the bone with a larger *external* branch. This artery is irregular both in origin and direction.

A branch, concealed in the substance of the biceps.

Branches, meeting the *descending* branch of the *circumflex* on the vastus externus, and sometimes the *superior externo articular*, with a large twig. They appear to rise from the *nutritious* branch in such a manner, that it seems to be inflected through the short head of the biceps to the vastus externus.

Many branches distributed to the short head of the biceps.

A *Descending Perforant*—passing under the flexors after perforating the adductor, and transmitting ramuli to the external and internal flexors. It forms, upon the surface and substance of these muscles, inosculations upwards with this artery, and downwards with the *perforant* of the *superficial*.

THE POPLITEAL ARTERY.

That part of the *superficial femoral* which runs along the hollow of the poples. As its limits should be accurately defined, on account of the numerous branches which arise from it, we observe that its superior part is bounded by the posterior margin of the tendon of the triceps, and its inferior by the higher extremity of the soleus muscle, under which it divides into the *anterior* and *posterior tibial* arteries. Being covered externally by the aponeurosis which surrounds the joint, it runs obliquely, outwards and downwards, through the adipose substance between the flexor tendons, passing into the cavity between the condyles and the heads of the gastrocnemii. As it proceeds over the joint of the knee, it lies upon the capsule, and afterwards on the popliteal muscle. The numerous branches to which, in this course, it gives origin, are divided into *articular* and *muscular*. Of these, the first are,

A. The SUPERIOR EXTERNO-ARTICULAR—ascending, on the periosteum of the femur, from the outer side of the trunk, above the condyle, and running, on the periosteum, towards the origin of the short head of the biceps; then bending, under the common tendon of the biceps, to the posterior margin of the vastus internus, divides into two ramuli.

Many Branches of smaller size, running upwards and downwards, distributed to the periosteum, capsule, biceps, and gastrocnemii.

The *Deep* Branch, passing through the vastus muscle, which it supplies with ramuli, to the periosteum of the external condyle, and there spreading into various ramifications. Of these some are distributed to the lateral ligament and skin; some are interwoven with the *inferior externo-articular*, and the perforating branches of the *superficial femoral;* while others run transversely to the internal condyle, and inosculate with the *superior interno-articular*.

The *Superficial* Branch—winding on the surface of the vastus externus, near its extremity, towards the upper edge of the patella, and anastomosing by an *ascending* branch with the extremity of the *large descending branch of the circumflex*, under the tendon of the rectus, with a branch of the *large anastomotic;* winding also round the patella, and uniting, by various *descending* twigs with the *vascular plexus* of the knee, formed by all the *articulars* together.

B. The SUPERIOR INTERNAL ARTICULAR—running, above the inner condyle, from the interior edge of the trunk, in a transverse or oblique

direction, under the tendon of the triceps to the patella. It is sometimes double.

Smaller branches—distributed in the hollow of the poples, to the periosteum, capsule, condyle, and flexor tendons.

A *Superficial* Branch—exhibiting a continuation of the trunk—running between the tendon of the biceps and the vastus internus, to the surface of the knee, and there forming a vascular plexus by its numerous branches. It inosculates, near the lateral ligament, with an *ascending* branch of the *inferior interno-articular*, and, by sending out branches that obliquely perforate the ligamentous strata, is extensively ramified below the patella.

N.B. A *Deep* Branch arises from the *large anastomotic* branch of the *femoral.*

C. The MIDDLE ARTICULAR, or AZYGOS—irregular in its origin—rising sometimes from the posterior and outer surface of the *popliteal*, at other times from the *external* or *internal superior articular;* runs always to the posterior ligaments of the knee, and the middle of the capsule; and divides into

An *External* Branch—winding extensively between the condyles; running to the posterior and crucial ligament, and the semilunar cartilages, and inosculating here with all the adjoining branches.

An *Internal* Branch—distributing its twigs in the inner side of the capsule, to the fat of the poples, to the bone, crucial ligament, and capsule.

D. The INFERIOR EXTERNO-ARTICULAR—rising below the knee joint under the plantaris and external head of the gastrocnemius; runs outwards and upwards to the top of the fibula, and there entering under the external lateral ligament and aponeurosis, a groove which is formed in the external semilunar cartilage, proceeds between the femur and the head of the fibula, to the patella.

Separate branches—distributed to the popliteus, soleus, gastrocnemius, skin, and periosteum.

A Branch, forming a conspicuous inosculation with the *tibial recurrent.*

A *Superficial* Branch—sent off while the trunk rests upon the cartilage; transmitting many small ramuli to the vascular plexus of the knee, the aponeurosis and skin; aud inosculating with the superior *externo-articular.*

Small Branches—entering the semilunar cartilage, periosteum, and capsule.

A *Deep* Branch—entering the capsule near the patella, and spreading out its various ramifications within the cavity of the joint.

E. The INFERIOR INTERNO ARTICULAR—descending a little, as it runs inwards below the joint, between the superior edge of the popliteus and the gastrocnemius, to the posterior angle of the condyle of the tibia; and then passing, under the internal lateral ligament of the knee, and the tendons of the internal flexors to the lower margin of the patella.

Many branches—terminating in the popliteus, posterior and crucial ligaments, capsule and tendons of the flexors;

one of them inosculating with the *nutritious* branch of the *posterior tibial.*

Superficial Branches—dispersed on the aponeurosis, to the inferior edge of the patella, and communicating there with the *anterior tibial.*

Branches exhausted on the common tendon of the extensors and ligament of the patella.

Branches to the ligament of the patella, inosculating with the *superior* and *inferior externo-articular.*

A *Deep* Branch—running along the edge of the internal semilunar cartilage, and inosculating, by a *transverse* branch, in the hollow of the joint, under the patella, with the *inferior externo-articular.*

N. B. The vascular plexus, covering the knee, is formed by all the *articular* arteries, the *recurrent tibial*, *circumflex*, *large anastomotic*, and some twigs of the *perforants.*

F. Of the MUSCULAR BRANCHES, which are infinitely varied, the following chiefly merit attention.

Two or three *Conspicuous* Branches—though often wanting—distributed to the flexors, but chiefly to the semimembranosus, biceps, and nerve. These sometimes supply, by *reflex* branches, the want of *perforants* from the *superficial femoral.*

Two *Gastrocnemial* Branches—running, in parallel lines, between the heads of the gastrocnemius, and penetrating, with various ramifications, the internal side of the muscle, in which they terminate. Of these one runs on the surface of the muscle, to the tendo Achilles, and its insertion into the os calcis.

Two branches to the soleus, but sometimes wanting.

Branches to the substance of the plantaris, periosteum, vessels, and nerves.

THE ANTERIOR TIBIAL ARTERY.

SOMEWHAT smaller than the *posterior*—rises anteriorly from the *popliteal*, at the inferior margin of the popliteal muscle, and perforating the interosseous ligament, runs from the posterior to the anterior part of the leg. It here descends close to the ligament, at first between the tibialis anticus and common extensor, and then between the anticus and the extensor longus of the great toe. In this course, it lies nearer to the fibula than the tibia; but having gradually separated from the ligament, it turns now more forwards and inwards the farther it descends; and passing over the lower extremity of the tibia, and over the tarsus, along with the extensor tendons, under the crucial ligament, divides, between the first and second metatarsal bones into two branches: of which one sinking between the bones to the planta of the foot, inosculates with the *external* and *internal plantar* branches of the *posterior tibial*, while the other, passing

along the dorsum of the foot, runs to the great toe. The most remarkable branches issuing from it in this course, are,

A. A BRANCH to the origin of the posterior tibial muscle, or soleus.

B. An ASCENDING BRANCH—transmitting twigs under the popliteus to the external and posterior part of the tibia and capsule, and thence to the head of the fibula, the origin of the soleus and joint which as they are reflected forwards, inosculate with the *inferior articular* branches.

N. B. These branches are sent off before the artery passes out of the ham.

C. The TIBIAL RECURRENT—winding to the anterior surface of the knee, between the superior part of the tibial and extensor muscles, or bending upwards through the substance of these muscles; and giving

Many branches to these muscles and the ligaments connecting the bones.

A branch winding round the head of the fibula, as it passes outwards under the common extensor of the toes and the peroneus longus, and inosculating with the branch B.

Branches running to the vascular plexus on the ligaments of the knee, and forming numerous inosculations with the *inferior articular*.

D. A LARGE BRANCH—running down upon the fibula, between the tibialis and peroneus lon-

gus, and between the same peroneus and extensor communis, and inosculating, near its inferior extremity, with the *fibular*.

E. MANY MINUTE BRANCHES——rising, through the whole course of the artery, between the two bones of the leg, distributed to the tibialis anticus, extensors, peronei, aponeurosis, and periosteum of the bone, chiefly of the tibia, variously interwoven with one another, and below with the *fibular*.

F. BRANCHES—partly sent off to the extensor tendons while the trunk lies upon the naked tibia, partly spreading, in a retrograde course, on the surface of the bone, covered by the aponeurosis, and meeting here the *posterior tibial* and *anterior fibular*.

G. The INTERNAL MALLEOLAR—spreading variously while running down on the inner ankle; inosculating, by *ascending* branches with the preceding ramuli, and stretching, with *descending* branches, to the capsule, astragalus, os naviculare, and cuneiforme; and uniting, in various places, with branches of the *internal plantar*.

H. The EXTERNAL MALLEOLAR—forming a large communication, in the interosseous space, or a little below it, with the anterior *fibula*, or some of its branches—winding to the external ankle, where it sends, if not sooner, branches to the peroneus brevis, the joint, the short common extensor, and the tendons of the peronei; forming under these tendons many inosculations with the

posterior fibula, and anteriorly with the *anterior fibula*. It at last reaches the *tarsal arc h*. It often exhausts the whole *anterior fibula*, or rather this takes the course of the *malleolar*.

I. MANY BRANCHES—passing, under the transverse ligament, to the extremity of the tibia, the hollow of the tarsus, capsule, extensor tendons, the most of the tarsal bones, particularly the astragalus, and the short extensor. Some of these, winding on the tarsal bones, and bending with ramuli to the planta, run, on one side, near the tendons of the peronei, to the *fibula*; and, on the other, beyond the inner margin of the tarsus to the *internal plantar*.

K. The TRANSVERSE TARSAL, or TARSAL—sent from the external side of the trunk, outwards and downwards, under the extensor brevis, to the surface of the second row of tarsal bones, uniting, at the edge of the fifth metatarsal bone, with the *external plantar;* and thus forming the *tarsal arch*. From this trunk generally proceed,

A Branch—running outwards, between the articulation of the tibia and fibula, with the astragalus and after sending twigs to each articulation, inosculating with the *posterior fibular* and *external malleolar*.

A Branch—sinking deep into the fovea or pit of the tarsus, and there supplying its ligaments and fat.

Branches—rising, in various places, and exhausted on the extensor brevis.

Branches—distributed between the cuneiform bones and cuboides of the tarsus.

The *First Dorso-metatarsal*, or *Dorso-interosseal*—lying in the space between the second and third metatarsal bones and the interosseous muscle; and after running to the root of the toes, and giving branches to the extensor tendons, and others to inosculate with the posterior and anterior *perforants* and *transverse metatarsals*, exhausting itself in the bifurcation of the *planta-digital artery*.

The *Second Dorso-metatarsal*, or *Dorso-interosseal*—running, like the last, to the third interval, and terminating in a similar manner.

The *Third Dorso-metatarsal*, or *Dorso-interosseal*—rising, near the os cuboides: running in the fourth interval of the metatarsal bones, and supplying similar branches as the former *metatarsals*.

A Branch—rising at the fifth metatarsal bone from the inosculation of the *transverse tarsal* and *external plantar*; running along this bone, and exhausting itself by some ramuli, upon the adductor of the little toe.

N. B. The *Dorso-metatarsals*, or *Dorso-interosseals*, often arise from the *transverse metatarsal*, in which case the *transverse tarsal* only produces minute branches, inosculating near their origin, with the *dorso-metatarsals*. Sometimes, also, the *dorso-metatarsals* give origin, by meeting with the *perforants*, to one or two *planta-digital* branches; or produce other *digitals* spreading on the back of the toes, and inosculating with the true *digitals* of the *external plantar*; or producing, as in the hand, *dorsal* branches. The *anterior perforants*, penetrating, near the roots of the toes, the metatarsal interstices, seem to arise from these *dorso-metatarsals;* or if they have issued from the *planta-metatarsals* and *digitals*, anastomose with them in the same place.

L. Branches—distributed, from the inner edge of the *tibial* artery, to the internal side of the tibia, the extensor tendons, the periosteum, the

tendon of the tibialis anticus, and the naviculare and first cuneiform bone.

