

**An account of the varieties in the arterial system of the human body / by
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Publication/Creation

Dublin : James Marshall Leckie, 1830.

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VARIETIES IN THE ARTERIAL SYSTEM
OF THE HUMAN BODY.



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AN ACCOUNT

OF THE VARIETIES
IN THE ARTERIAL SYSTEM

OF

THE HUMAN BODY.

BY P. H. GREEN, A. B., M. B.

TRINITY COLLEGE, DUBLIN.

ILLUSTRATED BY PLATES.

DUBLIN :
JAMES MARSHALL LECKIE,
11, GRAFTON STREET.

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The object of the present work is to draw the attention of the Medical profession, to a branch of Anatomical knowledge, which has been hitherto almost overlooked in these countries. In proportion to the study bestowed on the Varieties in the Arterial System, they are found to be more numerous, and of more frequent occurrence; the subject, therefore, daily ~~requires~~ ^a more interest and importance, not merely from constituting a curious part of the history of the structure of the human body, but from its great practical utility in Operative Surgery. It has been calculated by Meckel, that some deviation in the origin of the primary branches from the Arch of the Aorta, occurs once in eight times.*—I am convinced, by a careful examination of a great number of dead bodies, that varieties of the principal arteries in the upper extremity, exist at least as often as once in every four individuals—the variety which occurs most frequently in the human body, affects in a very important manner, the commonest operation in surgery, I mean venesection. I have so often seen the radial artery (and in some instances the ulnar), when it arises from the brachial or the axillary, pass almost directly over the place in which the operation of bleeding is performed, that it has been to me matter of much surprise, how the vessel has not been more frequently injured. The origin of the left carotid from the innominata is another irre-

* J. F. Meckel, Manuel d'Anat. t. ii. p. 318.

gularity, by no means very unfrequent. In this case, the vessel usually crosses, in front of the trachea, to the left side of the body, the possibility of such an occurrence every surgeon should be acquainted with, before he attempts the operation of tracheotomy.

Varieties in the arterial system appear to be regulated by the same laws which govern irregularities of structure in other parts of the body. These are frequently nothing but the union of parts naturally separate, or the separation of parts naturally united. This rule is illustrated by many varieties of the arch; as the separate origins of the right carotid and subclavian; or the union of the left carotid and subclavian to form an innominate on the left side. Another law, more general in its operation, is, that departures from the general mode of formation are imitations of the structure in animals, particularly in the monkey tribe. In the muscular system, although deviations are extremely rare, this analogy is striking: thus the absence of the gemini and the gastrocnemii; the occurrence of three supinators; the double pronator teres; the accessory psoas parvus, and the extension of the rectus abdominis on the chest, are imitations of the structure in the monkey. Analogous to the structure in birds, have been found a third pectoral muscle, a double rectus lateralis, and the biceps separated into three distinct muscles. Many other examples might be enumerated, which tend to prove that one great scheme of structure pervades the animal kingdom, and that varieties are not occurrences of chance, but the adoption of one mode of formation instead of another. An attempt has been made, in the following work, to reduce the varieties of the arterial system under this rule: those who are better acquainted with the structure of animals will, I hope, be able to perceive many analogies which have escaped my notice. An interesting circumstance connected with the history of these irregularities is, that we have reason to suspect they are sometimes hereditary. Pelletan (*Clin. Chirur. t. i. p. 101, 2.*) mentions a case corroborative of this opinion: the anterior tibial artery ran superficially along the front of the leg, in both a father and daughter.

When I commenced the description of the variations in the arterial system, I had intended to give accompanying outlines of all the deviations; but the publication of the plates of Tiedemann by Dr. Knox has rendered it unnecessary. I have therefore confined myself to the delineation of such varieties as have not hitherto been published; or, if known, have not, as far as I am acquainted, been exhibited in drawing. Dr. Macartney has, with much liberality, permitted me the use of the valuable Cabinet of Varieties of Arteries in his museum: from these, or recent dissection, the outline drawings have been taken by my friend, Mr. Gilgeous, to whom I feel greatly indebted.

TRINITY COLLEGE,
APRIL 7, 1830.

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VARIETIES OF THE ARCH OF THE AORTA,

AND OF THE VESSELS ARISING FROM THE ARCH.

THE trunk of the great vessel called aorta arises from the superior part of the left ventricle, and, having first ascended a little towards the right, behind the pulmonary artery, it passes over the inferior extremity of the trachea, in a curved manner, from the right to the left side. This curve, or arch of the aorta, is placed in front of the third and fourth dorsal vertebræ. The vessel continues its course along the left side of the spine, but as it descends it inclines gradually to the right, until, in front of the fifth lumbar vertebra, the division into primary iliacs takes place. From the arch of the aorta usually arise three great vessels, the arteria innominata, the left carotid, and the left subclavian. This distribution I believe to be very constant: in the great number of bodies which I have examined, but few deviations have presented themselves to me. Varieties of the arch of the aorta may be divided into varieties with three primary branches; with four; with five; with six branches; and, finally, with a diminished number of primary branches, which, however, are never less than two. Besides these, there are some anomalies in the course and formation of the arch itself, which may first be enumerated briefly. The arch of the aorta we have

described as crossing, from right to left, in front of the trachea, a little above its division; yet sometimes, though very rarely, we find a departure from this distribution, the aorta shewing a tendency to the right side of the spine. The first appearance of this disposition is the aorta passing over the right bronchia only, and being situated in front of the bodies of the vertebræ. Sometimes, although the direction of the arch is from right to left, yet it does not cross the vertebræ, but the thoracic aorta lies altogether on the right side of the spine.* This leads to an anomaly still more rare, in which the direction of the arch is reversed, being from left to right.† In a few instances, it has been observed that the arch lies close on the spine, behind the œsophagus and trachea.‡

In one remarkable case, the aorta, almost from its root, divided into two branches, one of which passed before, the other behind the œsophagus and trachea; both trunks immediately united to form the descending aorta.§ This leads to the following variety, in which the tendency to the division of the aorta is still greater. Here the aorta subdivided into two branches; each furnished, first a subclavian; then an external; and next an internal carotid; after remaining separate for about four inches, the two branches united for the thoracic aorta.|| In this curious example, the aorta was furnished with five semi-lunar valves, confirming the analogy between it and the double aorta. This is an approach to the distribution in amphibious animals, in lizards, tortoises, serpents, and frogs.

In one instance, there was no arch, but the distribution almost perfectly resembled that of animals, for the aorta immediately divided into two branches; one became the descending aorta; the other formed a straight ascending trunk, which gave off (in the form of a cross,) a common branch on the right side for the right subclavian and carotid; on the left side, the left subcla-

* Meckel. Manual d'Anat. Descript. t. ii. p. 312.

† Philosop. Transact. 1793, p. 60. In this case, the heart was not in its natural situation, and the origin of the great vessels was reversed.

‡ J. F. Meckel. Man. d'Anat. t. ii. p. 312.

§ Hommel. Commerc. litt. Norimberg. 1737, hebd. 21. p. 161.

|| Malacarne. Osservat. in Chirur. Torino, 1785, cap. 6. cum tab.

vian; the continuation of the straight branch formed the left carotid.* This structure occurs in the horse, ass, sheep, goat, camel, and in many other mammalia, especially in those which have long necks. Hence also arose the old distinction of the aorta into ascending and descending, evidently derived from the dissection of animals.

VARIETIES WITH THREE PRIMARY TRUNKS.

1. The two carotids may arise by a common trunk between the two subclavians.† This is the structure in the elephant.

2. A common trunk for both carotids, one for the left subclavian, and one for the right, which arises from the left side of the arch, and passes behind the trachea, or more frequently the œsophagus.‡

3. A common trunk on the right side, producing the right subclavian and both carotids: next this arose the left vertebral, nearly from the middle of the arch, and lastly the left subclavian.§

4. Sometimes the order of vessels is transposed; that is, we find an innominata on the left side, while the right subclavian and carotid arise by separate trunks.|| This distribution is rare.

5. In still more rare cases, we find the right subclavian, or even the innominata, arising from the descending aorta. In two of these examples which I have seen, the recurrent branch of the pneumo-gastric nerve did not pass round the vessel. In one, the right subclavian passed behind the œsophagus and trachea, to the right side.

The number of branches, arising from the arch of the aorta, may be increased or diminished, by the separation or union of the chief trunks distributed to the head and upper extremities. Thus the carotids, vertebrales, and subclavians may all arise by separate trunks, constituting six primary divisions; this is the limit of variation. On the other hand, we may find an arteria

* Klinz. Abhand. der Joseph. Med. Chirur. Akademie. Wien. 1787.

† Tiedemann. Tab. Arteriar. pl. iii. f. 11.

‡ Walter. Mem. de l'Acad. de Berlin. 1785.

§ J. F. Meckel. Manuel d'Anat. Gen. t. ii. p. 322.

|| J. F. Meckel. Manuel d'Anat. Gener. et Des. t. ii. p. 322.

innominata on each side, reducing the number of primary trunks to two.

VARIETIES WITH FOUR PRIMARY TRUNKS.

Sometimes the number of primary branches is increased to four. This anomaly may occur in several forms.

1. The most common is that in which the left vertebral artery arises from the arch, between the left carotid and subclavian.* It is curious, that this variety, which occurs frequently, has been observed on the left side only. It appears, according to the observation of Tiedemann, to be the regular distribution in the phoca vitulina. In the heart of a phoca, preserved in the museum of Dr. Macartney, the left vertebral does not arise from the arch.

2. The left vertebral also arises from the extremity of the arch, beyond the left subclavian.† This form of variety is much more rare than the preceding.

3. The anomaly which occurs next in frequency to the irregular origin of the left vertebral, is the origin of the inferior thyroid from the arch.‡ This variety usually takes place on the right side, the artery arising between the innominata and the left carotid.

4. In addition to the three usual branches, we may have the internal mammary, or thymic arteries arising from the arch.§

Sometimes the number of primary branches is increased to four by the separation of the innominata into two trunks. This may occur in several ways.

5. The right subclavian may form the first branch on the right side.||

* Morgani. de Sedib. et Causis Morbor. Epist. 3, Art. 20. Sandifort. Observat. Anat. Pathol. lib. 4, p. 92.

† J. F. Meckel. Hand. der Pathol. Anat. B. 2, Ab. 1, S. 109.

‡ Walter. Memoir de l'Acad. de Berlin, 1785. Tab. 3, fig. 2. Loder. de Nonnul. Arter. Variet. p. 4.

§ Sæmmer. de Corpor. Hum. Fab. t. 5, p. 121.

|| Winslow's Anatomy, p. 36. J. F. Meckel. Pathol. Anat. B. 2, Abath. 1, S. 107.

6. The right subclavian may arise from the lower part of the arch on the left side, or just above the left subclavian.*

7. Or it may have its origin between the right and left carotids. In one of these cases, the subclavian passed behind the right carotid to the right arm, but more usually it passes before it.†

8. The right subclavian may be removed still farther towards the left side, arising between the left carotid and subclavian. In this case, also, the right subclavian passed occasionally before, but sometimes behind both carotids.‡

9. Sometimes the arch furnishes the four branches in the following order :

Left carotid ; right carotid ; left subclavian ; right subclavian.§
Sometimes we find the vessels arranged thus :

10. Right carotid ; left carotid ; left subclavian ; right subclavian, which makes a curve behind the œsophagus and trachea to the right side.|| In some cases, the artery passes between the œsophagus and the trachea.

11. The rarest form of this species of variety is, when the carotids and right subclavian arise by separate trunks, while the left subclavian is the first branch of the arch on the right side.¶

VARIETIES WITH FIVE PRIMARY BRANCHES.

The existence of five trunks, arising from the arch, is still more rare than the varieties already mentioned. The principal forms are :

1. Besides the three usual trunks, there are the left vertebral and right internal mammary or inferior thyroid.**

2. The subclavians and carotids by four separate trunks, with a common trunk for the left vertebral and inferior thyroid.††

* Walter. Mem. de l'Acad. de Berlin, 1785, p. 62.

† Huber. Acta Helvetic. t. 8. p. 75.

‡ Walter. Mem. de l'Acad. de Berlin, 1785. Harrison on the Arteries, Dublin, 1829, t. 1, p.

§ J. F. Meckel. Anat. Descrip. t. ii, p. 320.

|| Bæhmer. de Quat. et Quinq. Ramis, &c.

¶ J. F. Meckel. Anat. Desc. t. ii, p. 321.

** Bæhmer. Obser. Anat. Rar. fas. 1, p. 11.

†† J. F. Meckel. Anat. Gen. Descrip. t. ii, p. 321.

3. The subclavians and carotids by distinct trunks, with either the left vertebral, or right inferior thyroid. The following species of this variety have been observed :

1. Right subclavian ; right carotid ; left carotid ; left vertebral ; left subclavian.* Or,

2. Right carotid ; left carotid ; left vertebral ; left subclavian ; right subclavian, passing behind the œsophagus and trachea to the right side.†

4. Sometimes the innominata is not separated into two branches, but both vertebrales arise from the arch in this order :

Innominata ; right vertebral ; left carotid ; left vertebral ; left subclavian.‡

VARIETIES WITH SIX PRIMARY BRANCHES.

The number of trunks has been increased to six, by the separate origin of the secondary branches. This variety is very rare, having, I believe, been observed only twice. The subclavians, carotids, and vertebrales all arose by separate trunks, each vertebral between the subclavian and carotid of its own side.§

VARIETIES WITH TWO PRIMARY BRANCHES.

This form of variety is still more rare than any of the preceding, if we except the occurrence of six primary branches. All the examples which illustrate it are referable, either to an irregular union of primary or secondary branches, or to an imitation of animal structure.

1. Sometimes the left carotid forms a branch of the innominata.|| This variety has been seen very frequently by the Continental anatomists ; but, were I to judge from my own experience, I would say it was of rare occurrence. It appears to

* Loder. de Nonnul. Arter. Variet.

† Koberwein. de Vas. Curs. Ab. p. 16.

‡ Fiorati. Atti della Acad. de Pad. t. 3, P. 1, p. 38.

§ Tiedemann. Explicat. Tab. Arter. p. 51. J. F. Meckel. Anat. Gen. et Des. t. ii, p. 322.

|| Malacarne. Osserv. in Chirur. P. 2, p. 128. Walter. Nouv. Mem. de l'Acad. de Berlin, Ann. 1785. J. F. Meckel. Hand. der Pathol. Anat. B. 2, Ab. 1, S. 131. Tiedemann. Tab. Arter. Descr. Carlsruhæ, 1822, p. 21.

constitute the type in the order quadrumana, especially in the simiæ. Perhaps it was on this account that the earlier anatomists, who seem frequently to derive their descriptions from dissection of the monkey tribe, have given this as the natural distribution in man. The same disposition has been seen in the dog, fox, wolf, and lion; in the hyena, bear, and many other mammalia. When the left carotid arises from the innominata, it always crosses to the left side, below the thyroid body and in front of the trachea. It is manifest that a variety, similar to the one now described, would interfere in the most important manner with tracheotomy. Every surgeon ought, therefore, to be prepared for such a contingency, and make a careful examination of the front of the trachea, before he attempt an operation on a part, where his first incision may divide the carotid artery.

