Illustrations of amputations / by W.P. Cocks.

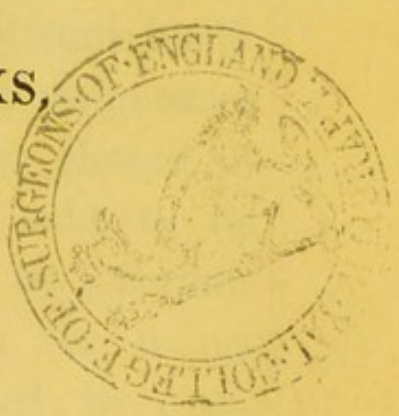
ILLUSTRATIONS

OF

AMPUTATIONS.

BY W. P. COCKS,

SURGEON.



24 *Plates.*

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AMPUTATIONS.

Such an operation frequently becomes indispensably proper, on the principle of sacrificing a branch, as it were, for the sake of taking the only rational chance of saving the trunk itself. Indeed, the suggestion of this measure in cases of mortification, where there is no chance of the parts recovering, may be said to be derived from nature herself, who, by a certain process, detaches the dead from the living parts: this separation is followed by cicatrization, and the patient recovers.

The necessity for amputation has always existed, and ever will continue, as long as the destructive effects of injuries and diseases of the limbs cannot be obviated in any other manner; although it is much less frequently performed at present, than it was forty years ago.

PLATE A. 1.

Fig. 1.

This sketch shews the manner in which the subclavian artery is compressed in amputation at the shoulder-joint. The compression is here made with the handle of the tourniquet, but a common key would answer the purpose.

Fig 1.