M. A BRANCH—running on the surface of the naviculare towards the plantar side of the foot, where covered by the adductor pollicis, to which it gives branches, it inosculates with one or two branches of the *internal plantar*.

N. A BRANCH to the adductor pollicis, first running along the margin of the first metatarsal bone, and then disappearing on the inner side of the dorsum of the great toe.

O. A BRANCH—issuing from the external edge, between the *transverse tarsal* and *transverse metatarsal* arteries, giving twigs to the extensor tendons and the short common extensor.

P. The TRANSVERSE METATARSAL ARTERY—varying in size, and sometimes entirely wanting, according to the number and magnitude of the branches which are sent off from the *transverse tarsal*. It runs to the commencement of the first and second dorso-metatarsal bones, and passing transversely to the little toe, gives rise to *metatarsal* branches, if they have not already been supplied by the *transverse tarsal*. Though smaller and shorter than usual, it generally gives origin to the *metatarsal* of the third interval, and the *dorsal* branches of the third toe. Its ultimate branch, winding near the os cuboides, under the tendon of the small peroneus, is partly exhausted

on the adductor of the little toe and peroneal tendons, and partly on the plantar integuments.

Q. The DORSO-METATARSAL, or EXTERNAL DORSAL of the GREAT TOE—the superficial branch of the *anterior tibial* artery as it is now about to terminate. It traverses on the interosseous muscle, the outer margin of the first metatarsal bone.

R. The DEEP ANASTOMOTIC BRANCH—sinking into the plantar side of the foot, where it again appears; and after sending branches to the abductor and adductor, inosculating with the *plantar arch.* From this inosculation, or sometimes sooner, arises the *planta-pollicar*, a remarkable artery of the plantar side of the great toe, of which I shall give a description along with the *plantar* branches.

THE POSTERIOR TIBIAL ARTERY.

THE other branch of the *Popliteal* Artery, where it divides at the superior extremity of the soleus—passing down, under the soleus, upon the posterior surface of the flexor longus and tibialis posticus, to the lower extremity of the tibia, is afterwards inflected inwards to the plantar side of the foot, run-

ning between the tendo Achilles and the epiphysis of the tibial behind the internal ankle. While there, covered by the laciniated ligament, and involved in fat, it meets, on the inner side of the foot, the broad extremity of the abductor pollicis, and divides into two branches: one of which passing to the great toe, I call the *Internal Plantar;* the other, denominated *External Plantar*, runs to the sole, between the flexor brevis and longus, and under these, still deeper, to the fifth metatarsal bone. Here returning to the great toe, by an oblique and transverse flexion, under the tendons of the flexor longus, it forms the *plantar arch.* The branches issuing from this artery I shall enumerate in the order in which they are exhibited.

BRANCHES to the inner head of the gastrocnemius; often wanting.

A. The LARGE NUTRITIOUS ARTERY of the TIBIA, or POSTERIOR INTEROSSEAL—spreading extensively downwards, between the flexor of the toes and *posterior tibial*, above the interosseous ligament, and inosculating with the *fibular*

at the inferior extremity of the tibia. From this issues

A Branch to the soleus, popliteus, and periosteum of the tibia, communicating with the *descending* branch of the *inferior interno-articular*.

A Branch to the tibialis posticus.

A Nutritious Branch—entering the bone, and distributing its twigs, upwards and downwards.

Branches—winding through the whole course of the artery, partly on the periosteum of the tibia, and partly on the tibial muscle, and the common flexor.

B. A LARGE BRANCH—winding round the external head of the fibula, under the muscles, after giving a twig to the soleus, and receiving some anastomotic branches of the *tibial recurrent*.

C. MANY LARGE BRANCHES to the soleus, interwoven every where with *fibular* twigs.

D. SOME CUTANEOUS BRANCHES—running out far with the veins and nerves, and anastomosing, upwards and downwards, with the *anterior tibial*.

E. The COMMON FIBULAR, or PERONEAL—very irregular in size and the distribution of its branches. It often equals in dimension the *anterior tibial;* it is sometimes entirely wanting; and at other times is rather smaller than the *posterior tibial*. After rising near the superior extremity of the *tibialis posticus*, it descends between this muscle and the flexor pollicis. A little lower it

is covered by the flexor pollicis; and, at last escapes the eye of the dissector, between the two bones, where it touches the interosseous ligament. Near the inferior extremity of the bones, where they are more closely connected, it divides into the *anterior* and *posterior fibular* arteries. It gives

Branches—passing through the soleus to the skin, inosculating with other *inferior fibular* twigs, and with branches of the *posterior tibial.*

A Branch—penetrating the peroneus longus and the skin.

Branches—partly exhausted on the tibialis and the common flexor of the great toe, and partly spreading on the periosteum of the fibula.

Many branches—winding tortuously, in various places, under the flexor pollicis, and peroneus longus to the anterior part of the fibula, inosculating there, upwards and downwards, with twigs from the *anterior tibial.*

Many Branches—rising, in various places, from the descending trunk, and distributed to the tibialis posticus, peronei, flexor pollicis, the inferior tendon of the soleus and gastrocnemius, the periosteum, and skin. Of these, some perforate the interosseous ligament, and terminate between the anterior muscles.

The *Nutritious* Artery of the Fibula—the last of the branches which rise from the trunk before it is covered by the flexor pollicis, ramifying on the periosteum and the substance of the bone.

The *Posterior Fibular*—the largest and most regular branch of the *common fibular.* As it proceeds from its cavity backwards and outwards, it begins to descend; and after running behind the external malleolus, to the outer and hollow surface of the os calcis, it inosculates, under the abductor of the little toe, before the tuberosity of the

os calcis, with some branches of the *external plantar*, or sometimes is wholly expended on this abductor muscle and the skin. It often gives

Branches to the long flexors of the toes and the peronei.

A Large *Transverse Anastomotic* branch—uniting, on the periosteum of the tibia, and under the tendons of the gastrocnemius, and the other muscles, with the *posterior tibial*, and some branches of the *anterior tibial*. Other ramuli are sometimes sent from this branch to the ankle joint and tendo Achilles, which, uniting with others from the *fibular* and the *external malleolar* of the *anterior tibial*, reach the outer surface of the os calcis.

A Branch—sometimes single—sometimes double—forming a plexus in the external cavity of the calcaneum, or os calcis, and anastomosing frequently with the *anterior tibial* branches.

A Branch—as the artery runs to the external side of the calcaneum, forming, under the ligament that unites the tibia and fibula, a new communication with the *posterior tibial*, and, by twigs, sent outwards, with the *external malleolar*.

Branches to the peroneal tendons and sheaths, forming a plexus with the *anterior fibular* when present.

The *Anterior Fibular*—often wanting—when present, passes through the interstice of the crural bones, running, downwards and forwards, in the angle between the extremities of the tibia and fibula, behind the extensor pollicis and the short peroneus, where it inosculates with the *external malleolar;* and then proceeding, under the tendon of the peroneus, to the os cuboides, where it lies concealed between this bone and the abductor muscle, inosculates partly with the *external plantar*, and partly terminates on the skin.

F. NUMEROUS BRANCHES—distributed, in the course of the artery, to the adjoining flexor muscles, tibialis posticus, soleus, tendo Achilles, nerve and skin.

G. TRANSVERSE BRANCHES—often double—anastomosing, already noticed, with the *posterior fibular*.

H. A BRANCH—forming a plexus, at the epiphysis of the tibia and its malleolus upon the periosteum, with some superior branches of the *posterior tibial* and *internal malleolar*, and sending sometimes twigs to the capsule of the joint.

I. BRANCHES to the flexor tendons and their sheaths.

K. TWO LARGE BRANCHES—issuing from the trunk as it runs along the lateral concavity of the heel, at the tuberosity of the calcaneum, spreading out upon its periosteum and aponeurosis, as also upon the abductor pollicis and skin; and inosculating with branches of the *fibular*.

L. A DEEP BRANCH—passing, under the tendons, to the capsule of the astragalus and calcaneum, and the bones.

M. Another DEEP BRANCH—running out to the other adjoining bones and their ligaments, and to the articulation of the tibia and astragalus.

N. The EXTERNAL PLANTAR—the larger branch of the *posterior tibial*—passing gradually outwards and forwards, between the short flexor of the toes, and the *massa carnea*; or, under this muscle, to the inner edge of the abductor of the

little toe. As it proceeds to the base of the metatarsal bone of the little toe, between the flexor brevis and abductor, it runs gradually inwards to the great toe, with alternate flexions; and, passing over the interosseous muscles, forms the *plantar arch;* which, at last, is wholly received by the *anterior tibial,* in the first interstice of the metatarsal bones, under the abductor pollicis. Its branches are,

A *Transverse Anastomotic* Branch—running outwards upon the naked bone, along the anterior tuberosity of the os calcis, and forming a large inosculation with branches of the *anterior tibial,* at the inner side of the tuberosity, and with the *posterior fibular* at the outer side; constituting, at the same time, a vascular plexus, from which many branches are sent to the bone, flexor brevis, aponeurosis, and skin.

Branches to the large ligament of the calcaneum.

Many Branches—while the trunk runs above or below the massa carnea, and passes exposed between the flexor and abductor minimus, sent to this muscle and the flexor brevis, and through this, or near its external margin, liberally distributed to the aponeurosis and skin.

The *First Deep* Branch, or *First Profunda*—running to the abductor and flexor of the little toe, and uniting with the *posterior fibula* on the external and lateral part of the calcaneum, and with the *deep branch* of the *internal plantar* upon the surface of the calcaneum on the internal side of the same bone.

The *Second Deep* Branch, or *Second Profunda*—rising at the termination of the os cuboides; and, while it observes the same course outwards as the last, forming similar and new inosculations with the *anterior fibular* and *transverse tarsal.* It also contributes to the plexus that

is spread out in the cavity of the foot, and among the ligaments of the tarsal bones.

Branches sent to the abductor of the little toe, and the periosteum of the adjoining bones; spreading variously among the bones,and inosculating with the neighbouring *ramuli.*

The *Plantar digital*, or *External Plantar* of the Little Toe—issuing from the trunk as it touches the base of the fifth metatarsal bone, and begins the formation of the *arch.* While it accompanies this bone forwards covered by the flexor and adductor of the little toe, it distributes branches to these muscles and skin. At the other extremity of this fifth metatarsal bone, it receives a transverse twig from the external plantar, or the adjoining digital; then passes over the inferior or plantar surface of the bone, and, on the outer or fibular side, reaches the apex of the little toe.

The *Second Plantar digital*—rising in the fourth interstice of the metatarsal bones, above the interossei, at the basis of the toes, and while there, covered by the transverse muscle, dividing into the *digito-tibial*, or *internal plantar* of the little toe, and the *digito-fibular*, or *external plantar* of the fourth toe. Sending out

Numerous Branches to the skin.

Branches to the abductor of the little toe.

Branches anastomosing with the *planta-metatarsal*, and others uniting with the *metatarsals.*

The *Third Planta-digital*—running between the third and fourth metatarsal bones, and giving origin to the *digito-tibial* of the fourth toe, and the *digito-fibular* of the third. From this arise

Branches—uniting with the external branch of the *internal plantar.*

Small and Superficial Branches to the adjoining lumbricals and transverse muscles.

Anterior Perforants—dispersed in this third interstice to the capsules of the joints.

The *Fourth Planta-digital*—running between the second and third metatarsal bones, and giving rise to the *digito tibial* of the third toe, and the *digito-fibular* of the second. From this branches issue, similar to those at *i*.

Between these DIGITALS, two or three *deep interosseals*, or *planta-metatarsal* and four *perforants*, issue from the *plantar arch* whose direction, though very irregular, deserves to be noticed.

A *Planta-metatarsal*, or *Deep Interosseal* Branch—rising near the *planta-digital* of the little toe, and running between the sixth and seventh interosseous muscles. After sending off many ramuli to the adjoining muscles, it inosculates with the *dorsal* or *anterior perforant** of the *dorso-metatarsal* of the fourth interstice, and unites, near the metatarsal articulations of the fourth and fifth toe, with the *dorsal* and *plantar* branches of the *digitals*. It sometimes gives a *dorso-metatarsal* to the fourth and fifth toes.

Another *Deep Planta-metatarsal*—the second arising from the *arch*, and running out, in the third interstice, between the fifth and sixth interosseous muscles. In other respects, its distribution is similar to the last, and to that of the *third deep planta-metatarsal*, when present.

The *Plantar*, or *Posterior Perforant* of the Fourth Interstice—emerging to the dorsum of the foot, and uniting with the *metatarsal*, after having distributed twigs to the interosseous muscles and the ligaments of the metatarsal articulation.