2. Sometimes, but extremely rarely, we find a transposition of the preceding variety; for, on the left side, a common trunk produces both carotids and the left subclavian.*

3. Occasionally, an arteria innominata exists on both sides; that is, the left carotid and subclavian arise by a common trunk.† This constitutes the type in the chiroptera. It occurs, also, according to Cuvier, in the *delphinus phocæna*.

4. Or, finally, in very rare cases, the right carotid arises from the arch; on the left side, is a common trunk for the left carotid and subclavian, while the right subclavian is a branch of the thoracic aorta.

5. This tendency of the vessels towards the left side leads to an anomaly extremely rare, an example of which I have before me; in this variety, all the vessels arise from the left side of the arch. First the right carotid, which crosses the lower part of the trachea, giving off the right vertebral: next this arose the left carotid and the subclavian, nearly from the same point; the right subclavian is detached from the back part of the arch, a little below the left subclavian. It passed to the right side, behind the œsophagus and trachea.

* Zagorsky. Mem. de l'Acad. de Scien. de St. Petersburg, 1809, t. 1, p. 384.

† Malacarne. Osservat. in Chirur. Torino, 1784, t. 2, p. 119. Tiedemann. Tab. Arter. Descrip. p. 17.

6. Sometimes there is an appearance of two innominatæ, but on examination we find that, of the two branches, one furnishes both carotids, the other, both subclavians.*

VARIETIES OF THE CORONARY ARTERIES.

The only variety of this vessel at all interesting is the existence of but one coronary artery, as this is analogous to the structure in the elephant.† Sometimes there are three, sometimes four coronary arteries.‡

VARIETIES OF THE CAROTID ARTERY.

The principal of these have been enumerated under the varieties of the arch. The carotid artery usually divides near the superior edge of the thyroid cartilage, into the external and the internal carotids, but sometimes the bifurcation takes place as high as the superior part of the styloid process. This irregularity conducts to another, in which there is no bifurcation at all, but the primary carotid, having given all the branches usually furnished by the external, is continued under the form of internal carotid. Sometimes the division into the two secondary branches takes place as low down as the sixth cervical vertebra.§

SUPERIOR THYROID ARTERY.

The origin of this artery frequently varies : it usually arises from the external carotid, a little above the bifurcation ; but it may arise from the primary carotid ;|| or from the external carotid, by a common trunk with the lingual artery ; in some rare cases, this trunk has arisen from the primary carotid. Sometimes the superior thyroid is wanting altogether ; sometimes

* J. F. Meckel. *Man. d'Anat.* t. 11, p. 322. Haller. *de Corp. Hum.* Fab. t. 4, p. 8.

† Thebesius. *Dis. de Circ. Sang.* p. 8. I have lately met with an example of this kind : the preparation is injected with plaister of Paris, and now lies in the museum of Dr. Macartney.

‡ Tiedemann. *Tab. Arter. Exp.* p. 13.

§ Burns, *Diseases of the Heart, &c.* p. 285. Morgagni. *de Sed. Causisque Morb.* lib. iii. epist. 29. art. 20.

|| Burns, *l. c.* p. 288. I have seen several examples of this.

there are two; but this latter variety is properly considered as the separation of the laryngeal branch from its primary trunk.

LARYNGEAL BRANCH OF THE SUPERIOR THYROID.

This branch very often arises from the external carotid; according to Meckel's observations, once in eight times.* It also may take its origin from the lingual, but this seldom occurs.

LINGUAL ARTERY.

By a common trunk with the superior thyroid; or, very frequently, by a common trunk with the facial. This latter artery occasionally supplies the sublingual also.

PHARYNGEA ASCENDENS.

This artery I have very frequently seen arise from the bifurcation of the carotid, as the sacra media does from the division of the aorta. In some cases it is furnished by the occipital artery,† or by the superior thyroid;‡ but rarely by the internal carotid. Sometimes this artery is supplied by the facial; sometimes it is double; in the latter instance, the accessory pharyngeal arises from the internal carotid; or both vessels may arise, one from the internal, the other from the primary carotid. As many as three pharyngeal arteries have been seen.§

FACIAL ARTERY, OR EXTERNAL MAXILLARY.

This vessel is peculiarly liable to variation; in so much, that we seldom find the facial arteries on both sides of the same body similar in distribution. Sometimes it is so small as scarcely to pass beyond the angle of the jaw; at other times, it extends up to the forehead, producing the palpebral and lachrymal arteries.|| In the former case, the branches of the facial are replaced by the temporal artery.

* J. F. Meckel. Manuel d'Anat. t. 11, p. 328.

† I have seen this origin in two subjects.

‡ Mayer. Lehre von der Blut. p. 49.

§ Sæmmer. l. c. p. 126.

|| Sæmmering. de Corpor. Hum. Fab. t. v. p. 132.

OCCIPITAL ARTERY,

In rare cases, from the internal carotid.* An example has been mentioned to me, by a friend, in which this artery was a branch of the vertebral.

POSTERIOR AURICULAR ARTERY

Sometimes arises from the occipital.

STYLO-MASTOID BRANCH.

I have seen two examples, in which this artery arose from the occipital.

TRANSVERSALIS FACIEI.

This artery, like the facial, is very subject to variety in its distribution, though usually constant in origin. In rare cases, it arises from the external carotid. When the facial artery is small, it frequently supplies some of the branches of this vessel, as the coronary artery of the upper lip, the external arteries of the nose, &c. In other cases, we find it so small and insignificant, as hardly to attract attention.

MENINGEA PARVA

Often arises from the meningea media, or from a pterygoid branch. Sometimes it supplies the place of the meningea media.

INFERIOR MAXILLARY, OR INFERIOR DENTAL ARTERY,

Sometimes arises from the meningea media.†

ALVEOLAR, OR SUPERIOR MAXILLARY ARTERY,

From one of the deep temporals, or from the sub-orbital.‡

OPHTHALMIC ARTERY.

The branches which the ophthalmic artery furnishes to the orbit vary considerably, both in size, number, and origin; so much, that we seldom find them as described in books.

* Tiedemann. Explicat. Tab. Art. p. 81.

† J. F. Meckel. Man. d'Anat. t. ii. p. 344.

‡ J. F. Meckel. l. c.

LACHRYMAL ARTERY.

In some cases, this artery is not a branch of the ophthalmic, but arises from the meningea media, and enters the orbit, either by the superior orbital fissure, or by a peculiar foramen, in the maxillary bone, or in the great wing of the sphenoid.*

POSTERIOR ÆTHMOIDAL ARTERY.

This vessel, like the other branches of the ophthalmic, is very inconstant; for it often arises from the lachrymal, from the anterior æthmoidal, or from the supra-orbital.

CENTRAL ARTERY OF THE RETINA.

The central artery of the retina is commonly a branch of the ophthalmic; but it may arise from the lachrymal, from the anterior æthmoidal, or from one of the muscular or ciliary arteries.†

The vascular communication, at the base of the brain, between the basilar and the carotids, called the circle of Willis, is formed by seven branches. Behind and at the sides, we have two branches to the posterior cerebral arteries, called the posterior communicating branches of the carotids. In front, the anterior arteries of the brain, which communicate by the transverse branch. This disposition is usually constant, but occasionally varieties are to be observed. Sometimes the lateral communication is made directly from the anterior artery of the brain to the basilar, and it has been found double on each side. The transverse communicating branch has also been seen double, or double for half its extent. Sometimes there is no transverse branch, but the anterior arteries join into one trunk, like the vertebrals, and afterwards separate. Sometimes both the middle arteries come from the right carotid; or both middle arteries and the right anterior arise from the right carotid, while the left anterior artery is the only branch of the left carotid.‡

* Sæmmering. de Cor. Hum. Fab. t. v. p. 152.

† Sæmmer. l. c. p. 156.

‡ J. F. Meckel. Man. d'Anat. t. ii. p. 358. Since writing the above description, I have met with a subject, in which the communicating branch

VERTEBRAL ARTERY.

The principal varieties of the vertebral artery have been enumerated, under the head of the varieties of the arch; but there are a few other anomalies, which may be noticed here. When the right subclavian arises from the left side of the arch, or from the thoracic aorta, the right vertebral usually is a branch of the carotid. Sometimes the trunk of the vertebral artery is formed by the union of two branches: occasionally one of these arises from the arch, the other from the subclavian; at other times, both branches are furnished by the subclavian.* The union of these two branches takes place at different distances from their origin. Sometimes they unite before they enter the vertebral canal; sometimes one enters at the usual place, while the other ascends a little higher, and then passes in to form a common trunk. The vertebral artery is described as entering its canal at the sixth cervical vertebra, but this circumstance is by no means fixed. It may enter either at the seventh, fifth, fourth, third, or even the second cervical vertebra;† but no case has as yet been observed, in which the artery remained outside the vertebral canal during its whole course.‡

INFERIOR ANTERIOR ARTERY OF THE CEREBELLUM

Sometimes arises from the basilar; this commonly takes place when the vertebral arteries unite sooner than usual.

BASILAR ARTERY.

This artery is extremely constant. In two very rare examples, seen by Meckel,§ the basilar artery divided into two

of the carotid, on the right side, was entirely wanting: the posterior cerebral artery, on the left side, was a branch of the internal carotid.

* Huber. de Aortæ Ar. Ramis. Act. Helv. t. viii. p. 68, J. F. Meckel, Man. d'Anat. t. ii. p. 361.

† Sæmmer. de Corp. Hum. Fab. t. v. p. 166.

‡ It has hitherto been supposed, that the holes in the transverse processes of the cervical vertebræ were for the transmission of the vertebral artery: but I have ascertained that these holes exist when the vertebral artery enters high up in the neck.

§ J. F. Meckel. l. c. p. 367.

branches, which again reunited. The same disposition was seen in the transverse communicating branch of the circle of Willis.

SUBCLAVIAN ARTERY.

See varieties of the arch.

INTERNAL MAMMARY ARTERY.

The internal mammary commonly arises as a single trunk from the subclavian; but, in rare cases, it arises in common with the inferior thyroid; or from the arch;* or, still more rarely, from the innominata.†

INFERIOR THYROID ARTERY.

The origin of the principal branches, usually described as being derived from the inferior thyroid, is so extremely uncertain, that we can never be assured, without examination, how the vessels of the scapula and neck may arise. The inferior thyroid also varies considerably in size: when it supplies the arteries just mentioned it is large, but if distributed to the thyroid body alone, the vessel is comparatively small. In rare cases, the inferior thyroid is a branch of the arch:‡ this occurs especially on the right side, between the innominata and the left carotid. Sometimes the right and left inferior thyroid arteries arise by a common trunk, either from the arch or from the subclavian.§ When the vessels, usually branches of the inferior thyroid, arise separately from the subclavian, the ramus thyroideus, which then becomes the proper thyroid artery, is given off either from the subclavian, the aorta, the innominata, or the primary carotid.|| Sometimes there is no inferior thyroid artery. Of this I saw an example, in a subject which I lately dissected. The thyroid axis furnished the internal mammary,

* Bæhmer. de Quat. et Quin. Ram. &c.

† Neubauer. Descrip. Anatom. Innom. p. 33. I have seen an example, in which the internal mammary of the left side arose from what is called thyroid axis; but the inferior thyroid itself was wanting.

‡ Tiedemann. Arter. Explic. p. 45.

§ Burns. l. c. p. 290.

|| J. F. Meckel. l. c. p. 373.

the arteries of the scapula, and a long superficial ascending branch; the inferior thyroid, on the left side, was wanting, its place being supplied by the superior thyroid, which was unusually large.

TRANSVERSALIS SCAPULÆ.

The transversalis scapulæ is described as the first branch of the inferior thyroid; but very frequently this vessel is detached, either singly or in conjunction with the transversalis colli, from the subclavian artery. I have seen many examples, in which the vessel passed in front of the scaleni muscles, and the descending branches of the cervical nerves, towards the scapula.

TRANSVERSALIS COLLI.

This artery, like the preceding, very often arises from the subclavian, and it frequently furnishes the supra-spinous artery of the scapula. The cervicalis ascendens is more constant in its origin than any of the branches of the inferior thyroid; but sometimes it is given off by the subclavian, or, in rare cases, by the internal mammary.

THYROIDEA IMA.

Besides the inferior thyroid artery, there exists, very frequently, a vessel not usually described in books, the thyroidea ima, vel Neubauerii. This vessel sometimes arises from the arch, and ascends straight on the trachea to the thyroid body. Sometimes it is a branch of the subclavian. At other times, the thyroidea ima arises from the innominata, or from the primary carotid. Whatever be the origin of the vessel, it always ascends, more or less in front of the trachea, to the thyroid body, to which its branches are distributed.* This anomaly is worthy of attention, on account of the relation it bears to all operations on the trachea. I have not met with any remarkable example of this vessel.

CERVICALIS PROFUNDA.

The size and extent of this artery are regulated very much

* Neubauer. Descr. Anatom. Art. Iu.

by the branches of the inferior thyroid. It frequently arises by a common trunk with the superior intercostal. In rare cases, it is furnished by the inferior thyroid, or even by the vertebral.*

SUPERIOR INTERCOSTAL ARTERY.

The origin of this artery from the subclavian is constant, but the manner of its distribution is extremely various. Usually the artery supplies the first and second intercostal spaces; sometimes it furnishes two arteries to each intercostal space. When the primary trunk is small, it is distributed to the first intercostal space only. In rare cases, the superior intercostal arises from the inferior thyroid;† but much oftener by a common trunk with the cervicalis profunda. The origin from the pectoral aorta is still more rare. I have seen one example of this kind.

THORACIC ARTERIES.

The origin and distribution of the thoracic arteries are very subject to variety. Sometimes two or three of them arise from the axillary by a common trunk, and then separate: at other times, one or more have their origin from the brachial, or by a common trunk with the profunda humeri, or from the subscapularis. In one example, extremely rare, which I possess, the long thoracic artery arises from the radial, this latter vessel being detached from the axillary.

SUBSCAPULAR ARTERY.