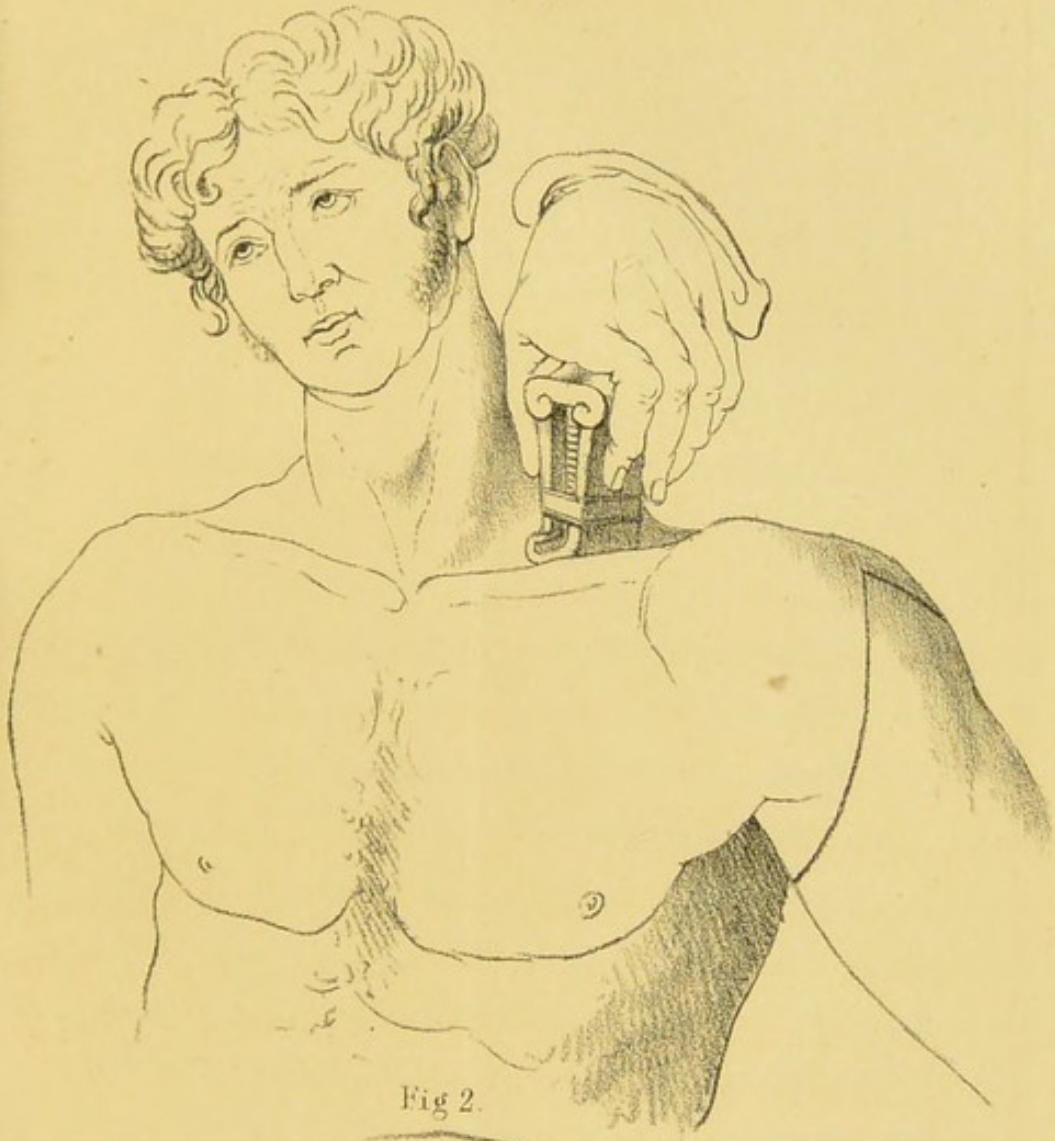

Fig 2.

PLATE A. 1.

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*Amputation at the Shoulder-Joint.**

Fig. 2.

The operator makes a longitudinal incision, which begins at the acromion, and extends downwards about an inch below the neck of the humerus, dividing the integuments and the deltoid muscle into two equal halves. The skin of the arm is then to be pulled up towards the shoulder by an assistant, and the anterior and posterior flaps are to be formed by two oblique incisions, made from within outwards, and at the same time downwards, care being taken that the tendons of the pectoralis major and latissimus dorsi are divided.

No fear need be entertained of wounding the axillary vessels, which are out of the reach of the point of the knife. The cellular adhesions of the two flaps are now to be cut through, and the flaps themselves lifted up by an assistant, who must also compress the divided circumflex arteries.

* Baron Larrey.

Thus the shoulder-joint becomes freely exposed. The knife is then to be conducted round the head of the bone, so as to divide the capsular ligament and tendons of muscles belonging to the joint; the head of the bone is next to be inclined a little outwards, and the knife carried down close to the posterior surface of the humerus, for the purpose of completing the division of the tendinous and ligamentous connexions situated in that direction.

An assistant then compresses the axillary artery between his two fore-fingers, and commands the flow of blood through it, while the surgeon turns the edge of the knife backwards, and cuts through the axillary vessels opposite the lower angles of the two flaps, and just in front of the fingers of the assistant; without remitting the pressure, the axillary artery is readily taken up with a pair of forceps and tied.

All that afterwards remains to be done, is to secure the circumflex arteries.

The wound having been cleaned with a sponge, the flaps are to be lightly brought together with two or three straps of adhesive plaster, (see fig. 3. plate 1. *a*.) over which the other dressings and a bandage are to be put, according to the rules observed after amputations in general.

Fig 1.