The *Plantar*, or *Posterior Perforant* of the Third Interstices—passing to the *transverse metatarsal*, after perforating the interstice of the bones.

The *Plantar*, or *Posterior Perforant* of the Second Interstice—similar to the former, and sending off twigs to the adductor pollicis.

* Professor MURRAY calls those *perforants* which run from the dorsum to the plantar, *anterior perforants;* and those which run from the plantar to the dorsum, *posterioperforants*.—TRANSLATOR.

The *Plantar*, or *Posterior Perforant* of the First Interstice—terminating in the *transverse metatarsal.*

N. B. These *Plantar Perforants*, besides, give a branch, which runs with the *metatarsal* of its own interstice, as far as the toe. The *planta-metatarsals*, after reaching the metatarsal bones, inosculate with branches of the *transverse tarsal* or *metatarsal*, and *dorso-digitals.*

Three branches, running in a retrograde course, from the concave margin of the arch, and forming, in the cavity of the tarsus, a plexus with the *deep* branches of the *internal* and *external plantars;* distributing ramuli to the ligaments, adjacent muscles, the sheath of the peroneous longus and tibialis posticus, the aponeurosis, and skin.

The *External Plantar*, bending to the first metatarsal interstice, becomes larger by its inosculation with the *anterior tibial* and running forwards, under the adductor, to the fibular side of the metatarsal bone of the great toe, where it sends a branch to the flexor brevis, gives rise to

The *Planta-Pollicar*, or *Internal Pollicar.*—This remarkable artery appears, at times, rather to arise from the *anterior tibial*, which then presents another anastomotic branch, uniting with the *external plantar.* Between the first and second toes, there spring from this common trunk

A Branch sending out the *digito-tibial* of the second toe, and the *digito-fibular* of the great toe; inosculating with the *profunda-fibular* of the *internal plantar.*

The *Digito-tibial* of the Great Toe—passing over the inferior or plantar surface of the metatarsal bone of the great toe, under the flexors and adductors, and spreading on the inner or tibial side of this toe, as far as its apex. It receives the *profunda-median* and *profunda-tibial* of the *internal plantar.*

The *Dorso-tibial* of the Great Toe—bending outwards, and generally running to the termination of the second

phalanx and nail, and forming an *arch* with the *dorsa-fibular*, which rises from the *anterior tibial.*

N. B. All the *Digitals* send many twigs to the skin, bones, and ligaments; and unless separate *dorsal* branches are formed by the union of the *metatarsals* and *perforants*, these give origin to *dorsal branches*, reflected upwards, and which form small arches around the root of the nails; while the trunks themselves, mutually inosculating, form on the plantar side of the apex of the toes *arches* similar to those upon the volar side of the fingers.

O. The INTERNAL PLANTAR—the smaller branch of the divided trunk—after rising, on the tibial side, in the sinuosity of the calcaneum, between the tendon of the tibialis posticus and the origin of the abductor pollicis, it runs along, covered by this muscle, and divides, under it, into four branches, which follow the course of the abductor and flexor brevis of the great toe, to the inferior extremity of the metatarsal bone of this toe, and terminate in branches of the *planta-pollicar* that issues from the *anterior tibial* and *external plantar.* It sends off,

A Branch—bending, under the abductor, to the tendons of the tibialis posticus and flexors, and the periosteum of the astragalus, variously interwoven with the *internal malleolar*, and with the branches of the *anterior tibial.*

Branches to the adductor and flexor brevis communis.

A Branch running deeply outwards, between the large ligament of the calcaneum and the massa carnea, distributing ramuli to the flexor brevis, the massa carnea, and ligament, and inosculating with branches of the *deep external plantar*, running to the tuberosity of the os calcis.

The *Profunda-tibial*, or Internal Deep Branch of the *Internal plantar*—the first ramulus of the four branches that exhaust the *internal plantar*—rising at the os naviculare, and following the inner border of the abductor pollicis, or inner margin of the planta; and disappearing, at last, in the *digito-tibial* of the *planta-pollicar*.

The *Profunda-median*, or *Deep Middle* Branch of the *Internal Plantar*—the second twig of the internal plantar after its division.—It lies under the abductor, and after running along the middle cuneiform bone, and the first metatarsal bone, unites with the *planta-pollicar*, or *digito-tibial* branch of the *pollicar*. It sends also twigs to the fat and skin, and others inosculating with the former.

The *Profunda-Fibular*, or *Deep External* Branch of the *Internal Plantar*—the third Branch of the trunk—rising at the beginning of the cuneiform bone. After running forwards, between the flexor brevis and abductor pollicis, towards the second toe, it at last unites with the *digito-tibial* of the second toe, and the *digito-fibular* of the great toe.

The *External* Branch of the *Internal Plantar*—the fourth division of the trunk—issuing, a little sooner, near the abductor; winding, variously outwards, between the massa carnea and ligament of the calcaneum to the os cuboides, and sending twigs to the neighbouring muscles, the tarsal ligaments, and the whole plantar cavity. It anastomoses with the *profundæ*, with recurrent branches from the arch of the *external plantar*, and with a branch of the *internal plantar*. A branch of this artery sometimes enters the first metatarsal interstice, and inosculates with the *transverse tarsal*. But it should be remembered that the branches of the *plantar* present as numerous varieties as the other arteries of the foot.

Plate I.

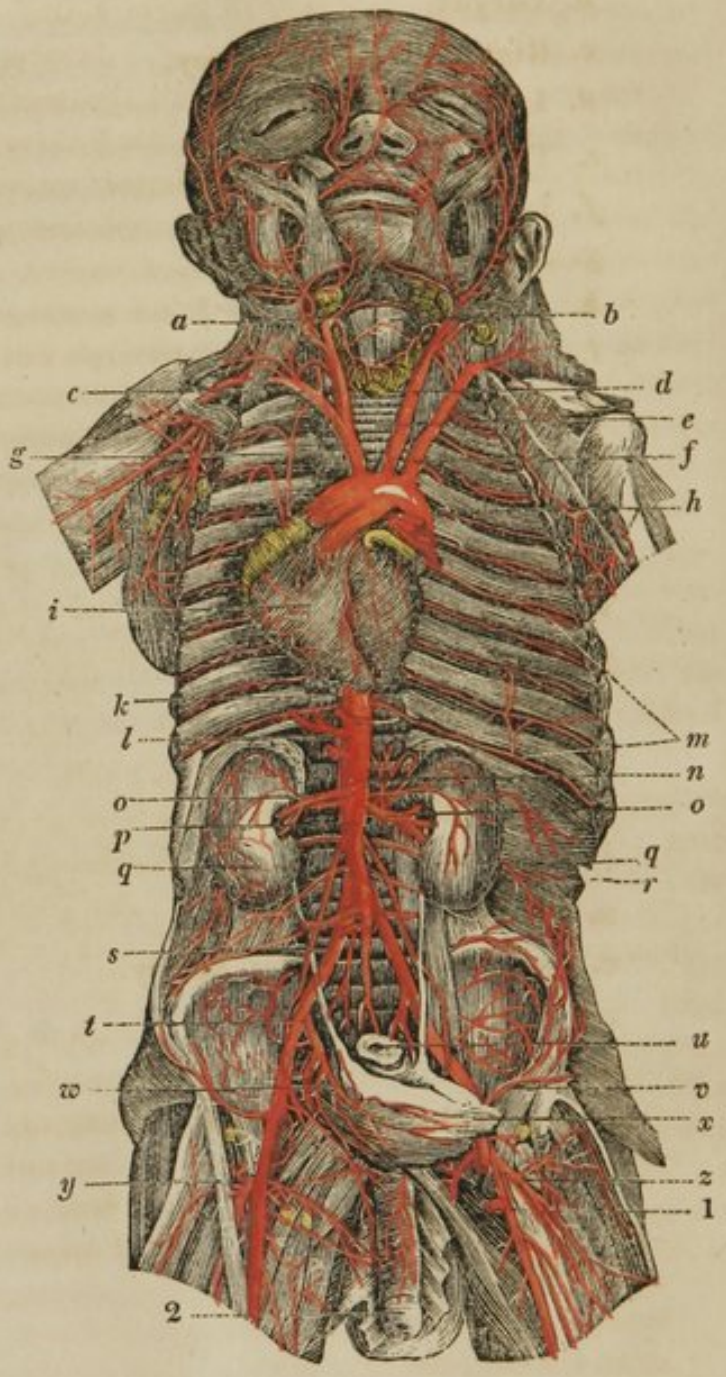


Plate I.

a. Division of the Carotid Artery.
b. Larynx.
c. Right Subclavian Artery.
d. Left Carotid.
e. Trachea.
f. Left Subclavian Artery.
g. Arteria Innominata.
h. Aorta.
i. Heart.
k. Spine.
l. Cœliac Artery.
m. Intercostals.
n. Descending Aorta.
o. Renal Arteries.
p. Spermatic.
q. Kidneys.
r. Lumbal Artery.
s. Right Iliac.
t. Division of Iliac.
u. Rectum.
v. Left Iliac Circumflex Artery.
w. Vesical.
x. Bladder.
y. External Pudic Arteries.
z. External Circumflex.
1. Arteria Profunda.
2. Penis.

Plate II.

a. Inferior Maxilla.
b. Occipito-Frontal Muscle.
c. Temporal.
d. Orbicularis Palpebrarum.
e. Levator Labii Superioris Alæque Nasi.
f. Levator Anguli Oris.
g. Zygomaticus Major.
h. Depressor Anguli Oris.
i. Depressor Labii Inferioris.
k. Orbicularis Oris.
l. Masseter.
m. Sterno-Mastoideus.
n. Parotid Gland.
o. Submaxillary Gland.
p. Common Carotid Artery.
q. Superior Thyroideal.
r. Sublingual
t. Facial.
u. Inferior Labial.
v. Superior Labial.
w. Transversus Facici.
x. Anastomosis of Facial and Temporal.
y. Occipital.
z. Posterior Auricular or Aural.
1. Anterior Auricular.
2. Temporal.
3. Temporo-Frontal.
4. Temporo-Occipital.
5. Internal Carotid.
6. Jugular Vein.
7. Facial Vein.

Plate II.

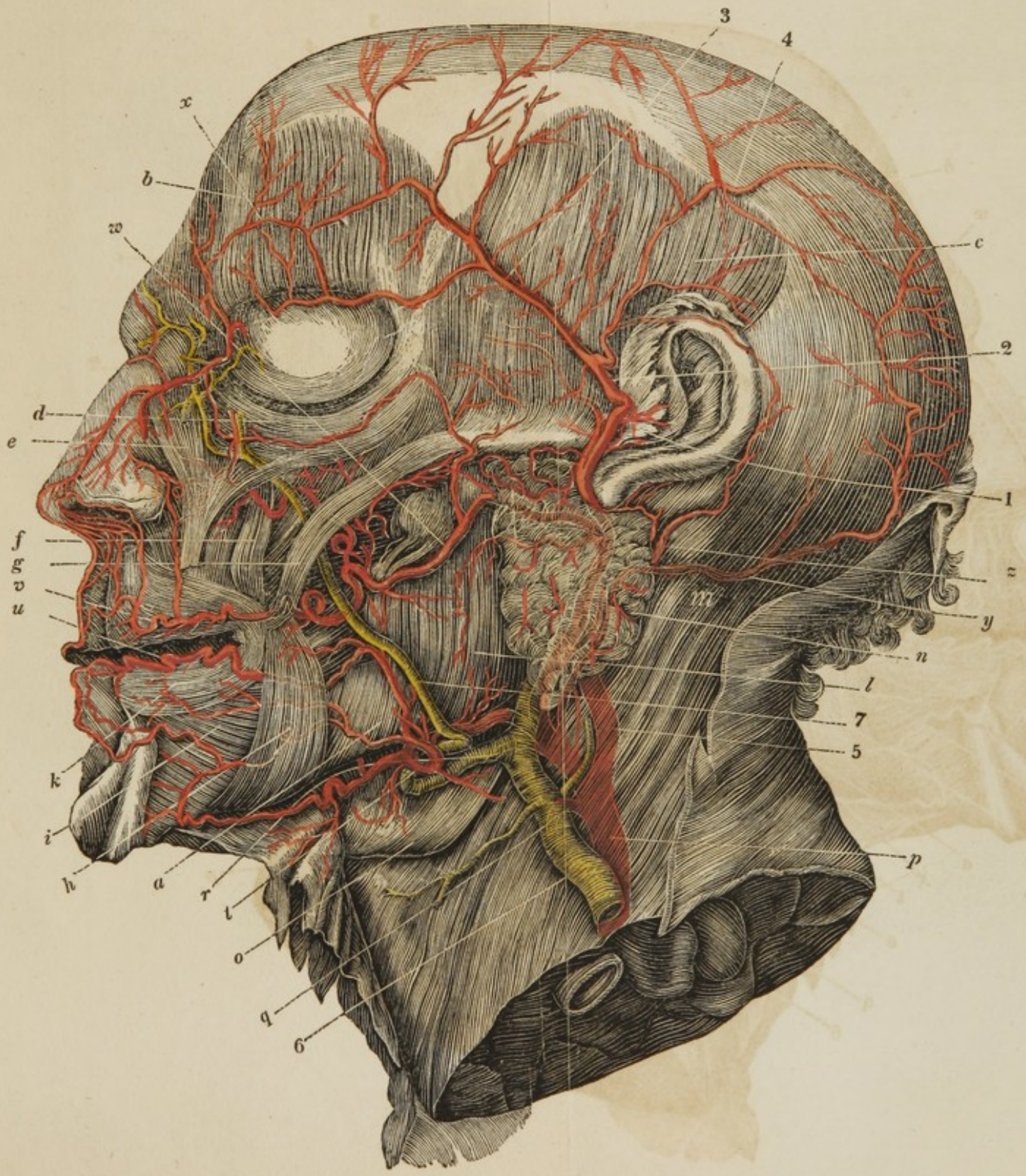


Plate III.