The origin of this artery from the axillary is generally constant; but the number of branches which it may furnish vary a good deal. A case, mentioned by *Monro*, in which it was detached from the inferior thyroid, appears to be very rare.‡

* *J. F. Meckel. Manuel d'Anat. t. ii. p. 375.*

† *Sæmmer. l. c. pagin. 181.*

‡ *Monro, Outlines, t. iii. p. 301.* I have once seen a variety, which may be considered as an approach to this. From the subclavian artery, just as it crossed over the first rib, arose a very large vessel, dividing into all the thoracic arteries, and continued on to the scapula, to become subscapular. It is remarkable, that, in the arm of this subject, many of the arteries of the

ANTERIOR AND POSTERIOR CIRCUMFLEX ARTERIES.

The anterior circumflex artery is described by authors as seldom varying in its origin, but I have chanced to meet with several; viz.: from the profunda humeri; from the radial, in a high bifurcation; and by a common trunk with the posterior circumflex. Sometimes (though not always, as described by Meckel,) the subscapular also arises from this common trunk. The posterior, as well as the anterior circumflex artery, may arise from the subscapular, or from the profunda. The two following varieties I have seen, which appear very unusual. A common origin for the posterior circumflex, profunda major and minor. A common origin for the anterior and posterior circumflex arteries, both profundæ, and the subscapular. There sometimes is found an artery of the arm, which is not described with any accuracy in books, but which exists so frequently, that I think it merits attention. Occasionally it arises, by a common trunk with the profunda from the subscapular, and this trunk I have seen so large, as to resemble a second humeral artery. Sometimes it arises from the profunda, but most commonly from the humeral, a little below the origin of the profunda. The vessel runs down along the triceps, giving many muscular branches, and anastomosing with the ramus anastomoticus magnus and the ulnar recurrent. This artery might be named collateralis interna, as the profunda is called collateralis externa.

RAMUS ANASTOMOTICUS MAGNUS.

Although this artery is called magnus, it is commonly a small branch. It sometimes is furnished by the radial, in a high bifurcation, by the ulnar,* or, in very rare cases, by an anomalous vessel, called vas aberrans.†

arm shewed a tendency to the high origin: the ulnar artery was given off from the middle of the humeral; the profunda arose from the same artery, very high up; the posterior circumflex was a branch of the axillary, and descended by the head of the humerus, to turn round the bone; and, finally, the subscapular was given off, as already mentioned, by the subclavian.

* J. F. Meckel. l. c. p. 391.

† Burns. l. c. p. 300.

VASA ABERRANTIA.

These are branches, sometimes of considerable magnitude, which arise from the superior part of the brachial, the axillary, or, in very rare cases, from the subscapular, and terminate in the brachial low down, in the radial, or in the ulnar, more commonly, I believe, in the radial. It is obvious that this disposition would cause much embarrassment to the surgeon, if he were called on to operate for aneurism, or if circumstances should render it necessary to take up the brachial artery. Perhaps the safest rule which the surgeon can follow is, to tie both vessels, if they should present themselves to him, on cutting down upon the edge of the biceps muscle. Sometimes the axillary artery divides into two vessels, which again unite at the fold of the arm; so that there are, in reality, two brachial arteries, lying close to one another, and of equal magnitude. I have seen two striking examples of this kind. In one case, the brachial divided into two branches, which, in like manner, conjoined above the fold of the arm. This is analogous to an anomaly of the basilar artery, already mentioned, and to a very rare disposition of the femoral.

RADIAL, ULNAR, AND INTEROSSEOUS ARTERIES.

The brachial artery usually divides, a little below the fold of the arm, into two branches, of nearly equal size, the radial and ulnar, which latter immediately gives off the interosseous. This distribution of the artery, however, is by no means so constant as is commonly represented. Bidlous met with the high bifurcation so frequently, that he considered it as the regular mode of distribution:* yet Camper, a distinguished Continental anatomist, denies the fact, and quotes (but erroneously) Haller, in support of his assertion.† That such division does happen is now admitted by all anatomists; the only question that can arise is, how often we are to expect such a deviation from the natural structure. In a debateable point of this kind, every one

* Idon. Wolf. Obser. Chirur. Med.

† Demon. Anat. Pathol. lib. 1, p. 15.

will be more or less guided by conclusions drawn from his own observations. Since I turned my attention to this subject, I have examined the arms of nearly two hundred bodies, while being dissected, and I find, from my notes, that the proportion of the irregular to the regular distribution is as one to four.* This fact, which I believe is but little known to the generality of surgeons, deserves their serious consideration; and I hope that the present statement will have the effect of drawing their attention to a circumstance hitherto neglected too much. Were it consistent with the object of the present work, innumerable examples might be cited, to prove the mischief which has arisen from ignorance, or inattention to this part of anatomy. Day after day, we read of cases in which the brachial artery (as it is said) has been wounded, while the operation of bleeding was being performed. In the majority of instances, I am convinced that the injured vessel is either the ulnar or radial artery, running superficially along the fore-arm; and that very little attention would enable the operator to detect the variety, and avoid the consequences of such a mistake. The transverse communications in the bend of the arm, and the existence of a median artery, are also worthy of attention in a surgical point of view; but I shall enumerate them without further comment, leaving every one to draw the conclusions which cannot fail to present themselves to him.

RADIAL ARTERY.

Varieties of the radial artery consist in its high origin, which may take place at any point, from the fold of the arm to the axilla; most commonly about the middle of the humerus. In one example, I have seen it arise so high up from the axillary, as to give off the long thoracic artery. It usually runs down for some way along the inner side of the brachial, before it crosses to the radial side. Sometimes, however, the artery crosses directly over the brachial, and passes down to the fold

* The relation here stated is confirmed by the observations of Mr. Harrison, who examined eighty injected subjects, and found varieties in the arteries of the arm in twenty-one of them. Harrison, *Surg. Anat. of the Arter.* vol. i. p. 272.

of the arm in this direction. In some rare instances, the vessel pierces the brachial aponeurosis, and becomes quite superficial;* but more usually it is covered by the tendinous expansion. In the bend of the arm, there is sometimes a transverse communicating branch, which joins the radial to the continuation of the main trunk, when the former arises high up from the brachial. In one remarkable example, I have found a vascular circle of communication between the two vessels, which furnishes the radial recurrent. Sometimes this transverse branch gives a median artery to the palm of the hand. The transverse communication just described, which exists as the regular distribution between the arteries of the corpus callosum, has been seen between the vertebrae, just before they form the basilar; between the primary iliacs, near the bifurcation of the aorta; and between the posterior tibial and fibular arteries, at the lower third of the leg. I have seen four examples of this transverse communication; all were accompanied by a high origin of the radial artery. In the only example given by Tiedemann,† the ulnar was the vessel which arose from the brachial. Sometimes the radial artery, near the lower third of the fore-arm, turns round the radius, to the back of the bone, and descends in this direction to the hand, while the superficialis volæ pursues the course of the primary trunk. I have seen two examples of this in the dead body, and two in the living. The circumstance is worthy of attention, since such a deviation would give a very false notion of the state of the pulse, which can only be distinctly felt as the artery passes over the radius. Sometimes the superficialis volæ arises at the point we have indicated, and accompanies the radial artery, but more superficially.

RADIAL RECURRENT ARTERY.

When the radial artery arises high up from the brachial, the radial recurrent almost constantly is a branch of the continuation of the original trunk, though sometimes it is given off by the ulnar. I have met with two examples, in which the radial

* I have a distinct recollection of one such occurrence. Tiedemann also makes the same remark. Vide Tab. Arter. Explicat. p. 169.

† Tiedemann. Tab. Arter. xv. fig. 11.

recurrent was furnished by the transverse branch already described; and, on one occasion, I have seen two radial recurrent arteries. Meckel mentions a deviation extremely rare, viz.: the origin of this vessel from the brachial, without being accompanied with any irregularity of the vessels of the fore-arm.*

ULNAR ARTERY.

The high origin of this artery is by no means so common as that of the radial; but, when it does arise above the usual place, we find it detached from the inner side of the brachial, generally very high up, or from the axillary. When this disposition of the ulnar artery occurs, the ulnar recurrent invariably arises from the interosseous, or from the continuation of the main artery. I have seen six examples of the high origin of the ulnar: in all cases the vessel was situated immediately under the fascia of the arm. When we consider the frequency with which these deviations of the two principal arteries of the fore-arm present themselves, it becomes a matter of high importance to ascertain such circumstances as may enable the surgeon to detect the variety in proper time, and prevent the unpleasant consequences which must arise from mistaking the radial or ulnar arteries for the main trunk. The following considerations will, I think, always be sufficient to afford a certain discrimination. On cutting down upon the inner edge of the biceps muscle, should we find, immediately under the fascia, and above the median nerve, a vessel smaller than the humeral artery in its natural state, we may at once conclude that it is either the radial or the ulnar artery arising high up, most probably the radial; for, I believe, the radial deviates from its usual origin more frequently than the ulnar, in the proportion of ten to one. Further examination will, however, set the question at rest; for, under the circumstances just described, the main trunk will be found under the median nerve, and a little to the outer edge of it. In all the examples which I have seen, such has been invariably the disposition of the vessels as far as the bend of the arm: here the vessels begin to separate; but, if the ulnar should

* J. F. Meckel. l. c. p. 395.

happen to be the artery which arises high up, it pursues its course along the fore-arm, immediately under the fascia; while the radial very often dips under the pronator teres, and disappears from our view. According to the observations of Mr. Burns, the ulnar artery, when it is given off from the humeral, most commonly descends above the fascia:* this I have not seen. In some rare cases, the ulnar artery, even when it arises at the bend of the arm, penetrates the fascia, and accompanies the basilic vein to the wrist.† A similar anomaly has been seen in the anterior tibial artery.‡ In one instance, both radial and ulnar arteries, arising at the bend of the arm, ran immediately under the fascia.§

INTEROSSEOUS ARTERY.

It is a very rare circumstance to find the interosseous artery a branch of the humeral:¶ I have seen only one example of this deviation: the vessel arose from the middle of the humeral as a very large trunk, gave many muscular branches in its descent to the interosseous space, and finally terminated, as the interosseous artery does, by passing to the back of the hand, near the pronator quadratus. The division of the main branch, into radial and ulnar arteries, took place a little above the lower extremity of the humerus. I have met with two remarkable anomalies of this artery, which I do not find noticed by any writer, viz.: the complete termination of the interosseous in the radial, as the latter is about to turn to the back of the thumb. When the ulnar artery is given high off, the interosseous is always a branch of the main trunk.

MEDIAN ARTERY.

This name may be given to a vessel which very frequently exists. It arises from the radial, the ulnar, the interosseous (most commonly), or, in very rare cases, from the humeral;

† Allan Burns. l. c. p. 296.

† Do. p. 299.

‡ Peletan. Clin. Chirur. t. i. p. 101.

§ Barclay. Descript. of the Arter. Edinburgh, 1820, p. 102.

¶ Sæmmering. l. c. t. v. p. 201. Sabatier. Traite d'Anat. p. 69.

runs down between the flexor sublimis and profundus, in company with the median artery; and, passing under the annular ligament, terminates in the deep or superficial palmar arch. Sometimes, though rarely, when the ulnar artery is small, and terminates in muscular branches, this median vessel supplies its place in the palm of the hand.* In a great number of examples, in which the radial artery was detached from the humeral, I have seen this median branch from the ulnar or interosseous. Meckel thinks that it more frequently accompanies the high origin of the ulnar; but in this, I am convinced, he is in error. I have seen more than twenty examples of this median artery, and in only one instance was the ulnar artery irregular in origin. The manner of its termination in the palm of the hand is very various. Usually it ends by anastomosing with the superficial palmar branch of the ulnar, as it crosses the palm of the hand. Sometimes it forms the palmar arch with the ulnar, supplying the place of the superficialis volæ, and frequently it supplies the digital arteries of the index finger and thumb, anastomosing with the princeps pollicis.

DIGITAL ARTERIES.

The manner in which the digital arteries are formed is so extremely various, that to describe all the deviations which I have noticed would compose in itself a book: every one, the least conversant with anatomy, must have remarked this: indeed, I do not think that I have seen more than two or three examples which exactly corresponded with the descriptions given in books as the regular distribution; but fortunately the student, in pursuing his dissection here, cannot fall into error,—while, in a surgical point of view, the varieties of these arteries do not present any thing worthy of interest. I have therefore omitted these, as well as the plantar arch, and digital arteries of the foot.

BRONCHIAL ARTERIES.

These vessels are peculiarly liable to irregularity, both in number and mode of origin. Sometimes (but very rarely) there

* Sabatier. l. c. p. 69.

is only one, often there are three, or four, or even five; very frequently the right bronchial is a branch of the first intercostal;* or one of them may arise from the subclavian, from the internal mammary,† from the innominata, or from the inferior thyroid.‡ Sometimes the left bronchial is furnished by the subclavian of that side, or by the internal mammary.

INTERCOSTAL ARTERIES.

Varieties of these arteries consist entirely in the union of many arteries at their origin. Sometimes the first and second intercostals arise from the superior intercostal of the subclavian. Sometimes two or more arteries (either of the same or of opposite sides,) arise by a common trunk. This takes place with respect to the superior or inferior intercostal, much more frequently than the middle. The two inferior intercostal arteries very often arise by a common trunk, shewing an analogy between the superior and inferior vessels; but not unfrequently their place is supplied by the first lumbar artery.

PHRENIC ARTERIES.

Anatomists differ much in their descriptions of the origin of the phrenic arteries. Some consider them as branches of the cœliac; but it appears to me that, in the greater number of cases, they arise from the aorta; and we shall regard such as the natural distribution: very frequently, however, they are furnished from the cœliac, either by a common trunk, or separately. Sometimes one of the phrenics arises from the aorta, the other from the cœliac: sometimes one or both are branches of some division of the cœliac; or of the renal; or of the inferior capsular. In rare cases, there are four phrenic arteries, two of which arise from the aorta, the others from the cœliac.§ In one example, a common trunk from the aorta produced the coronaria ventriculi and the common phrenic; or the right phrenic and coronaria ventriculi may arise from the aorta in common, while

* Meckel. l. c. p. 410.

† Sæmmering. l. c. p. 226.

‡ Haller. Tab. Bronch. Vasor.

§ Haller. Icon. fas. iii. p. 54.

the left phrenic is a branch of the cœliac. I have seen one example of this kind. To these varieties I may add one from my own observation, which appears extremely rare: a common trunk arose from the aorta, above the diaphragm, descended through the aortic opening, and then divided into right and left phrenics. In one case, I saw the left phrenic arise from the cœliac; while the right was detached from the aorta, below the superior mesenteric. In another example, there were three phrenic arteries; one from the aorta, on the left side; on the right side, a common trunk from the renal, divided into right and left phrenics.

CŒLIAC ARTERY.