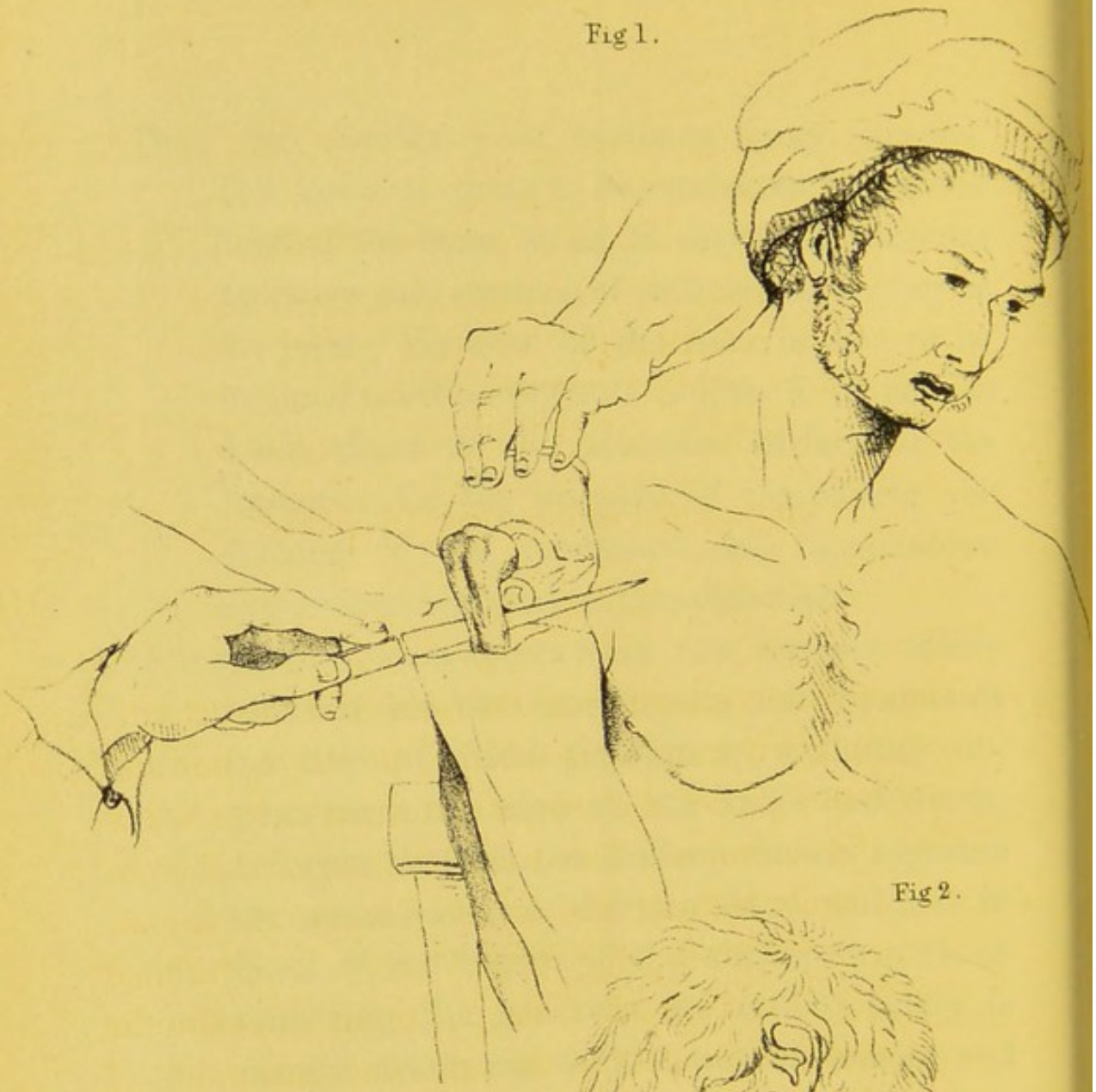

Fig 2.