Plate III.

a. Os Frontis divided.
b. Os Temporis divided.
c. Os Maxillare Superius.
d. Os Maxillare Inferius divided.
e. Sterno-Mastoideus Muscle.
f. Sterno-Hyoideus.
g. Trachea.
h. Aorta.
i. Right Subclavian Artery.
k. Left Carotid.
l. Right Carotid.
m. Division of Carotid.
n. Superior Thyroid.
o. Submental.
p. Internal Maxillary.
q. Suborbitary.
r. Temporal.
s. Occipital.
t. Posterior Aural.
u. Anterior Aural.
v. Posterior Temporal.
w. Facial Nerve.
x. Its Anastomosis with the Par Vagum.
y. Sublingual Nerve.
z. Its Branch called Descendens Noni.
1. Par Vagum.
2. Accessory Nerve.
3. Great Sympathetic.
4. Its Superior Ganglion.
5. Branches of the Fifth Pair.
6. Muscles of the Eye.
7. Optic Nerve.

Plate IV.

a. Anterior Lobes of the Brain.
b. Middle Lobes.
c. Posterior Lobes.
d. Cerebellum.
e. Pons Varolii.
f. Medulla Spinalis.
g. Olfactory Nerves.
h. Optic.
i. Motores Oculorum.
k. Pathetic.
l. Trigemini.
m. Motores Externi.
n. Facial.
o. Auditory.
p. Par Vagum.
q. Sublingual.
r. Internal Carotid Artery.
s. Two Vertebral Arteries.
t. Basilary.
u. Communicating Arteries or Circle of Willis.
v. Anterior Arteries of the Cerebrum.
w. Middle.
x. Posterior or Deep.
y. Superior or Anterior Arteries of the Cerebellum.
z. Middle arteries of the Cerebellum.
1. Posterior.
2. Arteries of the Pons Varolii.
3. Anterior Spinal.

Plate IV.

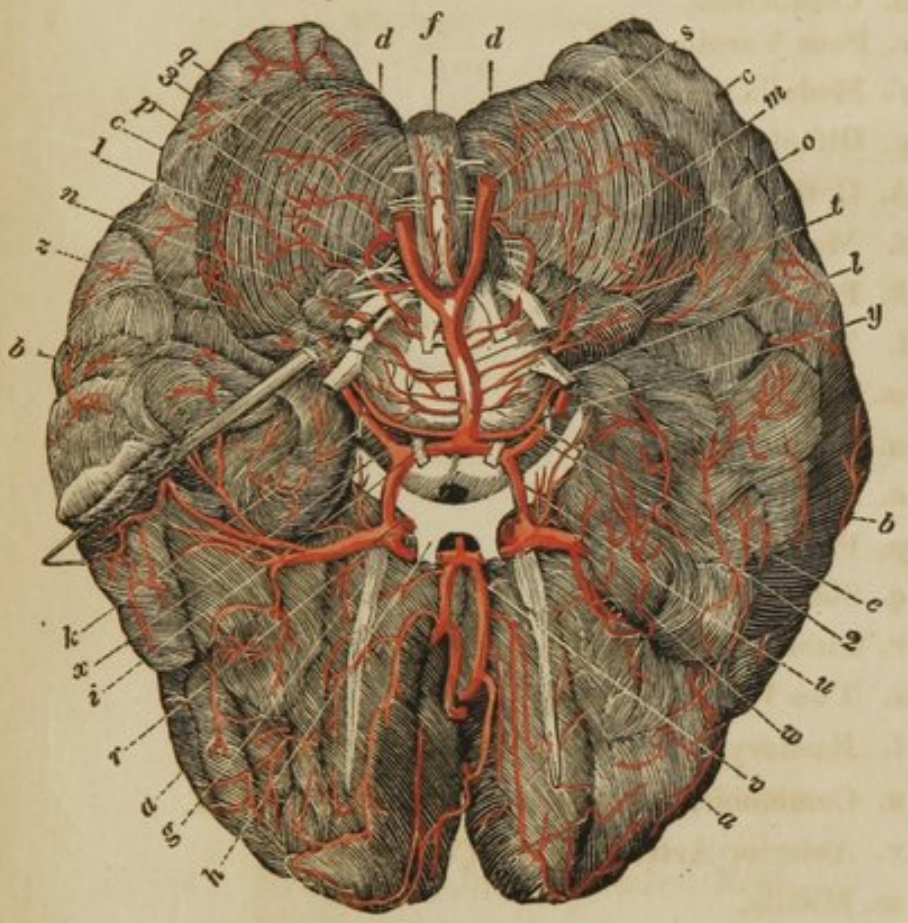


Plate V.

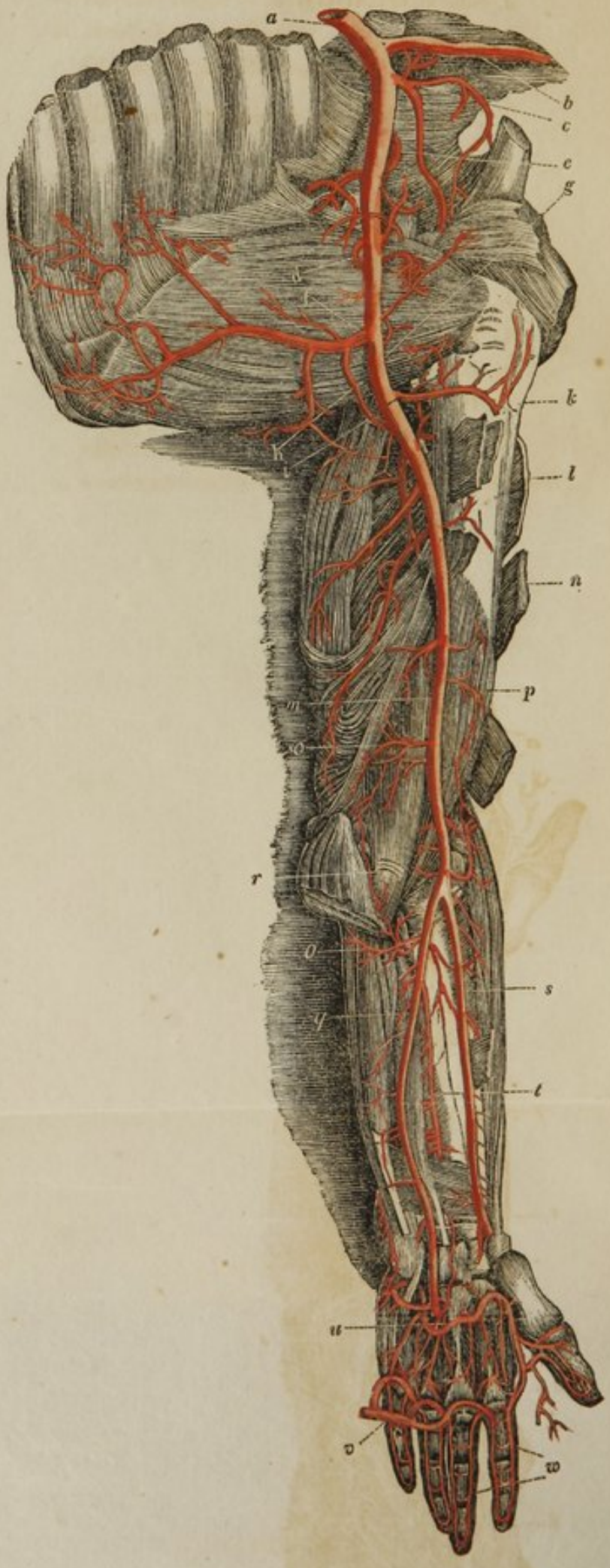


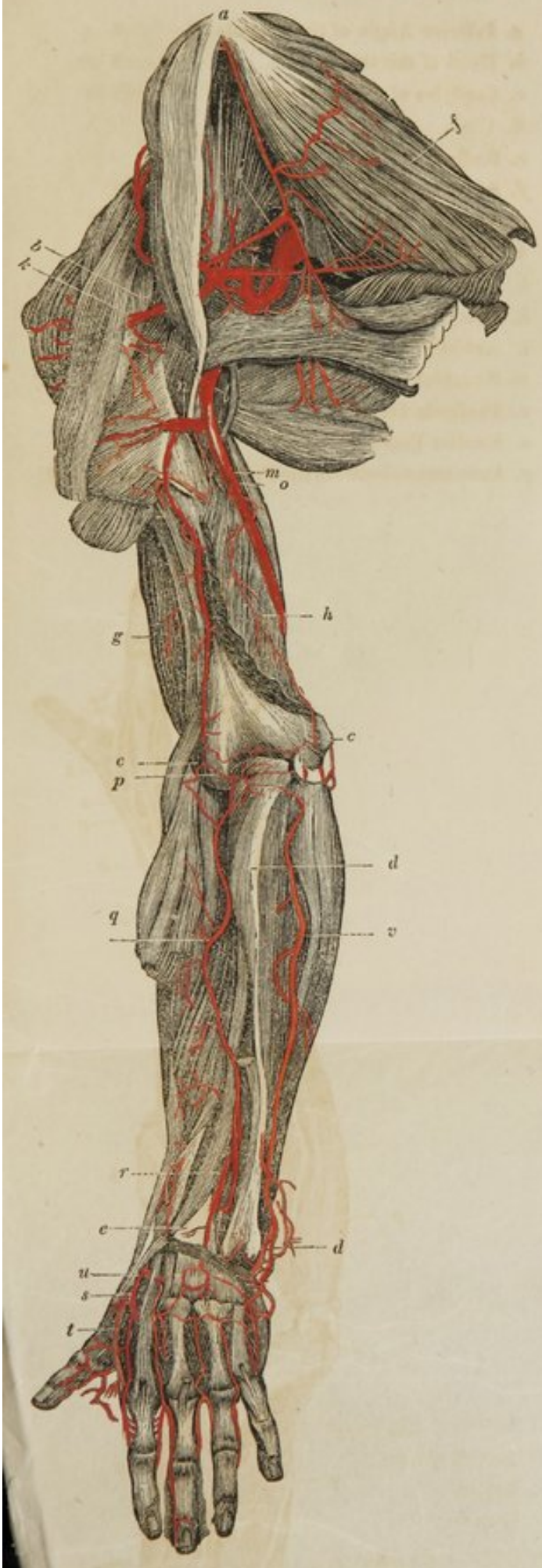
Plate V.

a. Subclavian Artery.
b. Carotid.
c. Superior Scapular.
d. } Branches to the dorsum of the Scapula.
e. }
f. Inferior Scapular.
g. Axillary.
h. Posterior Circumflex.
i. Anterior Circumflex.
k. Os Humeri.
l. Part of the Pectoralis Major Muscle.
m. Brachial Artery.
n. Part of the Deltoid Muscle.
o. Articular Arteries.
p. Biceps Muscle.
q. Ulnar Artery.
r. Tendon of the Biceps.
s. Radial Artery.
t. Internal Interosseal.
u. Deep-Seated Palmar Arch.
v. Superficial Palmar Arch raised.
w. Digital Arteries.