The cœliac artery usually divides into three principal branches—the coronaria ventriculi, the hepatic, and the splenic; but, like the inferior thyroid, to which it bears some analogy, the manner in which these branches separate from the primary trunk is very various. In rare cases, the coronaria ventriculi arises from the aorta, either alone or in common with one or both phrenics.* Very frequently this artery is large, and produces the left hepatic. The hepatic artery is often divided into two separate trunks, one of which arises from the cœliac, the other either from the cœliac, or in rare cases from the aorta. Sometimes there are three hepatic arteries, one from the cœliac, the other from the aorta, and the third from the superior mesenteric. Occasionally the hepatic arises from the aorta by a single trunk.† Its origin from the superior mesenteric, described by Haller, must be extremely rare.‡ As the left hepatic sometimes arises in common with the coronaria ventriculi, thus the right hepatic may have its origin from the superior mesenteric, in common with the gastro-epiploica-dextra. In a recent dissection, I have found three hepatic arteries: the left from the cœliac, in common with the coronaria ventriculi; a middle, from the cœliac also, in common with the gastro-epiploica-dextra; and a left hepatic, from the superior mesenteric, which gave off the cystic

* Meckel. l. c. p. 418.

† Meckel. Man. d'Anat. t. ii. p. 435.

‡ Haller. Icon. Anat. fasc. viii. p. 36.

artery. A modern author* has published a dissection, in which, as he allèges, there was no hepatic artery at all; but it appears more consistent with physiology and anatomical experience, to conclude that such an appearance was attributable to some of the varieties just mentioned, which escaped his notice.

SUPERIOR MESENTERIC ARTERY.

The distance at which the superior mesenteric arises from the cœliac differs much in different subjects. Sometimes they are so close as to be scarcely distinguishable. This is a transition to the variety, in which the superior mesenteric arises by a common trunk with the cœliac,† a distribution analogous to the structure in tortoises.

RENAL ARTERIES.

The renal arteries may vary in number from one to five, either on the same, or on both sides. The existence of only one renal artery depends on a malformation, viz.: the congenital absence of one of the kidneys. It appears that the left kidney is the one usually wanting: such was the case in one example which I have met with, and some authors who notice this circumstance coincide in the remark. When the number of the renals is increased, the accessory vessels arise, either from the aorta, or in rare cases from the common iliac,‡ or from the hypogastric,§ especially when the kidney is situate lower down in the abdomen than is natural. In the latter case, one of the renals often arises from the common iliac or hypogastric of the opposite side.|| Meckel describes a variety, which he justly considers as very rare, where the renal arteries arose by a common trunk from the aorta.¶ This tendency of the symmetrical vessels of the right and left side to unite into a single trunk is worthy of notice; it

* Dr. Mills.

† Haller. *Icon. Anat.* fasc. viii. p. 35. J. F. Meckel. l. c. p. 423.

‡ Eustach. *Tab.* iii. f. 3.

§ Stach. *Anat. Bot. Spec.*

|| Tiedemann. l. c. p. 283.

¶ Meckel. l. c. p. 435..

is seen in the carotids, bronchials, intercostals, phrenics, renal, spermatic, and lumbar arteries.

SPERMATIC ARTERIES.

The spermatic arteries, like the renal, are often increased in number, but never exceed two on the same side. Sometimes they arise by a common trunk from the aorta. Not unfrequently one of them arises from the renal, or from the middle or inferior capsular artery.* In rare cases, one of the spermatic vessels is furnished by a lumbar, by the external iliac, the hypogastric, or even the epigastric.†

INFERIOR MESENTERIC ARTERY.

This artery is little liable to variety. In some rare cases, where the bifurcation of the aorta takes place higher than usual, the inferior mesenteric has arisen from the primary iliac. Petsche‡ describes a very curious variety of this artery: immediately below the origin of the right renal artery (the left kidney was wanting by congenital malformation), the aorta divided into the two iliacs, from the left of which arose the inferior mesenteric. Beneath this the two iliacs were joined by a transverse branch. When the inferior mesenteric does not exist, a circumstance extremely rare, its branches are supplied by the superior mesenteric.§ The absence of the inferior mesenteric is analogous to the structure in some reptiles.

LUMBAR ARTERIES.

The right and left lumbar arteries arise from a common trunk much more frequently than the intercostals, to which they are analogous. This takes place with respect to one, or to all the lumbar arteries. Sometimes the two or three inferior lumbar arteries of the same side arise by a common trunk, and very often the first lumbar artery is a branch of the inferior intercostal.

* Haller. Icon. fas. iii. p. 50.

† Mayer. Leher von der Blutz. p. 180. J. F. Meckel. l. c. p. 437.

‡ Syllog. Obser. Anat. s. 76.

§ Fleischmann. Leichen-œff. s. 239.

SACRA MEDIA

Sometimes arises from a lumbar,* or from one of the primary iliacs, usually the left.†

PRIMARY ILIAC.

The origins of the vessels detached from the primary iliac in the pelvis are so extremely uncertain, that it becomes difficult to say what is the regular distribution. The best anatomists describe it as dividing, first, into two branches, the external iliac, and the internal iliac or hypogastric. The internal iliac subdivides into two branches, the anterior and the posterior; of these, the posterior produces the ileo-lumbar, the sacra lateralis, the obturator, and the glutæal arteries; the anterior branch furnishes the ischiatic, the umbilical, and internal pudic arteries; which latter generally produce the middle hemorrhoidal, the uterine, vaginal, and vesical arteries. This distribution, therefore, we shall assume as the regular one, and regard all departures from it as varieties, though perhaps some of these irregularities occur as often as the common disposition.

ILEO-LUMBAR.

This is generally the first branch of the posterior division of the internal iliac; but it may arise, either from the primary iliac; from the internal iliac, or its anterior branch; from the sacra media; by a common trunk with the last lumbar; or, finally, from the common femoral.‡ I have seen the ascending branch of the ileo-lumbar arise as a distinct trunk from the internal iliac.

SACRA LATERALIS.

This vessel varies much in number and origin. Sometimes it is double; sometimes there are as many as five, communicating with each other and with the sacra media. Occasionally it is given off from the internal iliac; or, in rare cases, from the primary iliac.

* I have seen many examples of this.

† Meckel. l. c. p. 441.

‡ Meckel. l. c. p. 445.

GLUTÆAL ARTERY.

This is usually the largest branch of the posterior division of the internal iliac; but very often it arises by a common trunk with the ischiatic. Sometimes it is so large as to produce the ileo-lumbar, sacra lateralis, ischiatic, and internal pudic arteries.*

OBTURATOR ARTERY.

The obturator artery is, perhaps, as liable to irregular origin as any other in the body. The slightest degree of anomaly is that, in which the obturator arises from the internal iliac; next, we find it arising from the anterior branch of the internal iliac, or from the external iliac, either within the pelvis, or below Poupart's ligament. In rare cases, it arises from the common femoral, two inches below the crural arch. It may also take its origin from the ileo-lumbar, the ischiatic, the pudic, or the glutæal.† The origin by a common trunk with the internal epigastric occurs much more frequently than any of those already mentioned,—according to Monro, once in ten times; from my own observation, I would conceive it to occur about once in three times. Sometimes the obturator artery is formed by the union of two branches, one from the internal iliac; the other from the epigastric‡ or common femoral. This anomaly conducts to another, with which I once met. On the left side were two obturator arteries; one from the epigastric, which was large; the other, smaller, from the usual origin: the two vessels passed through the obturator ligament, near one another, but by distinct foramina. There is a cast of a preparation, in the museum of Dr. Macartney, in which there was no internal obturator, but a branch from the profunda ascended towards the obturator foramen, and supplied the muscles which receive branches from the obturator in its regular distribution. When the obturator artery arises below Poupart's ligament, it ascends close on the

* Meckel. l. c. p. 453.

† Sæmmer. de. Corp. Hum. fab. t. v. p. 272. Tiedemann. Tab. Arter. Explicat. p. 289. I have seen myself examples of the varieties here enumerated.

‡ Portal. Anatom. Med. t. iii. p. 322.

pectineus, and turns short over the brim of the pelvis; but I have seen two examples, in which the artery ascended so far forwards, and left such a space beneath, that a femoral hernia would have passed immediately behind the vessel. This, however, is an occurrence extremely rare. How very frequently the obturator arises from the epigastric, may be collected from the following observations of Cloquet. In two hundred and fifty examples, he saw the obturator arise from the epigastric, fifty-six times on both sides, and twenty-eight times on one side of the body; making a proportion of eighty-four to two hundred and fifty, or very nearly one to three.* Hesselbach,† in thirty-two cases, found the obturator to arise from the epigastric nineteen times, a relation of three to five.

The anterior branch of the internal iliac usually divides into the ischiatic, common pudic, and umbilical arteries; from some one of which arise the vesical, uterine, and vaginal arteries.

ISCHIATIC ARTERY.

The ischiatic artery very often arises by a common trunk with the pudic, or with the glutæal.

INTERNAL OR COMMON PUDIC ARTERY.

The internal pudic is described as passing out of the pelvis, between the pyriformis muscle and the great sacro-sciatic ligament; but not unfrequently, especially in the male, the artery descends along the inferior surface of the bladder, and crosses over the prostate, to be distributed to the penis. Sometimes the profunda penis arises, as a distinct vessel, from some branch of the hypogastric, or from the external iliac. It is not very rare to find the dorsal artery of the penis arise from the obturator, or from some other branch of the hypogastric, and pass straight forwards under the symphysis pubis: the older anatomists, and even Winslow, have described this as the regular distribution. In very rare cases, the dorsal artery of the penis arises from the

* Cloquet. Recherches Anat. sur les Hernies de l'Abd.

† Hesselbach. l. c. p. 26.

profunda or the common femoral.* I have seen one example, in which the dorsal artery was furnished by the obturator, which was given off from the femoral, below Poupart's ligament. See plate.

VESICAL ARTERIES.

These arteries arise sometimes from the internal pudic; or they are branches of the umbilical; of the hemorrhoida media; of the ischiatic; or the obturator.

HEMORRHOIDEA MEDIA.

This vessel does not always exist. It is furnished occasionally by the ischiatic, or the internal pudic.

EPIGASTRIC ARTERY.

The varieties of this vessel, as well as of the obturator, are peculiarly interesting, on account of their relation to the different kinds of hernia. As has been already mentioned, the epigastric very frequently arises by a common trunk with the obturator. Sometimes, though rarely, this common trunk is given off by the common femoral, below Poupart's ligament: at other times, the epigastric arises from the profunda, either below Poupart's ligament, or, when the femoral artery divides high up, above the crural arch. An example of this latter kind, which occurred in the dissecting-room of Trinity College, as it is extremely rare, deserves some notice. The profunda was given off above the arch, and produced the epigastric within the abdomen. In the same subject was observed a high bifurcation of the humeral artery, and the subscapular produced the profunda humeri and both circumflex arteries.

CIRCUMFLEXA ILEI.

The circumflexa ilei, in some cases, arises from the epigastric, or from the femoral, below the arch.

FEMORAL ARTERY.

The point at which the common femoral divides into the deep

* Tiedemann. l. c. p. 315.

and superficial femoral arteries is extremely uncertain. The origin of the profunda is usually described as taking place about an inch or two below the crural arch; but very often we find the profunda detached higher up. In some rare examples, the profunda arises above the arch; in which case, it usually furnishes the external pudic and circumflex ilei arteries. This high origin of the profunda is seen in birds, in which the profunda is given off within the pelvis.

CIRCUMFLEXA FEMORIS.

These arteries usually arise from the profunda. Sometimes one of them, particularly the internal, or in rare cases the external also, arises from the common femoral or from the superficial. In one very rare case, the circumflexa interna arose from the external iliac.* Sometimes both circumflex arteries are furnished from a common trunk.

ARTERIE PERFORANTES.

The number of perforating arteries is very variable. Sometimes the profunda passes backwards, behind the adductor magnus, to the back of the thigh. Sometimes the perforans prima is the only branch which passes through the adductor magnus, and the other perforating branches arise from the superficial femoral. These have been found to the number of five.

SUPERFICIAL FEMORAL ARTERY.

The superficial femoral artery is constant in its course and manner of division; but two remarkable deviations are on record. In a person, on whom the operation for popliteal aneurism was unsuccessfully performed, the femoral artery, immediately below the origin of the profunda, divided into two branches, which afterwards reunited in the tendinous canal of the triceps. On examination after death, it was found that the superficial branch alone was tied.† This division is analogous

* Burns. l. c. p. 319.

† Lancet, vol. x. p. 629. An anomaly precisely similar is described by Mr. Houston, in the fourth volume of the Dublin Hospital Reports: the

to that which, much more frequently, takes place in the humeral artery.

Sandifort (*Observ. Anatom. Pathol.* iv. 97,) mentions a case, in which the femoral artery divided into posterior tibial and fibular, immediately under Poupart's ligament. Besides the high division just mentioned, Portal saw an example, in which the femoral divided in the middle of the thigh.*

SUPERIOR AND INFERIOR ARTICULAR ARTERIES.

These are often double, at least on one side. Sometimes the superior arise by a common trunk: the same remark is applicable to the inferior.†

ANTERIOR TIBIAL ARTERY.

The anterior tibial does not always supply the vessels on the front of the foot; for, not unfrequently, we find it terminating on the lower part of the leg, while its place is supplied by the anterior branch of the fibular, or by the posterior tibial. In some rare cases, the anterior tibial artery does not exist, but is replaced, on the leg, by perforating branches of the posterior tibial, and on the foot by the fibular.‡ Peletan mentions a case, in which the anterior tibial artery became superficial, running down under the skin to the foot. *Chirur. Clin.* t. i. p. 101.

INTERNAL AND EXTERNAL MALLEOLAR ARTERIES

Are sometimes double. In rare cases, they arise from the fibular, or the posterior tibial,§

POSTERIOR TIBIAL ARTERY.

The posterior tibial artery, generally, is larger than either the anterior tibial or the fibular; and is more constant in its distribution than either of these vessels. The case has already

preparation is preserved in the museum of the College of Surgeons. Mr. Houston has kindly permitted me to take a sketch of it,

* *Anat. Medic.* t. iv. p. 239.

† *Meckel.* l. c. p. 475.

‡ *Barclay.* l. c. p. 267.

§ *Meckel.* l. c. p. 482.