Plate VI.

a. Inferior Angle of the Scapula.
b. Head of the Os Humeri.
c. Condyles of the Os Humeri.
d. Ulna.
e. Radius.
f. Serratus Major Muscle.
g. Biceps.
h. Triceps.
i. Axillary Artery.
k. Posterior Circumflex.
l. Anterior Circumflex.
m. Brachial.
n. Profunda Humeri.
o. Smaller Profunda.
p. Anastomosis between the Profunda and Interosseal.
q. External Interosseal.
r. Internal Interosseal.
s. Radial.
t. Pollicar.
u. Dorsal Arch.
v. Posterior Interosseal Perforant.

PLATE VI.



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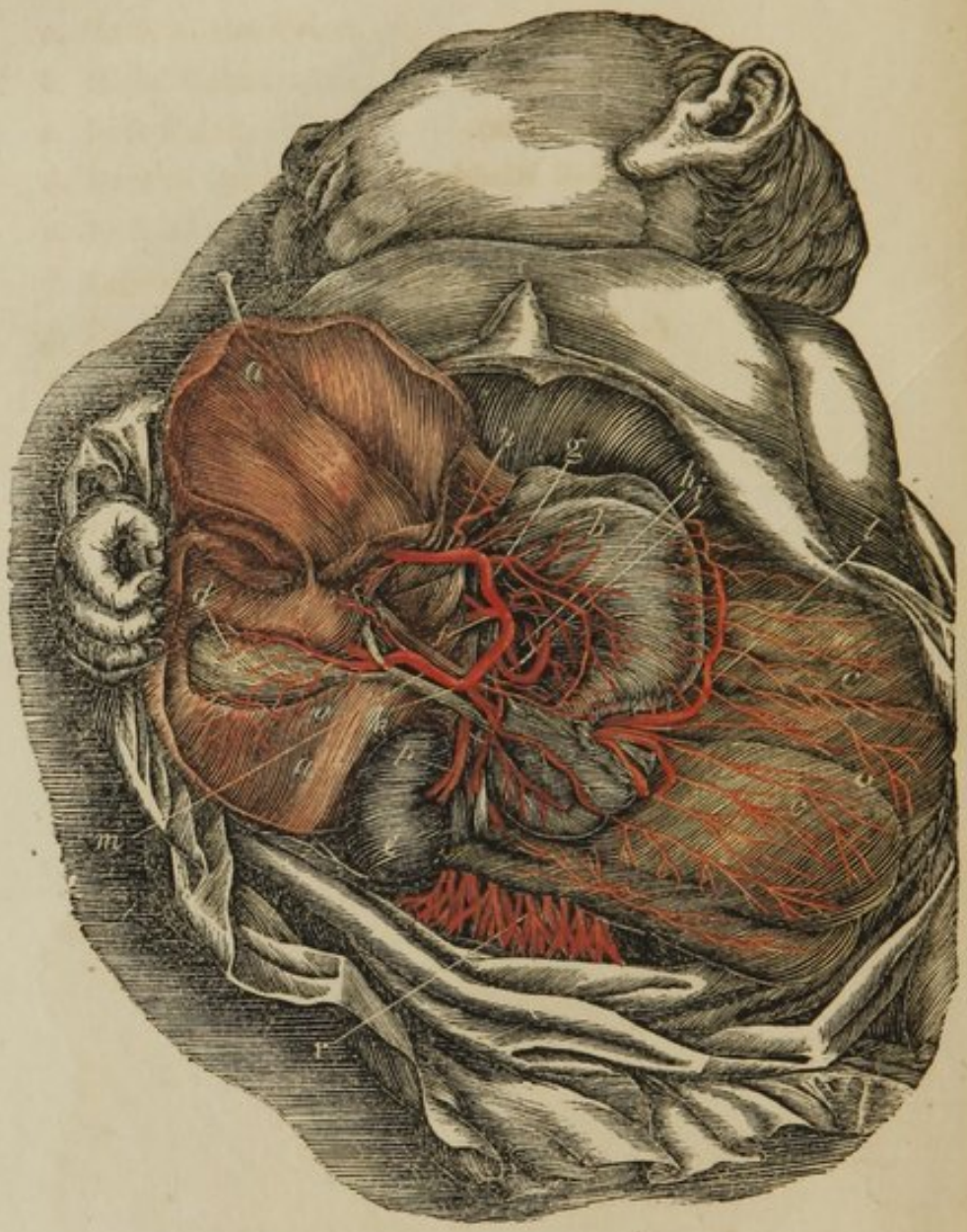
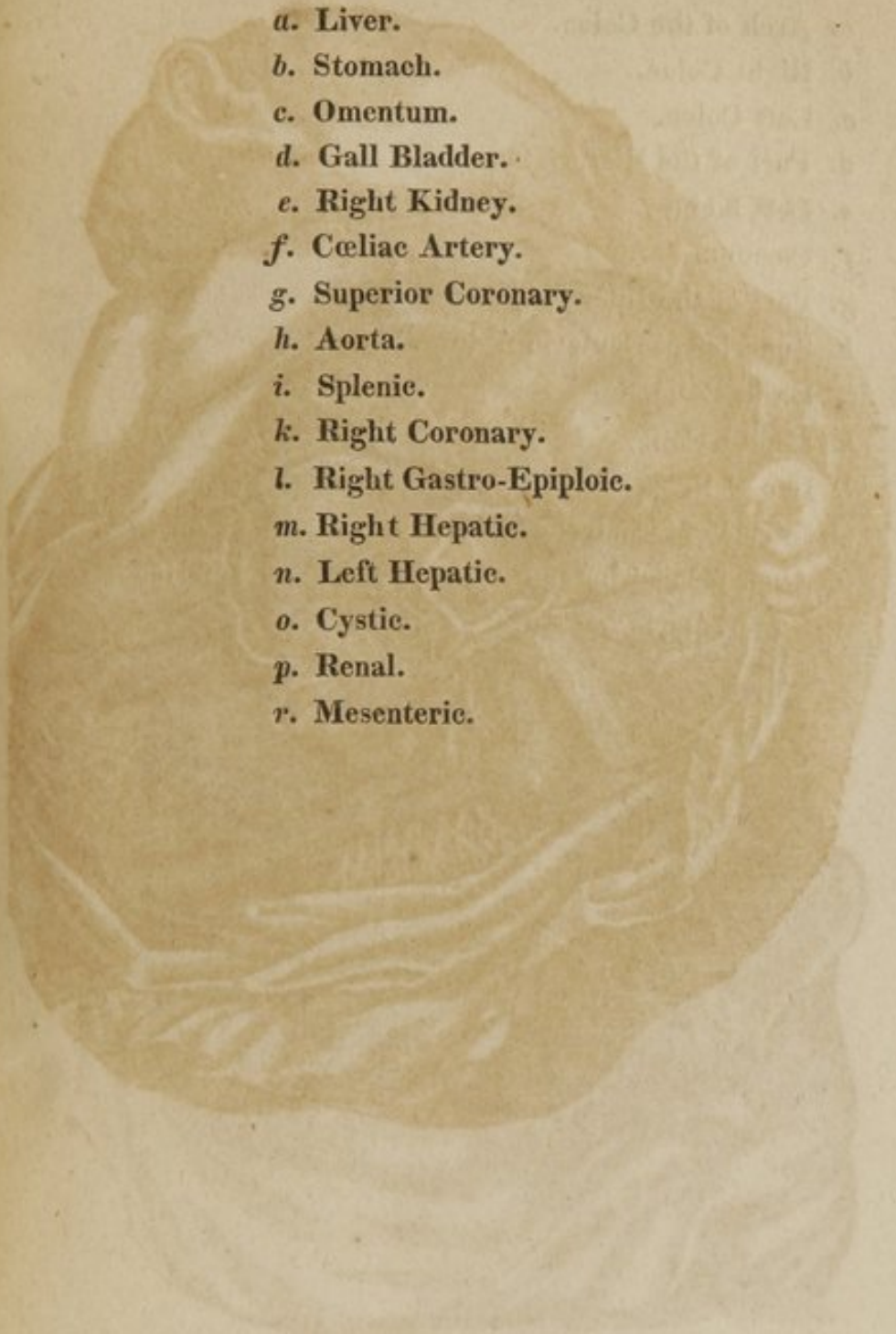


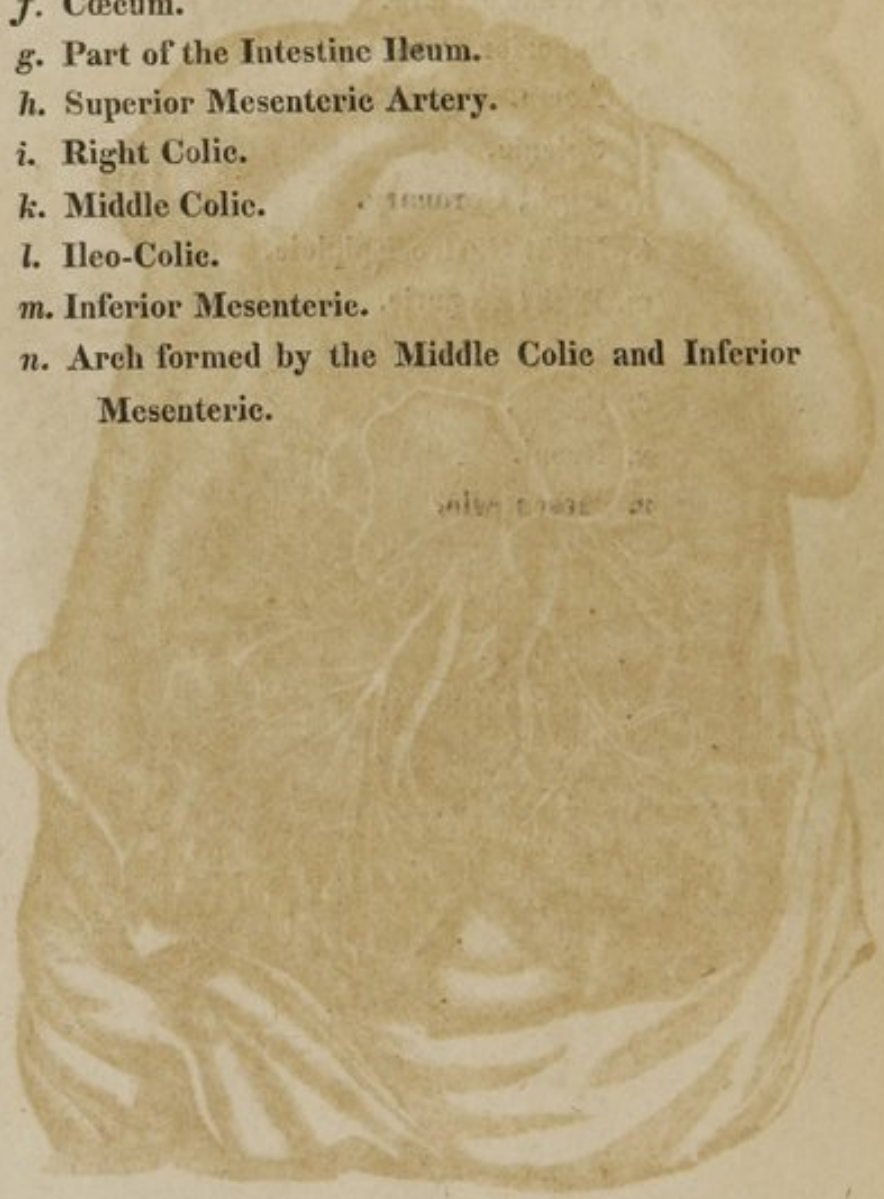
Plate VII.



a. Liver.
b. Stomach.
c. Omentum.
d. Gall Bladder.
e. Right Kidney.
f. Cœliac Artery.
g. Superior Coronary.
h. Aorta.
i. Splenic.
k. Right Coronary.
l. Right Gastro-Epiploic.
m. Right Hepatic.
n. Left Hepatic.
o. Cystic.
p. Renal.
r. Mesenteric.

Plate VIII.

a. Arch of the Colon.
b. Right Colon.
c. Left Colon.
d. Part of the Right Kidney.
e. Left Kidney.
f. Cœcum.
g. Part of the Intestine Ileum.
h. Superior Mesenteric Artery.
i. Right Colic.
k. Middle Colic.
l. Ileo-Colic.
m. Inferior Mesenteric.
n. Arch formed by the Middle Colic and Inferior Mesenteric.



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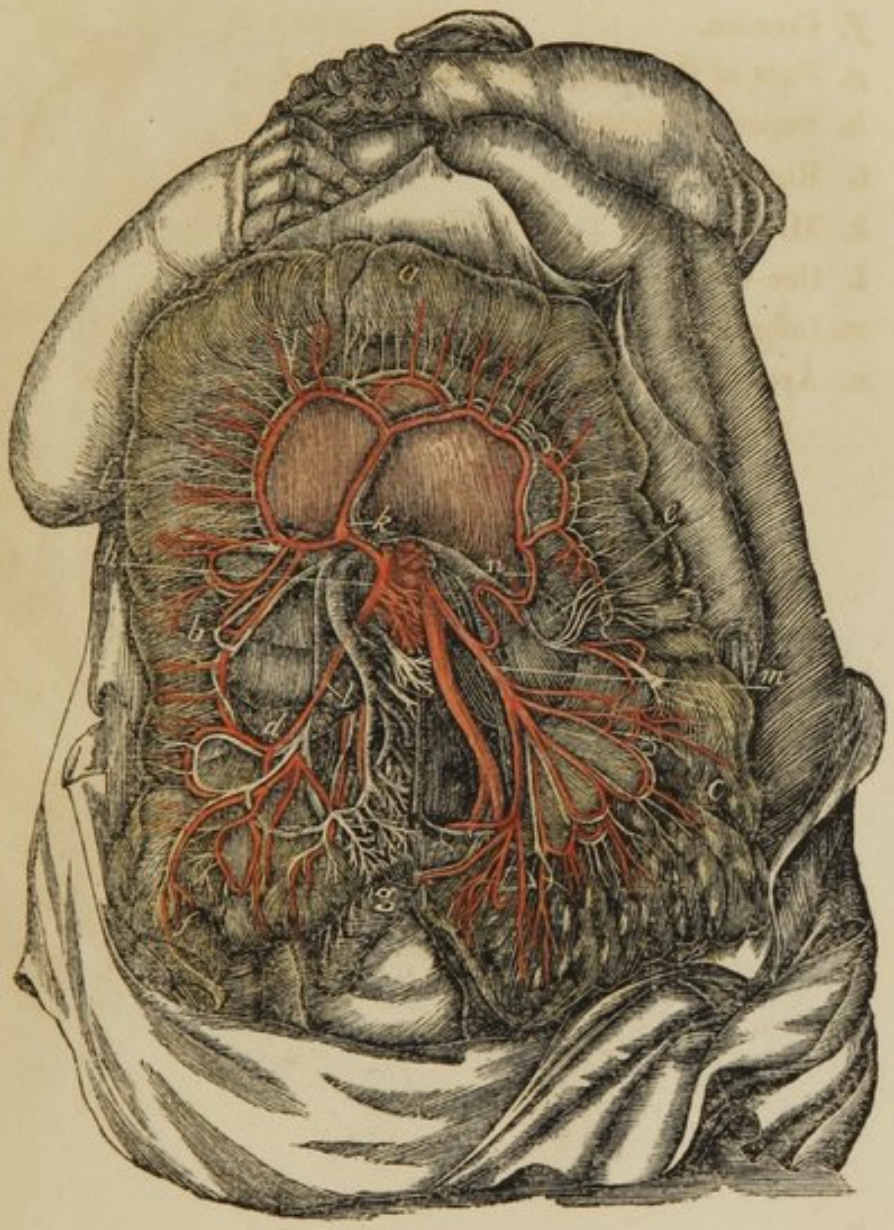


Plate IX.

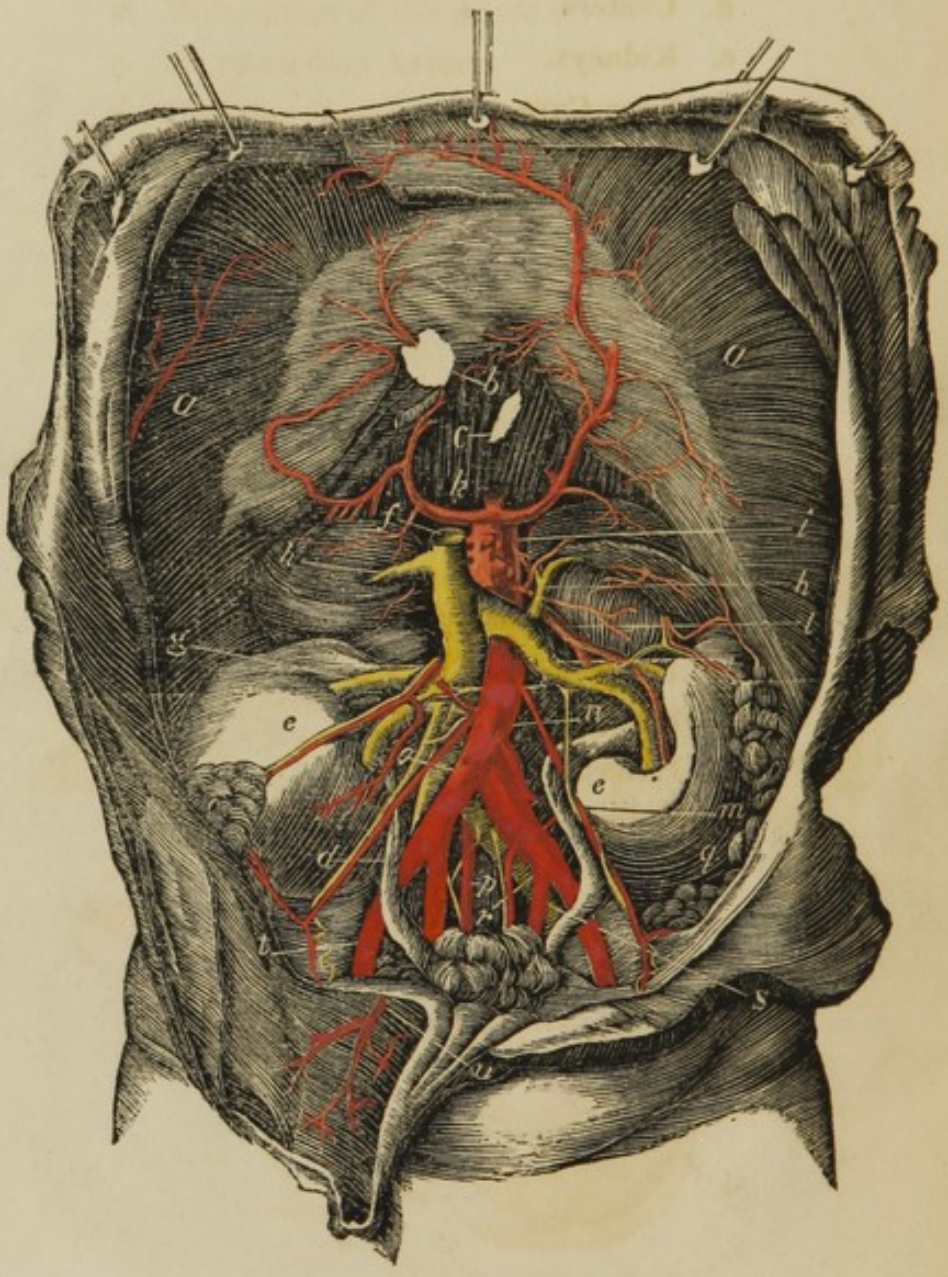
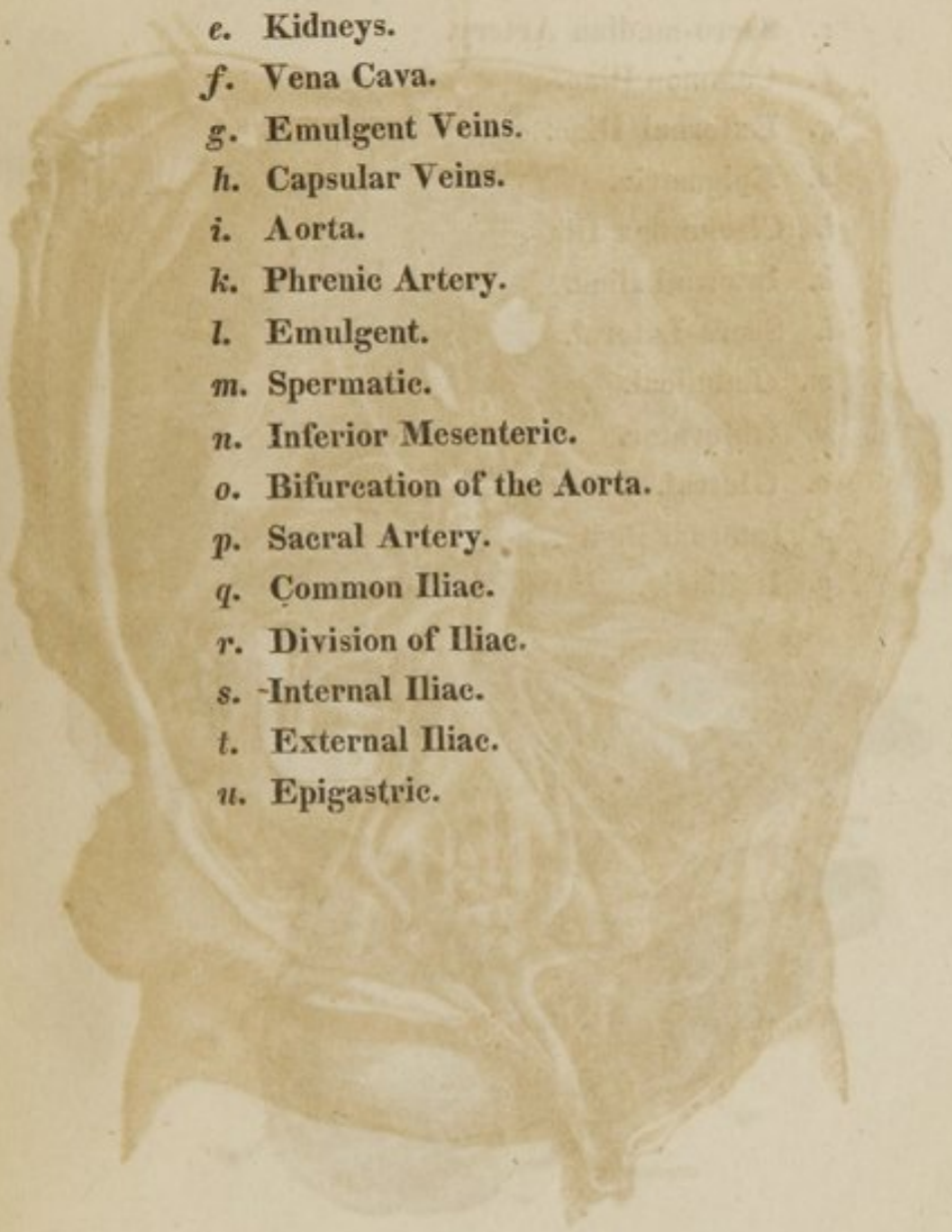


Plate IX.



a. Diaphragm.
b. Foramen of the Vena Cava.
c. Foramen of the Œsophagus.
d. Ureters.
e. Kidneys.
f. Vena Cava.
g. Emulgent Veins.
h. Capsular Veins.
i. Aorta.
k. Phrenic Artery.
l. Emulgent.
m. Spermatic.
n. Inferior Mesenteric.
o. Bifurcation of the Aorta.
p. Sacral Artery.
q. Common Iliac.
r. Division of Iliac.
s. Internal Iliac.
t. External Iliac.
u. Epigastric.

Plate X.

a. Lumbar Vertebræ.
b. Ossa Innominata.
c. Aorta.
d. Bifurcation of the Aorta.
e. Sacro-median Artery.
f. Common Iliac.
g. External Iliac.
h. Epigastric.
i. Circumflex Iliac.
k. Internal Iliac.
l. Sacro-Lateral.
m. Umbilical.
n. Obturator.
o. Gluteal.
p. Internal Pudic.
q. Ischiadic.