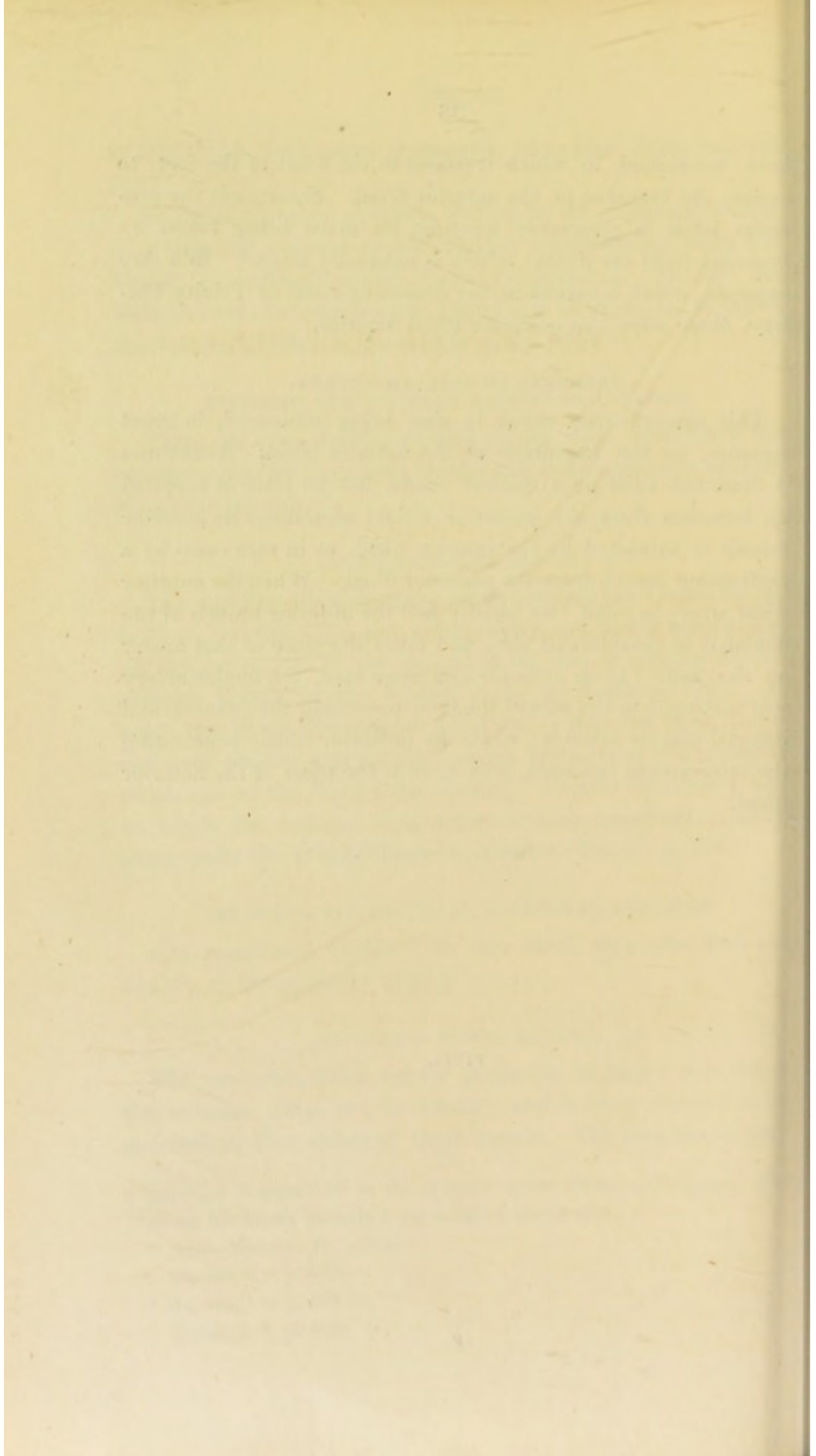
been mentioned, in which it passes to the front of the foot, to supply the branches of the anterior tibial. Sometimes the posterior tibial is altogether wanting, its place being taken by branches from the fibular, which is unusually large.* In a rare example, which occurred in the dissecting-room of Trinity College, there were two posterior tibial arteries.

PERONEAL OR FIBULAR ARTERY.

This artery varies much in size, being influenced, in great measure, by the magnitude of the anterior tibial. Sometimes it does not exist as a distinct vessel, but its place is supplied by branches from the posterior tibial; sometimes its anterior branch is furnished by the anterior tibial, or in rare cases by a perforating branch from the posterior tibial. When the anterior tibial artery is small, we usually find the anterior branch of the fibular is of considerable size, and takes the place of that artery on the foot. In an example still more rare, the fibular artery was continued to the sole of the foot, producing the external and internal plantar arteries; while the posterior tibial, penetrating the interosseous ligament, took upon it the office of the anterior tibial.

* Barclay. l. c. p. 270.

FINIS.



EXPLANATION OF THE PLATES.

TAB. I.

FIG. 1.

1. THE right subclavian. The dotted lines represent the course of the artery behind the arch. 2. The right carotid, furnishing the right vertebral (5). 3. The left carotid. 4. The left subclavian.

FIG. 2.

1. The right renal artery. 2. The superior mesenteric artery. 3. The inferior mesenteric artery. 4, 4. The common iliac arteries.

FIG. 3.

1, The aorta. 2. The common trunk of both coronary arteries. 3. The left coronary artery. 4. The right coronary artery.

TAB. II.

1, 1. The vertebral arteries. 2, 2. The inferior arteries of the cerebellum. 3. The basilar artery. 4, 4. The superior arteries of the cerebellum. 5. The left inferior artery of the cerebrum. 6. The posterior communicating branch of the circle of Willis, which in this instance joined the inferior artery of the cerebrum to the superior artery of the cerebellum. 7, 7. The right inferior artery of the cerebrum, arising from the carotid. 8, 8. The carotid arteries. 9, 9. The anterior arteries of the cerebrum. 10. The

anterior or transverse communicating branch of the circle of Willis. 11, 11. Two very small branches, lost on the crus cerebri. There was no communication whatever between the carotid and vertebral arteries of this side.

TAB. III.

FIG. 1.

1, 1. The brachial artery. 2, 2. The radial artery, arising from the inner side of the brachial. 3. The radial recurrent artery, taking its origin from a transverse branch which joined the radial artery to the main trunk. 4. The transverse branch. 5. A branch from this transverse vessel, which joined another from the brachial artery, thus making a circle of communication in the fold of the arm.

FIG. 2.

1. The brachial artery. 2. The radial artery, arising from the outer or radial side of the brachial. 3. The radial recurrent artery, given off by a transverse branch, between the radial and brachial arteries. 4. The transverse branch. 5. The ulnar artery. 6. The interosseous artery. 7. A median artery, from the interosseous to the palmar arch.

FIG. 3.

1. The brachial artery. 2. A median artery, arising from the brachial, and terminating in the palmar arch. 3. The radial artery. 4. The ulnar artery.

TAB. IV.

FIG. 1.

1, 1. The brachial artery. 2, 2. The radial artery, arising from the radial side of the brachial artery, near the axilla. 3. The interosseous artery. 4. The ulnar artery. 5. The superficialis volæ, unusually large. 6. A communicating branch from the superficialis volæ to the palmar arch.

FIG. 2.

1, 1. The brachial artery. 2, 2, 4. The radial artery, arising from the axillary, and crossing over the brachial, near the fold of the arm. 3, 3. The ulnar artery. 5, 5. A median branch from the brachial to the palm of the hand. 6. The ulnar palmar artery of the thumb. 7. The radial palmar artery of the index finger.

FIG. 3.

1. The brachial artery, dividing into two branches, which unite again a little above the fold of the arm. 2. The radial artery. 3. The interosseous artery. 4. The ulnar artery. 5. The superficialis volæ, large, and uniting at an acute angle with the ulnar.

FIG. 4.

1, 2. Two brachial arteries, uniting at the bend of the arm. 3. The radial recurrent artery. 4. The ulnar recurrent artery. 5. The radial artery. 6. The ulnar artery.

FIG. 5.

1. The brachial artery. 2. The radial artery, given off from the inside of the brachial. 3. The radial recurrent artery. 4. The ulnar recurrent artery. 5, 5. A median branch from the continuation of the main trunk, giving the ulnar palmar artery of the thumb, and the radial palmar artery of the index finger. 6. The ulnar artery. 7. The interosseous artery.

FIG. 6.

1. The brachial artery. 2, 2, 2. The radial artery, from the inner side of the brachial. 3. The radial recurrent artery, from the brachial. 4. The ulnar recurrent, from the same artery. 5, 5. A median branch, from the

brachial artery, joining the superficial branch of the ulnar, and forming with it the palmar arch. 6, 6. The interosseous artery, which terminates completely in the radial. 7, 7. The ulnar artery.

TAB. V.

FIG. 1.

1. The common femoral artery. 2. The profunda femoris, passing over the femoral vein. 3. The superficial femoral artery. 4. A branch arising from the profunda, which supplied the place of the obturator artery. 5. The femoral vein.

FIG. 2.

1. The common femoral artery. 2. The profunda femoris. 3. The superficial femoral artery. 4. The femoral vein. 5. The internal epigastric artery, which arose from the profunda, below Poupart's ligament, and ascended, across the femoral vein, to the rectus muscle.

FIG. 3.

1. The external iliac artery. 2. The obturator artery, arising from the common femoral. 3. The dorsal artery of the penis, a branch of the obturator. 4. The profunda femoris.

TAB. VI.

FIG. 1.

1. The common femoral artery. 2. The profunda femoris. 3, 4. Two branches of equal magnitude, into which the femoral artery divided. 5. The point of union, in the tendinous canal of the triceps.

FIG. 2.

1. The popliteal artery. 2. The fibular artery. 3, 4. Two posterior tibial arteries,

FIG. 3.

1. The fibular artery. 2. The posterior tibial artery. 3. The transverse communicating branch. 4. A branch from the posterior tibial to the heel. 5. The artery as it divides into internal and external plantar arteries.

NOTE.—The Plate marked Fig. 1, Tab. 6, is taken from a preparation in the Museum of the Dublin College of Surgeons. Those marked Fig. 1, Tab. 2, Fig. 3, Tab. 5, were taken from my own dissections; and the remainder from preparations and casts preserved in Dr. Macartney's Cabinet of Varieties of Arteries, in the Museum of Trinity College.

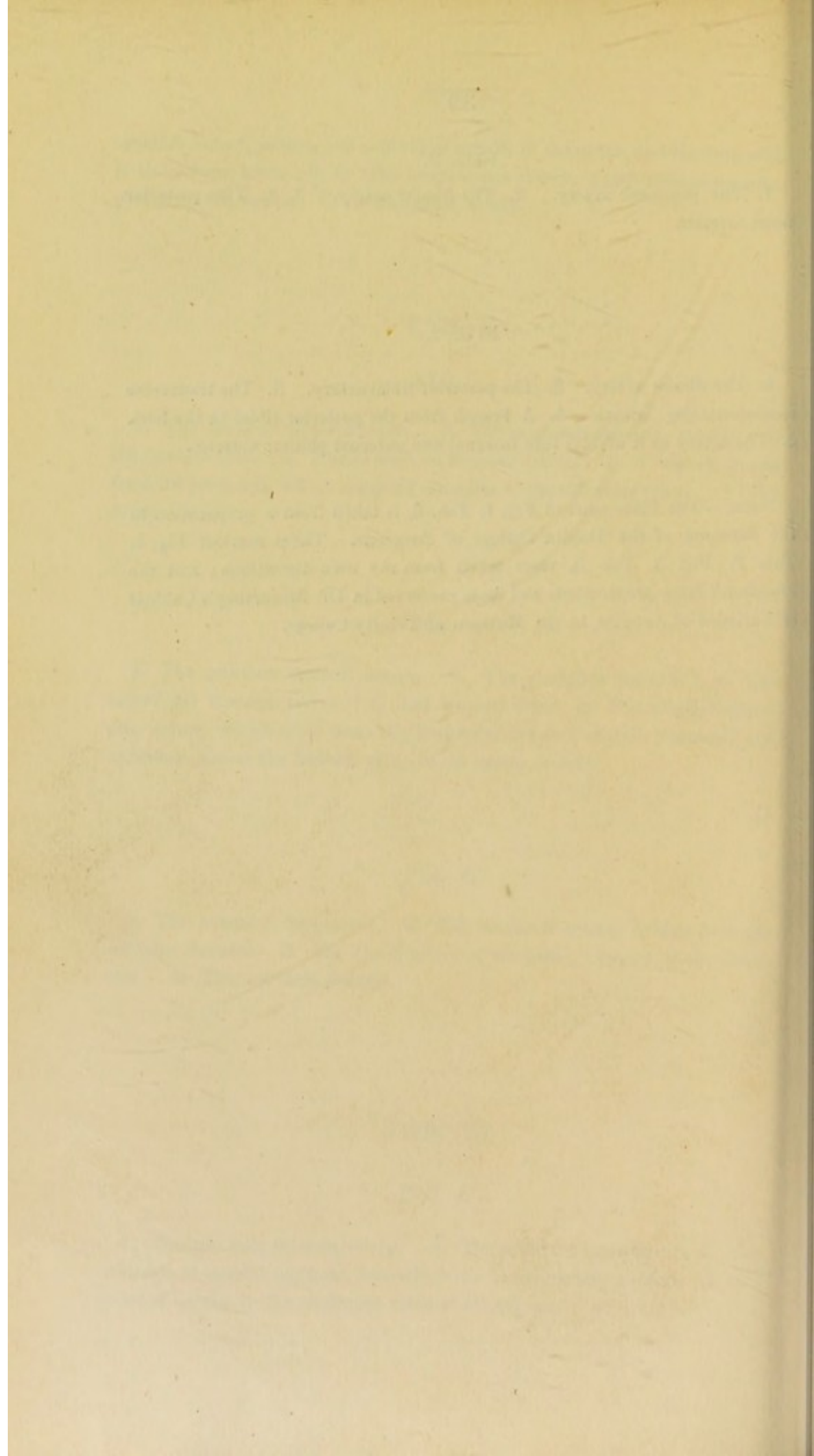


Fig: 1.