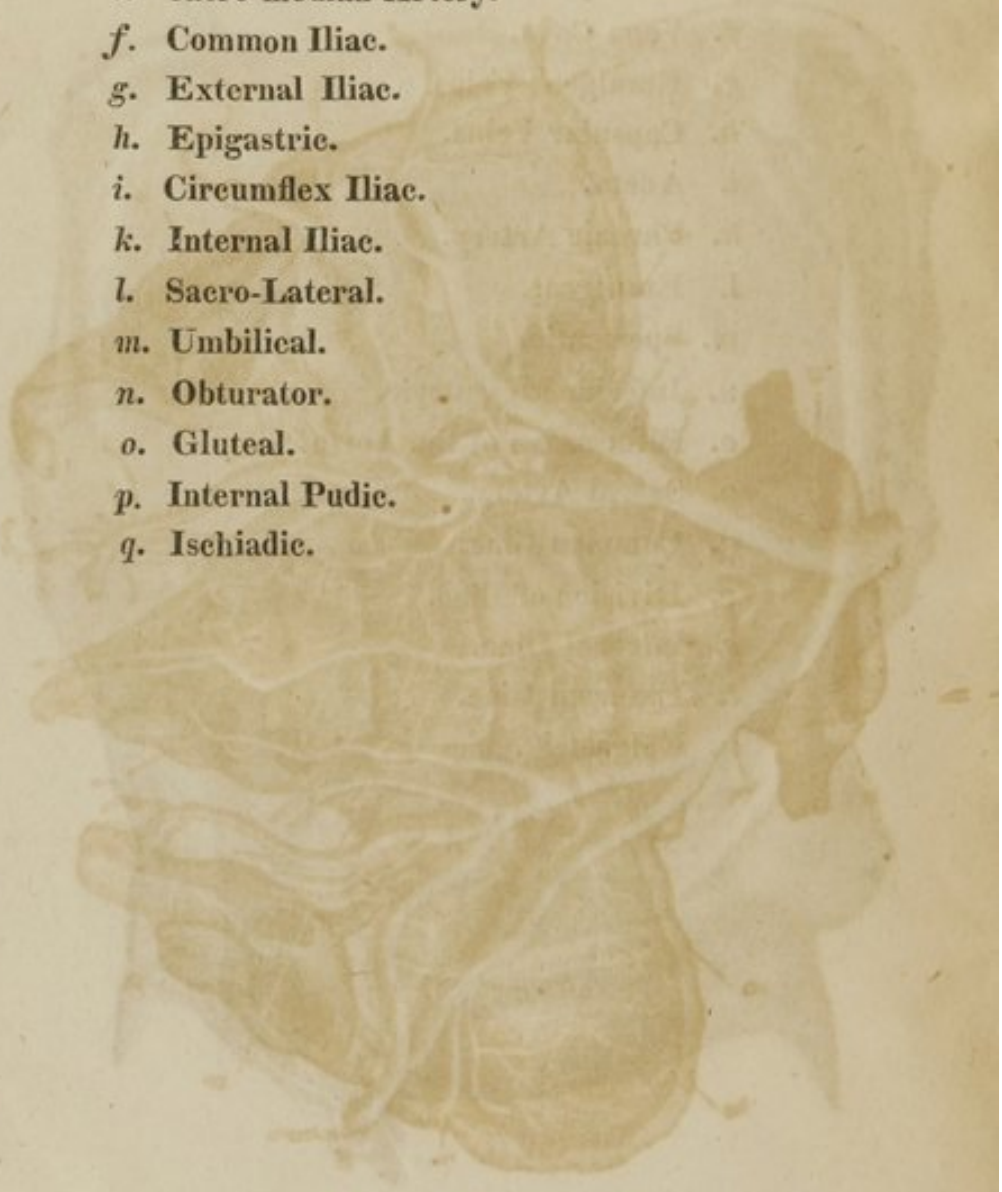


Plate X.

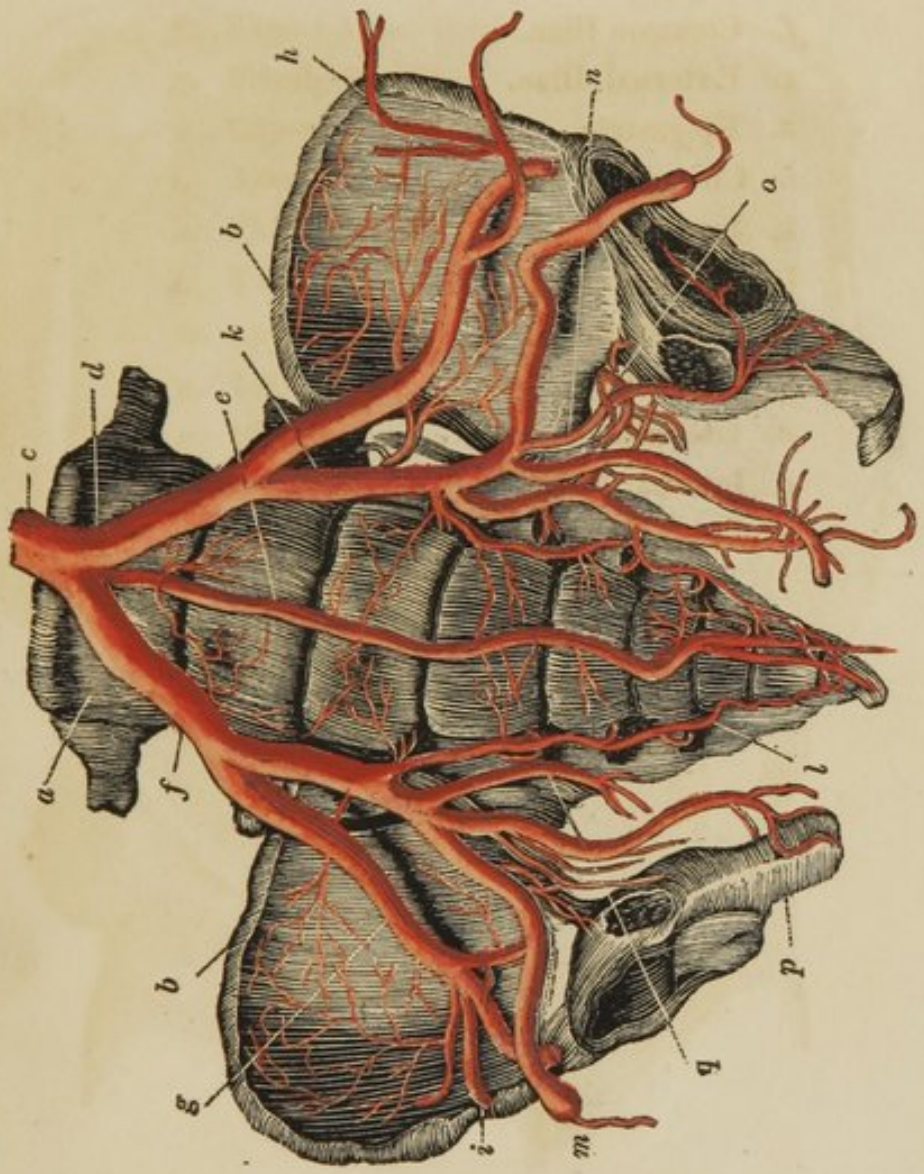


Plate XI.

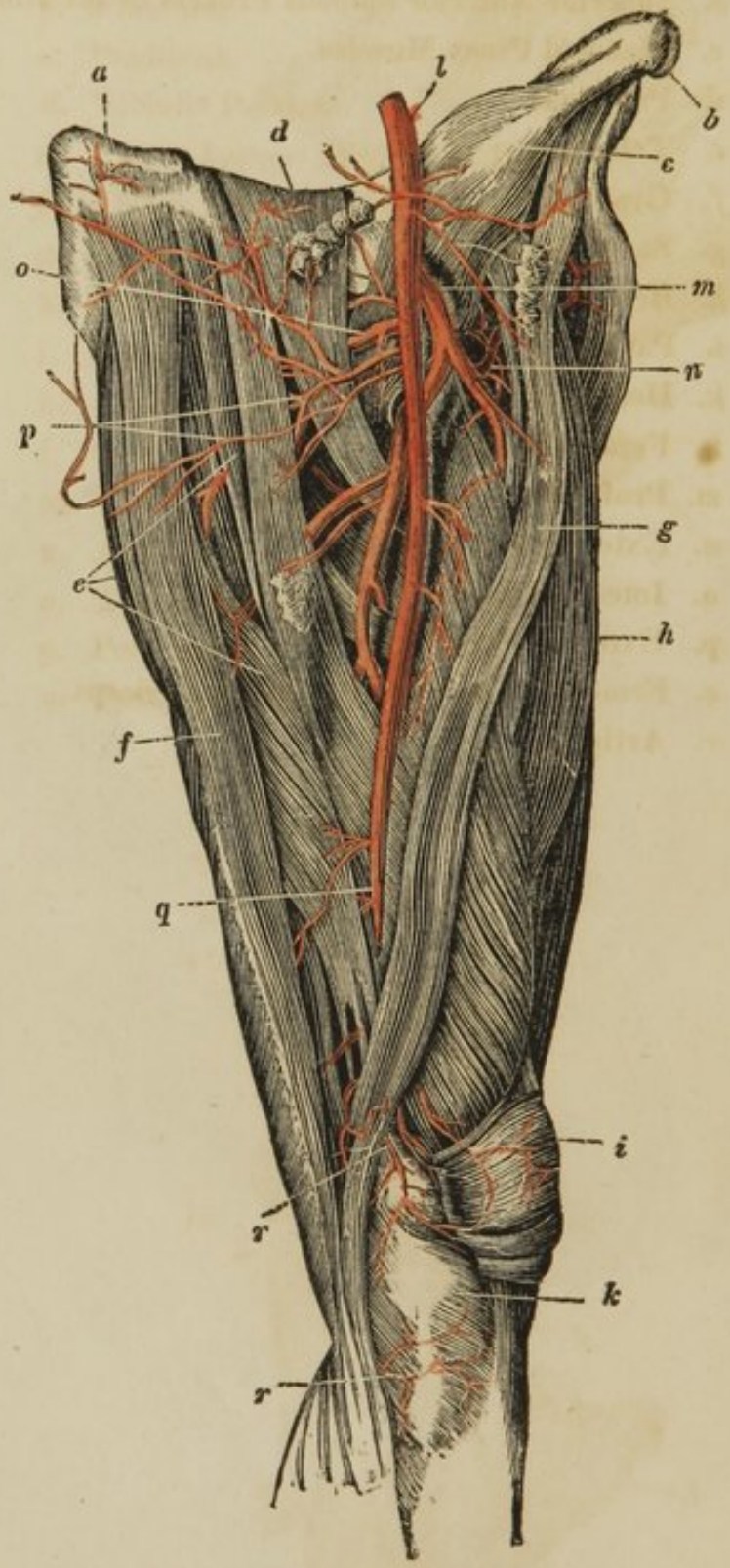


Plate XI.

a. Part of the Os Pubis.
b. Superior Anterior Spinous Process of the Ilium.
c. Iliac and Psoas Muscles.
d. Pectineus.
e. Triceps.
f. Gracilis.
g. Sartorius.
h. Rectus.
i. Patella.
k. Head of the Tibia.
l. Femoral Artery.
m. Profunda.
n. External Circumflex.
o. Internal Circumflex.
p. External Pudic Arteries.
q. Femoral Artery perforating the Triceps.
r. Articular.

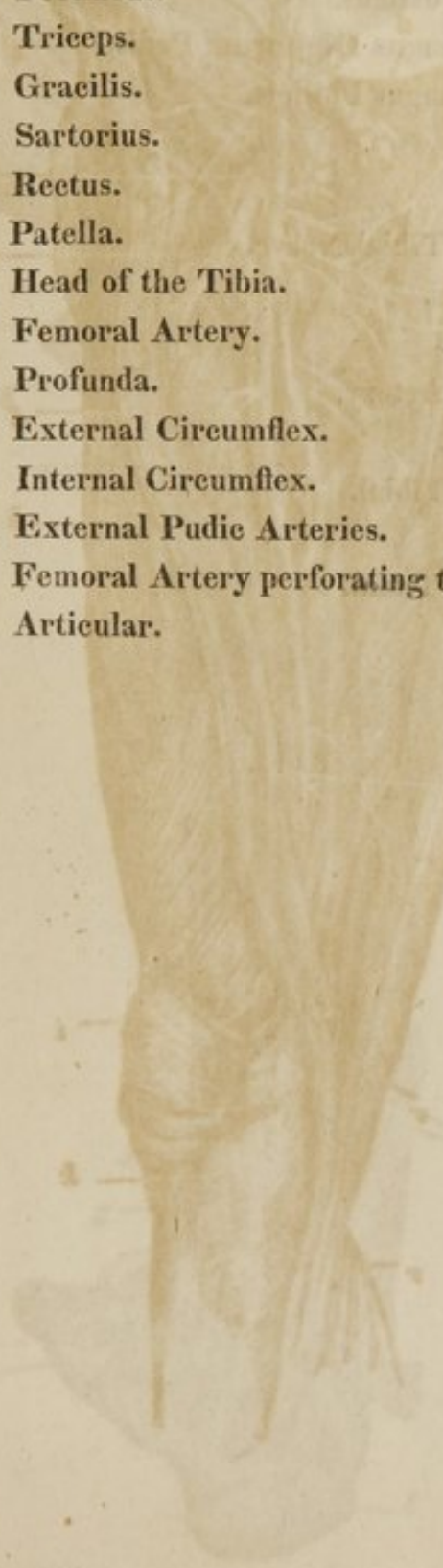
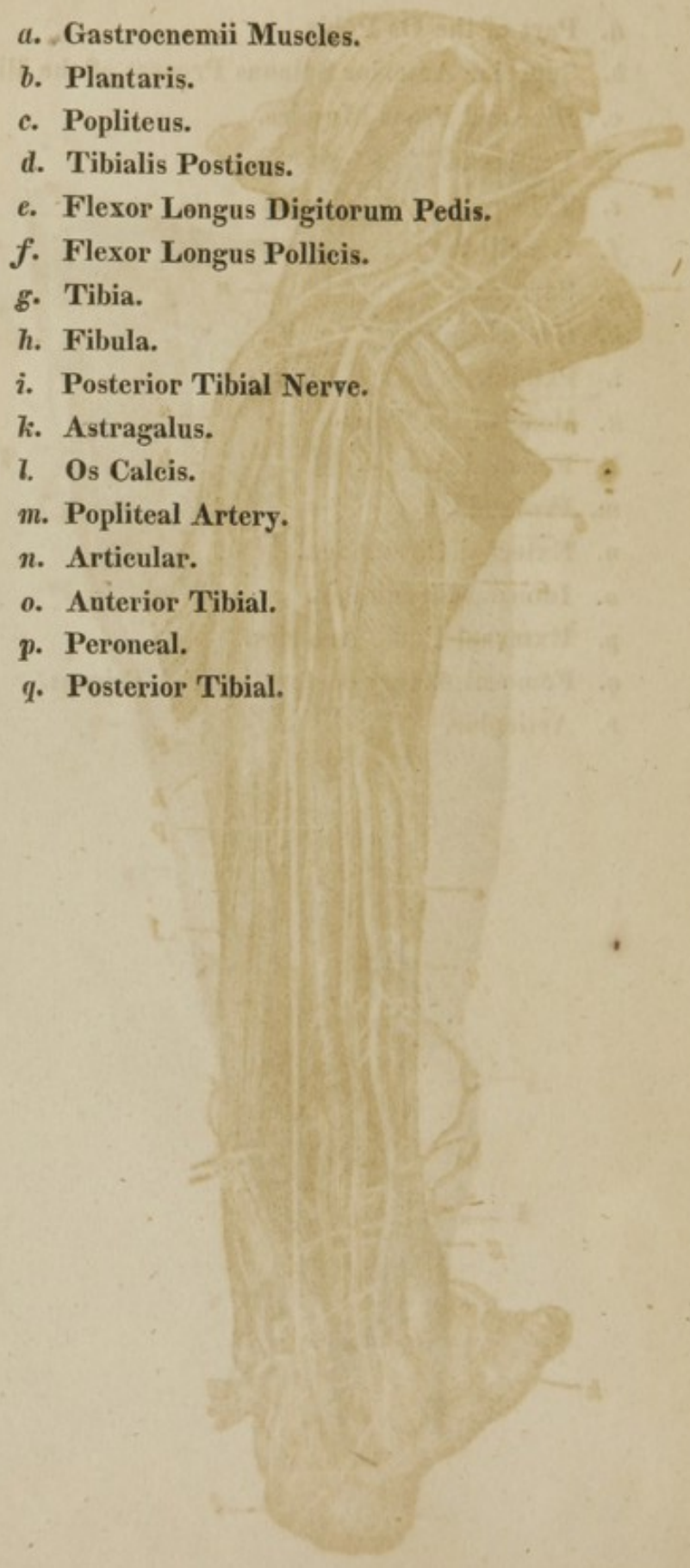


Plate XII.



a. Gastrocnemii Muscles.
b. Plantaris.
c. Popliteus.
d. Tibialis Posticus.
e. Flexor Longus Digitorum Pedis.
f. Flexor Longus Pollicis.
g. Tibia.
h. Fibula.
i. Posterior Tibial Nerve.
k. Astragalus.
l. Os Calcis.
m. Popliteal Artery.
n. Articular.
o. Anterior Tibial.
p. Peroneal.
q. Posterior Tibial.

Plate XII.

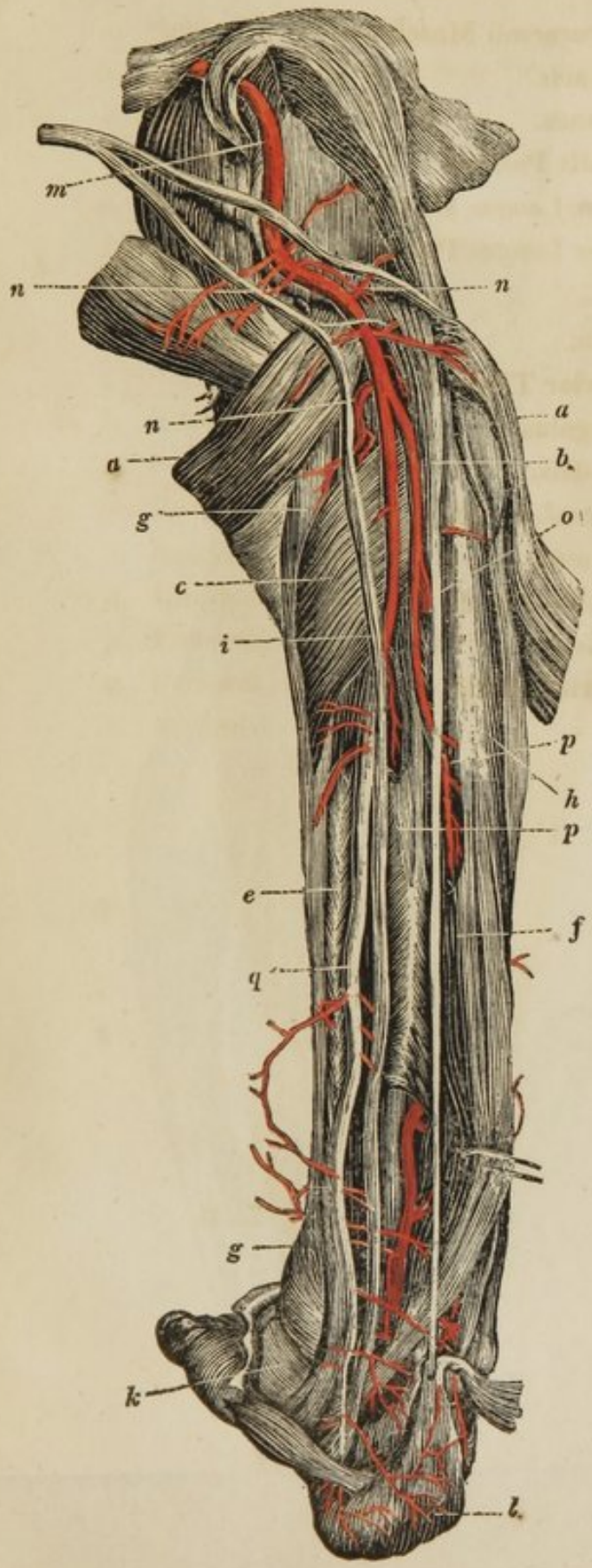


PLATE XIII.

Plate XIII.

a. Superior Artery of the Patella.
b. Superior Internal Articular.
c. *d.* } Condyles of the Os Femoris.
e. Superior External Articular Artery.
f. Inferior Internal Articular.
g. Inferior External Articular.
h. Anterior Tibial Artery.
i. Extensor Pollicis.
k. Extensor Digitorum Longus. } Muscles.
l. Tibialis Anticus.
m. Internal Articular Artery of the Ankle.
n. External.
o. External Pollicar.

Plate XIV.

a. Os Calcis.
b. Os Naviculare.
c. Large Ligament from the Os Calcis to the Os Cuboides.
d. Transverse Musele of the foot.
e. Metatarsal Bone of the little toe.
f. Metatarsal Bone of the great toe.
g. Tendon of the Flexor Pollicis Pedis.
h. Tendons of the Flexor Digitorum Pedis.
i. Posterior Tibial Artery.
k. Internal Plantar.
l. External Plantar.
m. Termination of the Anterior Tibial.
n. Digital Arteries.

Plate XIV.

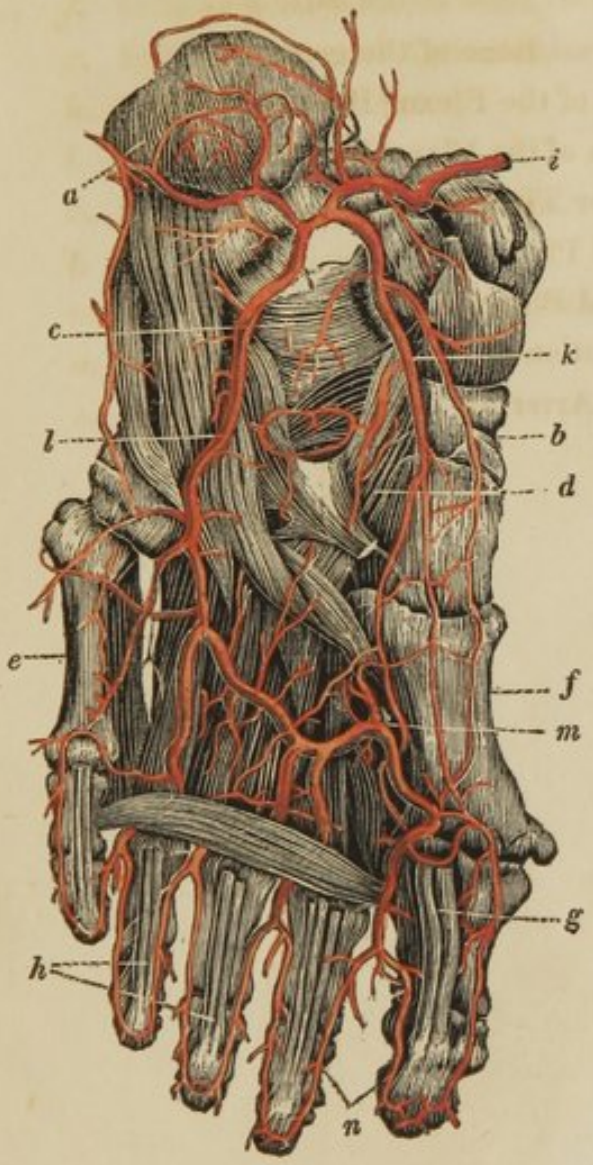


Plate XV.

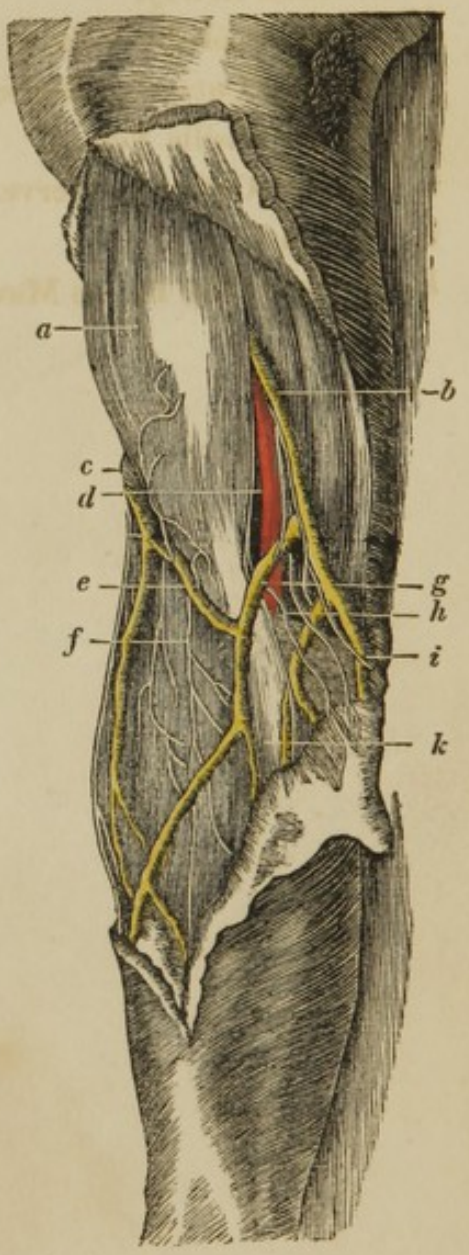


Plate XV.

a. Biceps Muscle.
b. Basilic Vein.
c. Cephalic Vein.
d. Brachial Artery.
e. Median Cephalic Vein.
f. External Cutaneous Nerve.
g. Median Basilic Vein.
h. Internal Cutaneous Nerve.
i. Median Vein.
k. Tendon of the Biceps Muscle.