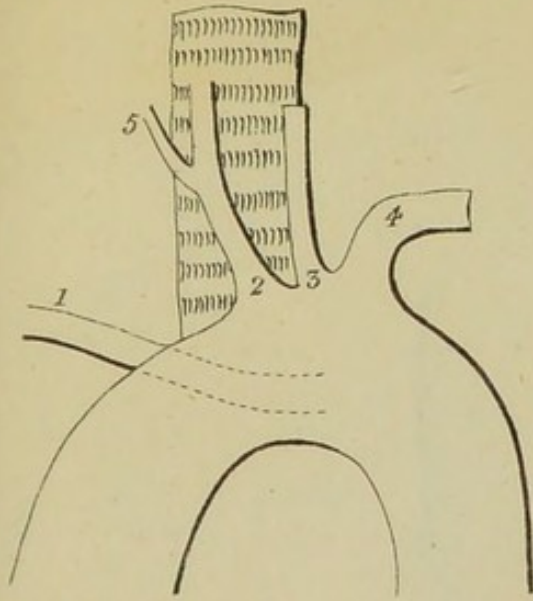


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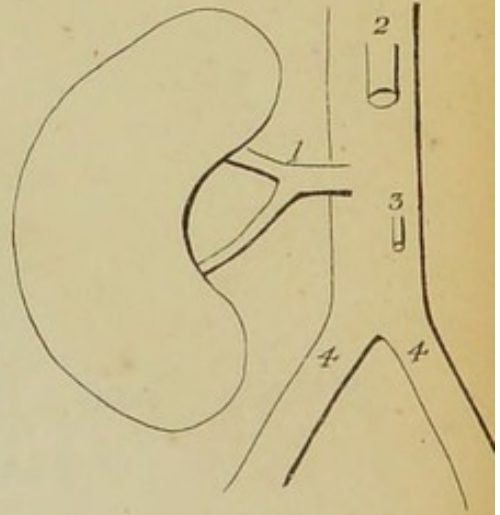
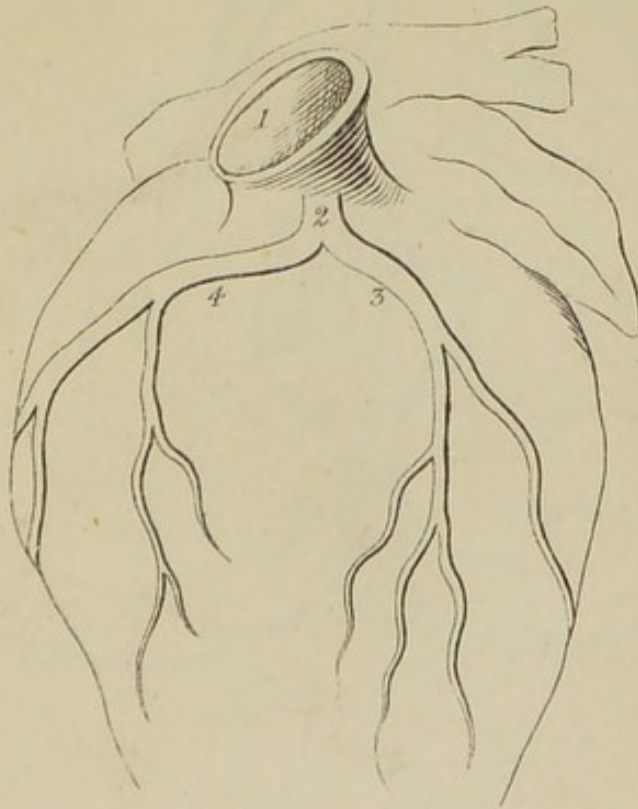
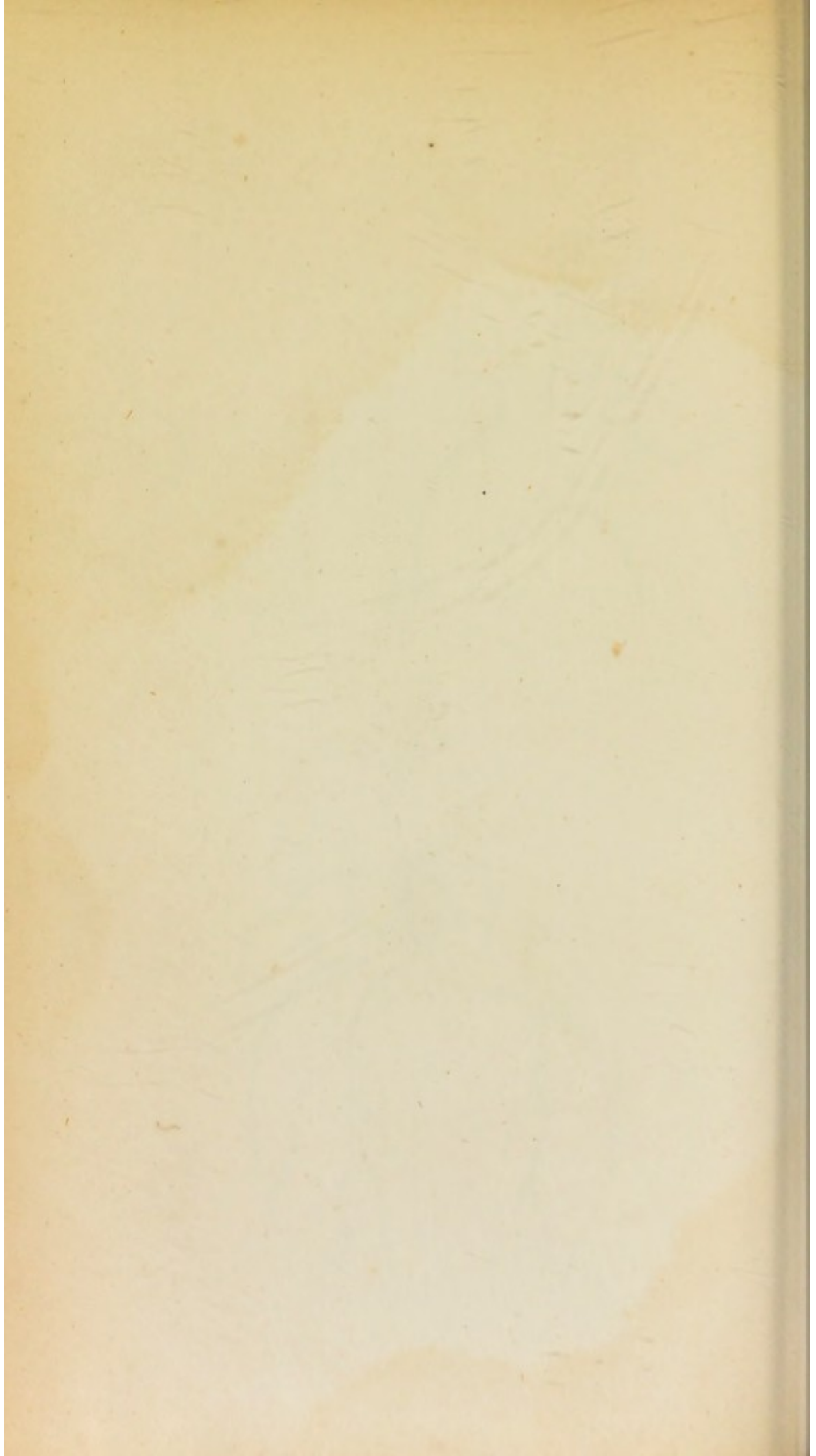
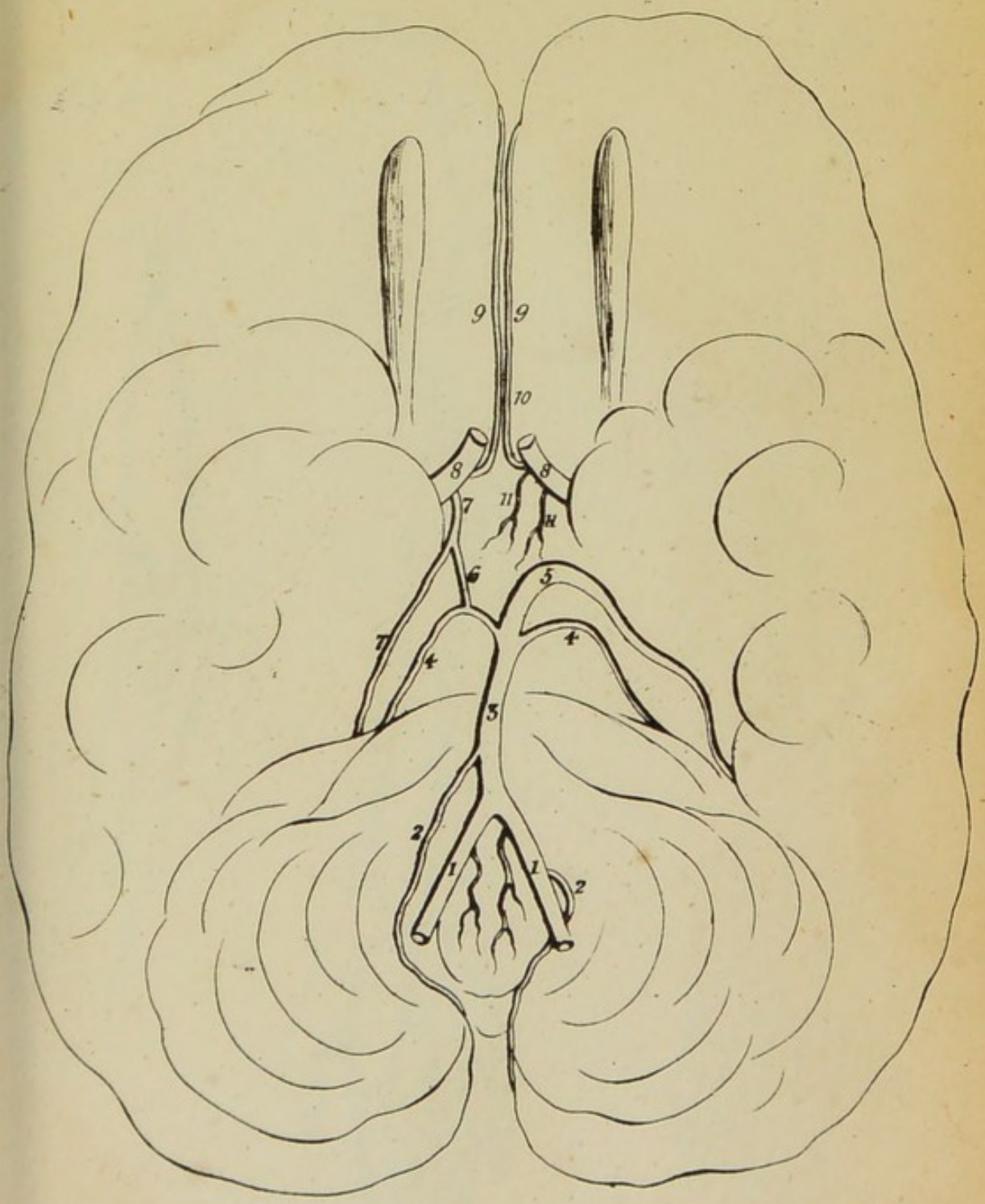


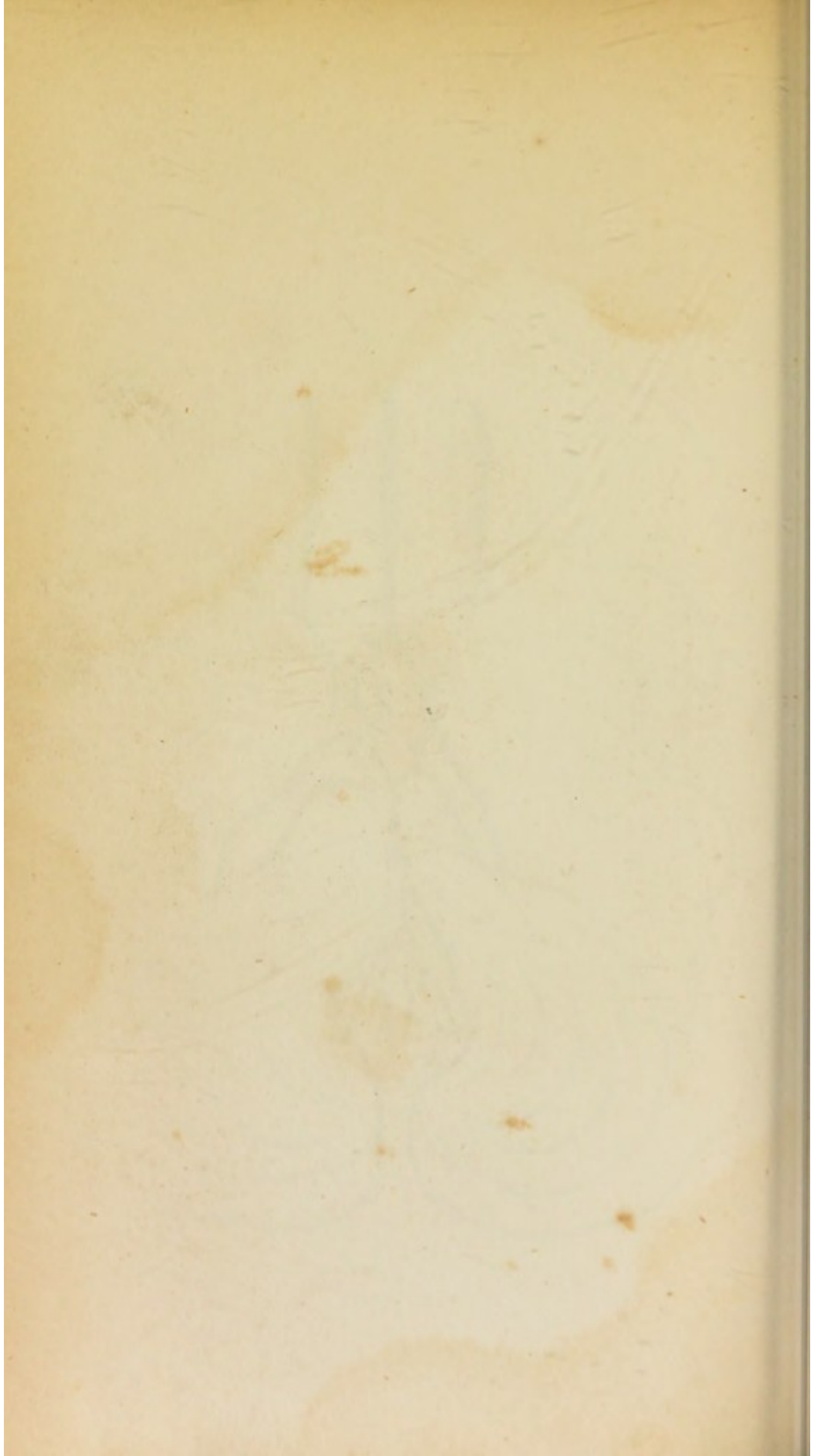
Fig: 3.





Tab:2.





Tab. 3.

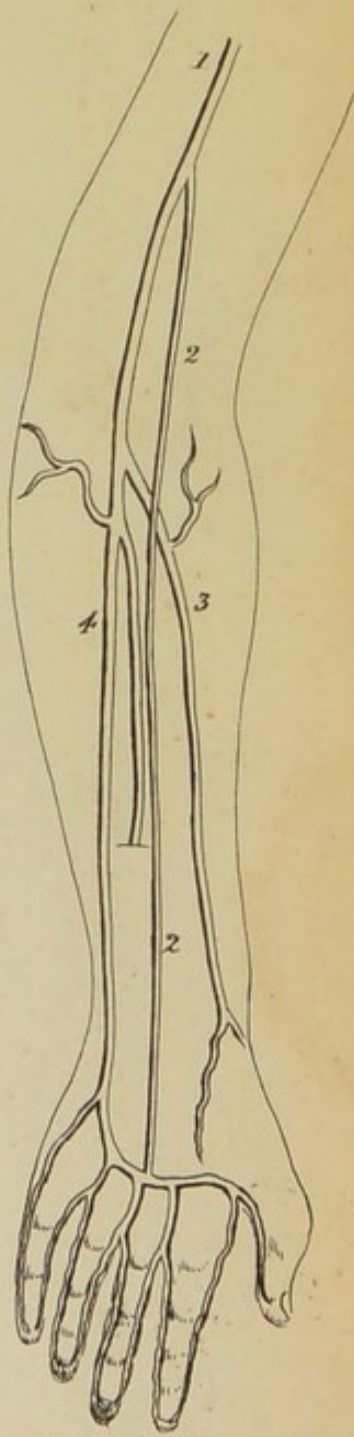
Fig. 1.



Fig. 2.



Fig. 3.



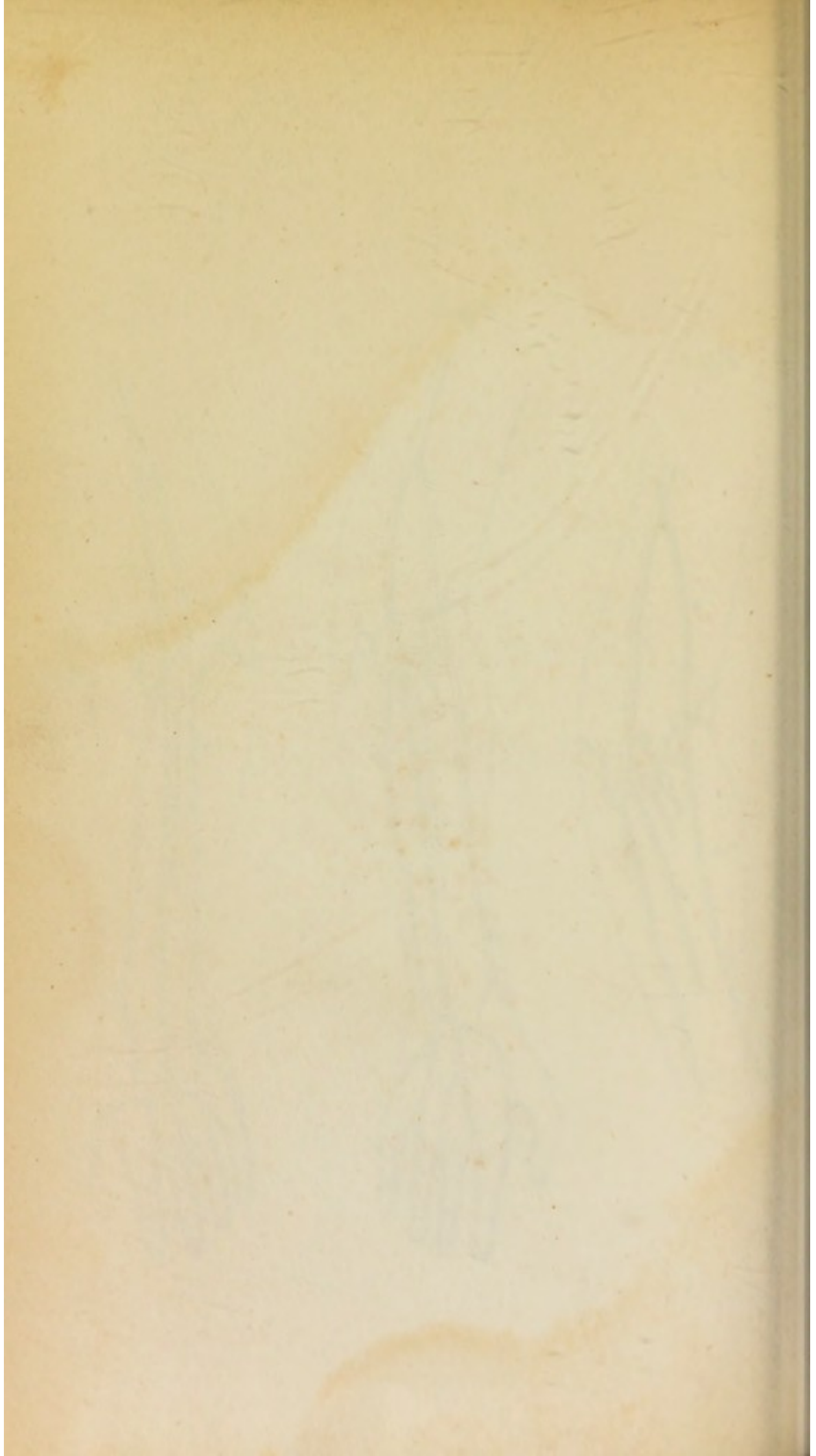


Fig: 1.

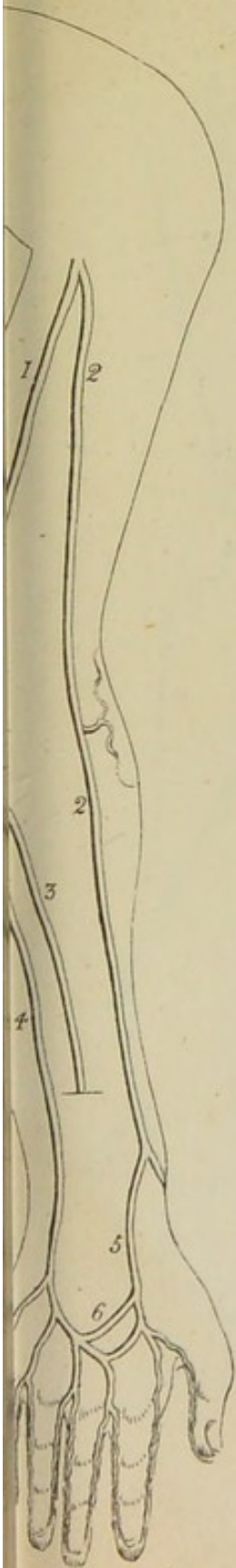


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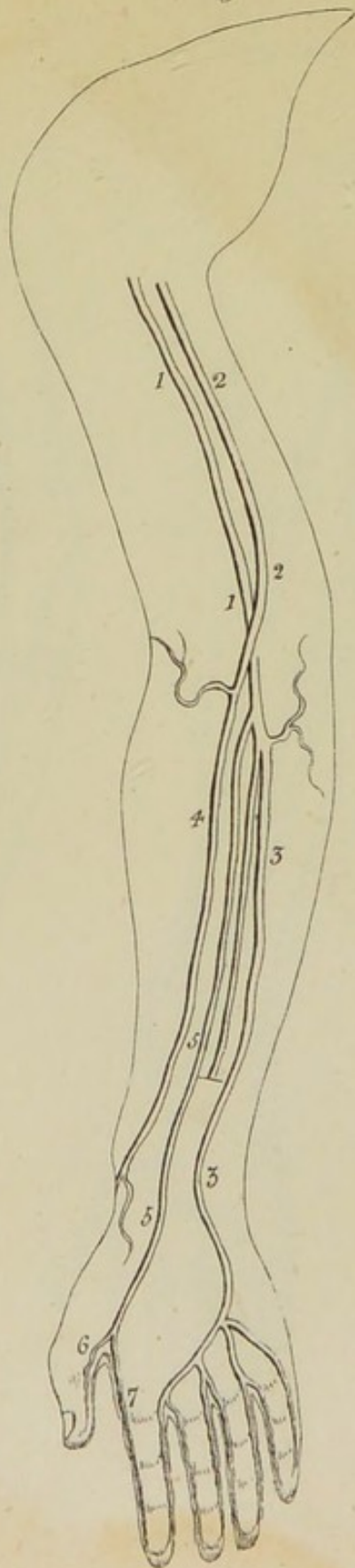
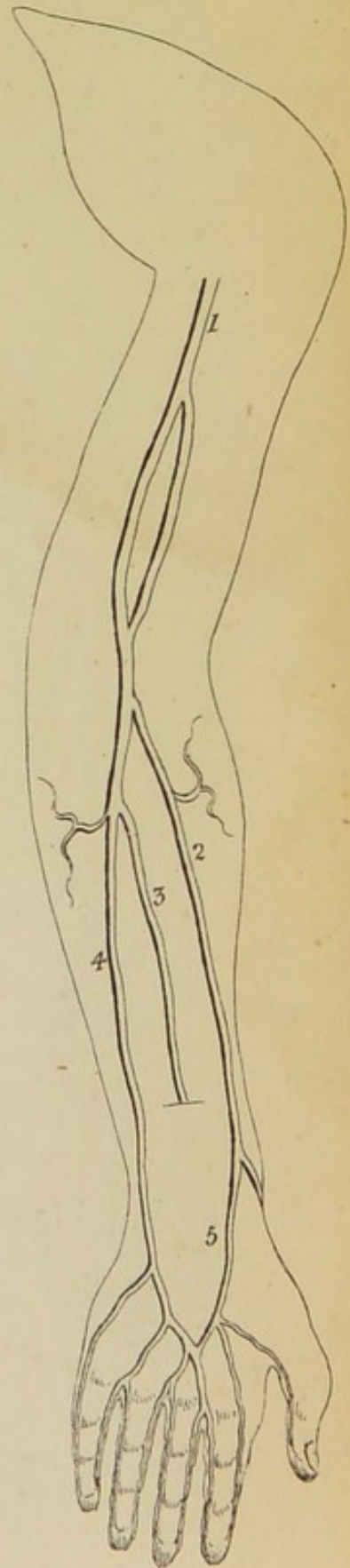


Fig: 3.



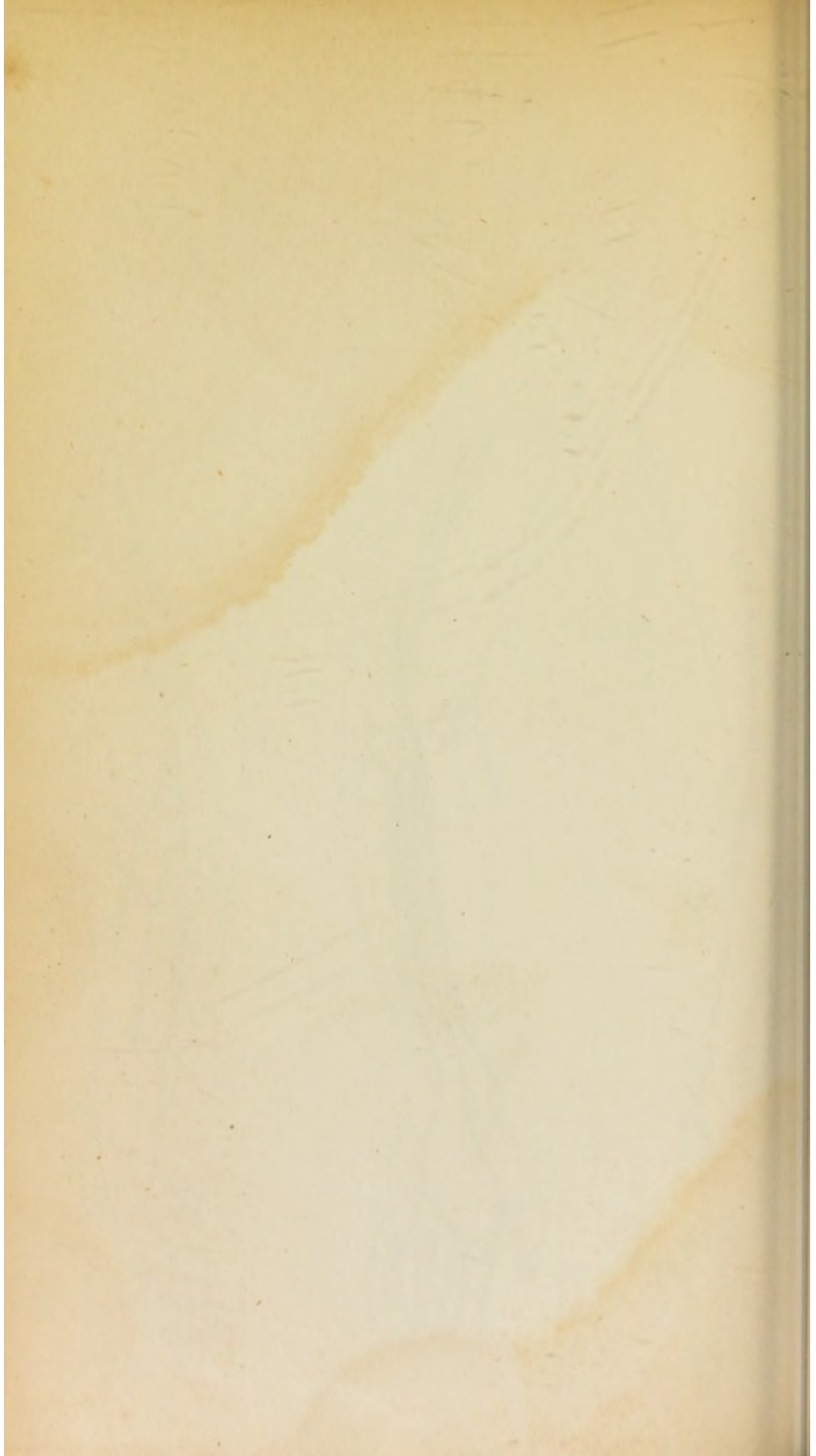


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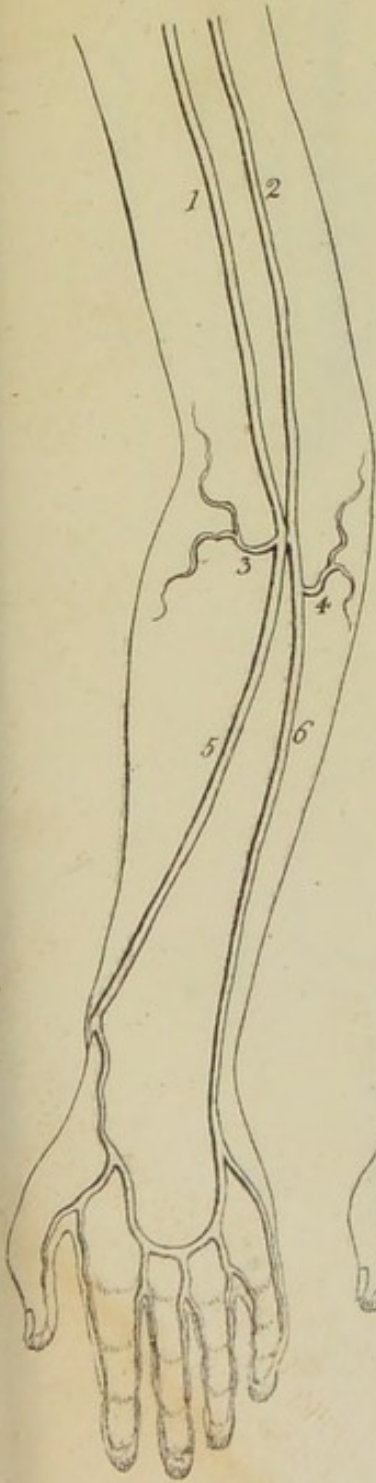


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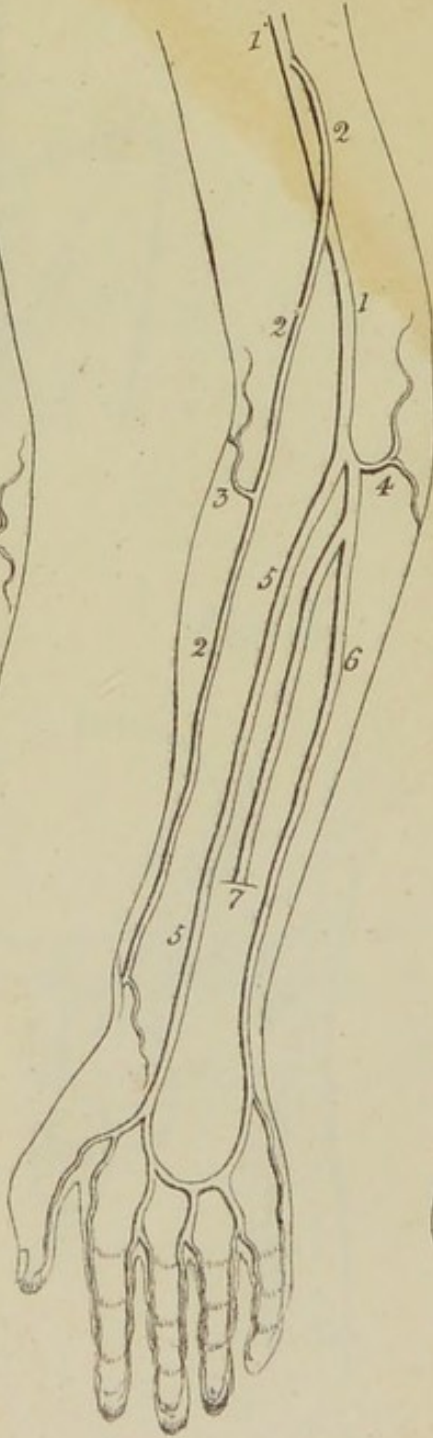


Fig: 6.



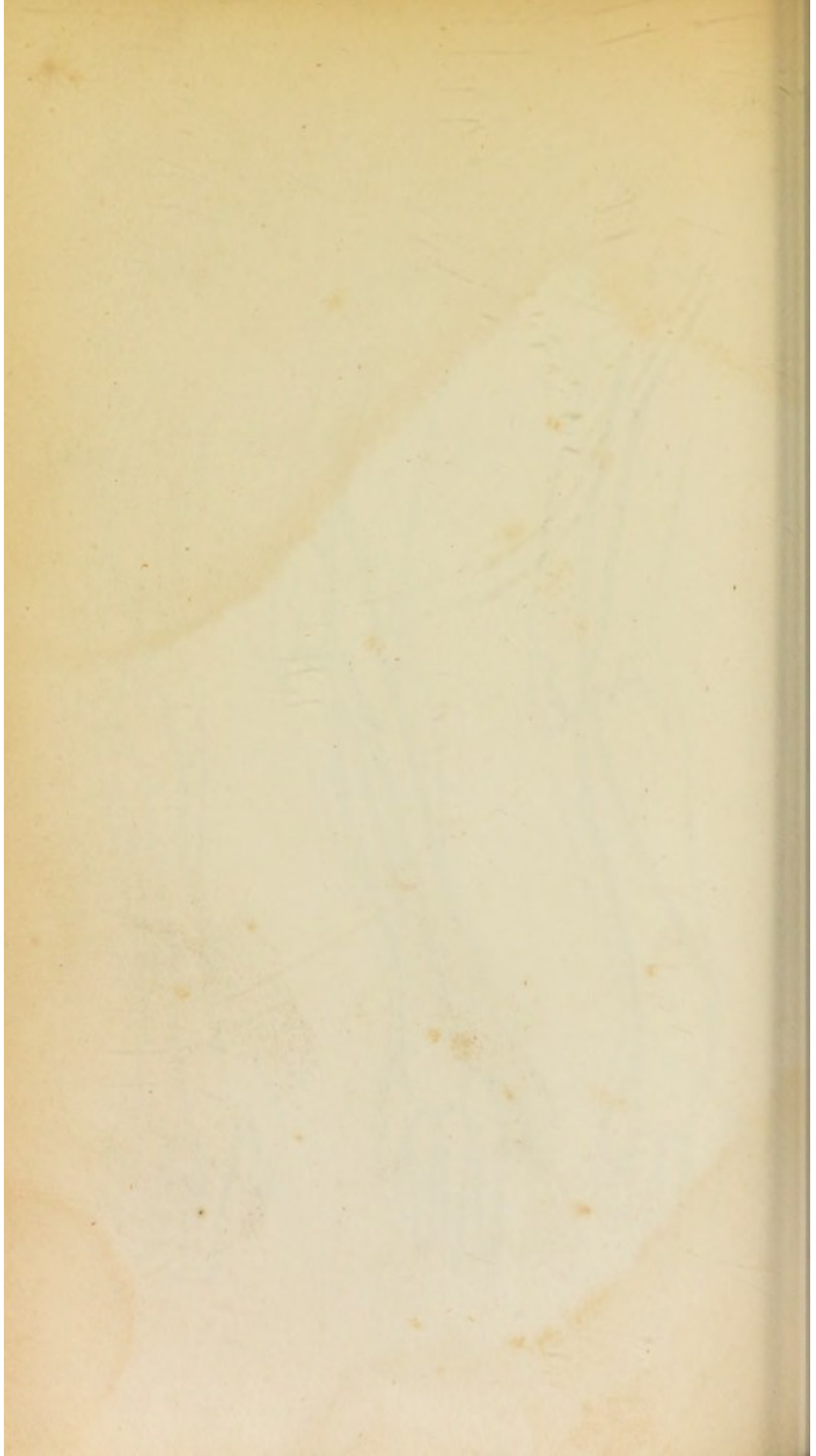


Fig: 1.

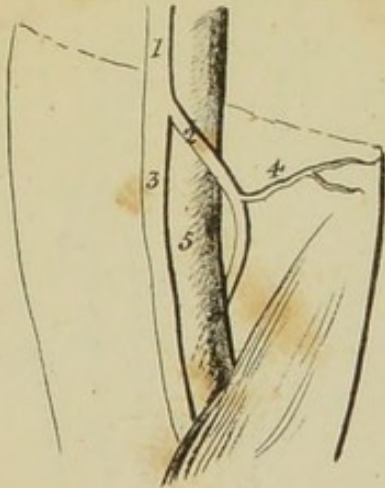


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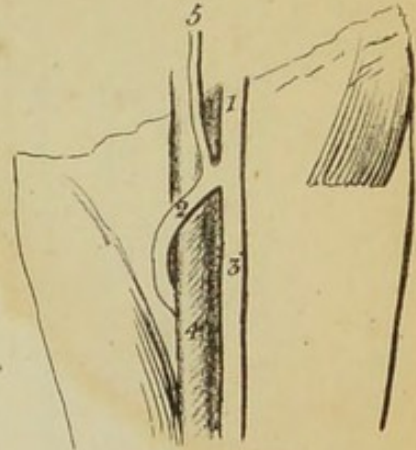
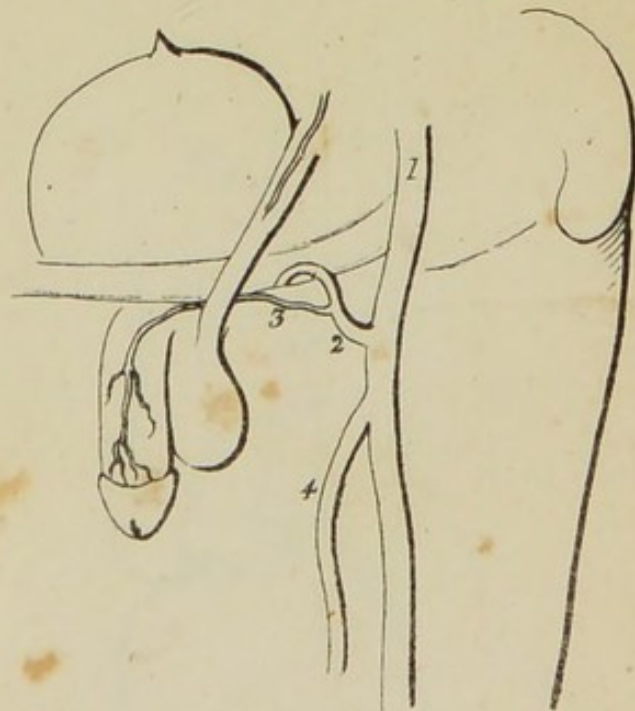


Fig: 3.



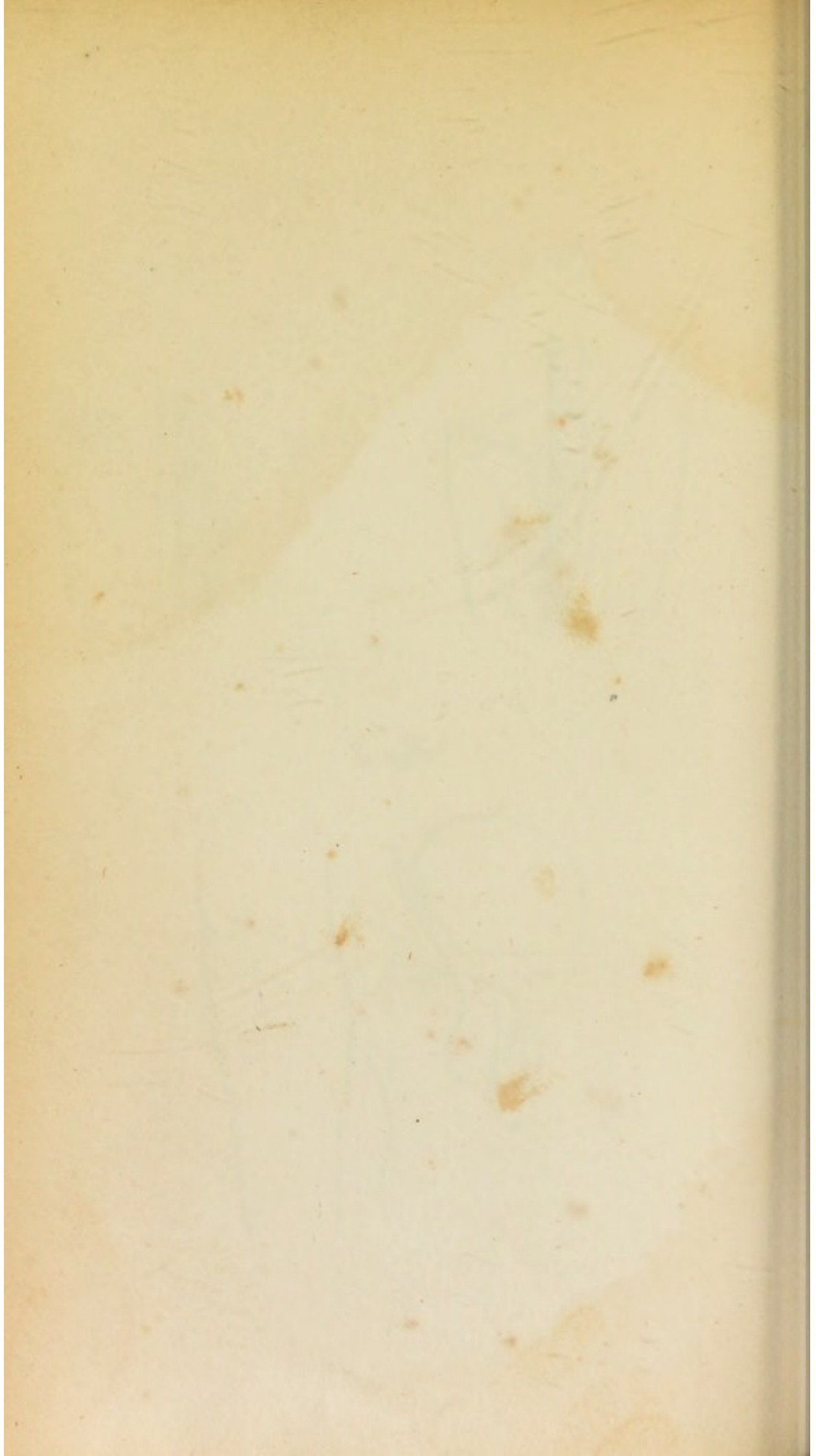


Fig: 1.

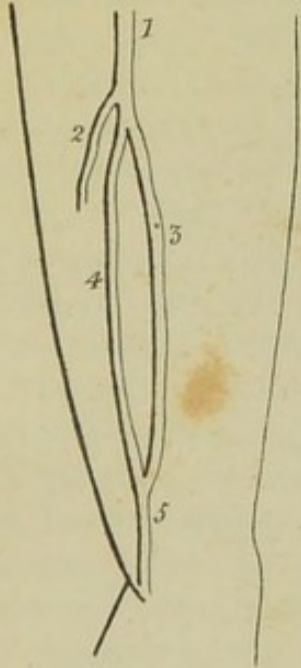


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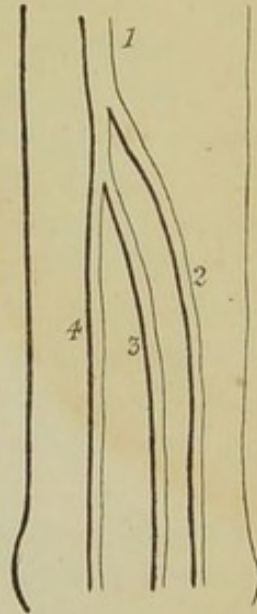


Fig: 3.