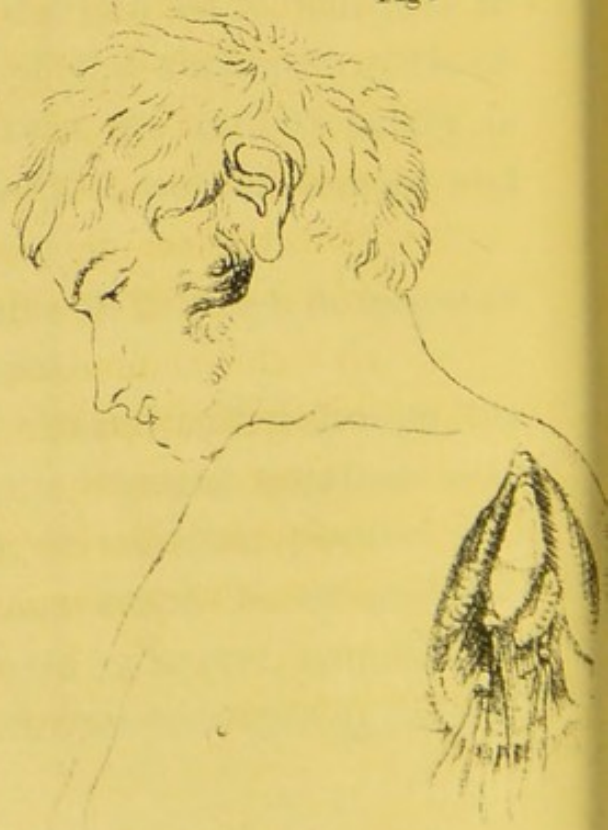

Fig 3.

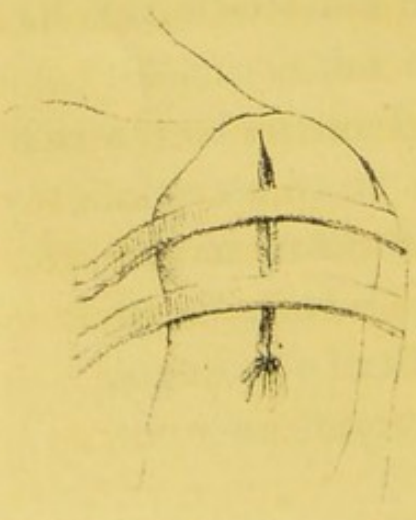

PLATE A. 1. *a.*

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*Amputation at the Shoulder-Joint.**

Fig. 1.

The operator, standing on the outside of the patient, makes a transverse incision at the upper and outer part of the arm, about three inches below the acromion. The wound is thus carried completely through the deltoid down to the humerus. This having been done, a longitudinal cut is to be made from the point opposite the coracoid process to the anterior extremity of the transverse incision, and this second cut must also divide the deltoid down to the bone. A third incision is to be made behind, reaching from the place where the acromion unites with the spine of the scapula to the posterior termination of the transverse wound. In this way, a square flap is formed that comprises nearly the whole of the deltoid. It is next to be separated from the humerus, and

* M. Richerand.

raised, so that the shoulder-joint may be got at. The posterior circumflex artery may now be found in the back angle of the wound, and as soon as it has been tied, the tendons of the teres minor and of the supra and infra-spinatus muscles are to be cut through. Then the arm is to be allowed to hang down, and rotated outwards, for the purpose of making the subscapularis muscle tense, which is to be divided. The next thing is to open the capsular ligament extended over the head of the bone, and at the same time to cut through the tendons, the long head of the biceps, and, after dividing the capsule more freely, to dislocate the head of the humerus upwards and outwards. The large knife is now to be laid aside, and a straight bistory applied to the inside of the humerus, along which it is to be carried downwards, so as to separate the soft parts from it sufficiently far down the limb; but previously to completing the inner flap by dividing these soft parts, the axillary artery should be compressed together with a portion of the skin of the armpit, between the fingers and thumb of an intelligent assistant. In this manner, hemorrhage may be prevented, even though the subclavian artery is not compressed. The rest of the operation consists in turning the edge of the knife inwards, cutting through the skin, vessels, etc., at the

inner side of the arm, and tying the brachial artery, and other vessels, requiring ligatures. The flaps are afterwards to be brought together.

PLATE A. 1. *b*.

Shews the first stage of the operation* at the shoulder-joint. It represents the patient sitting upright in a chair.

See pages 95 to 102.

* The flap is made and raised so as to expose the head of the humerus.

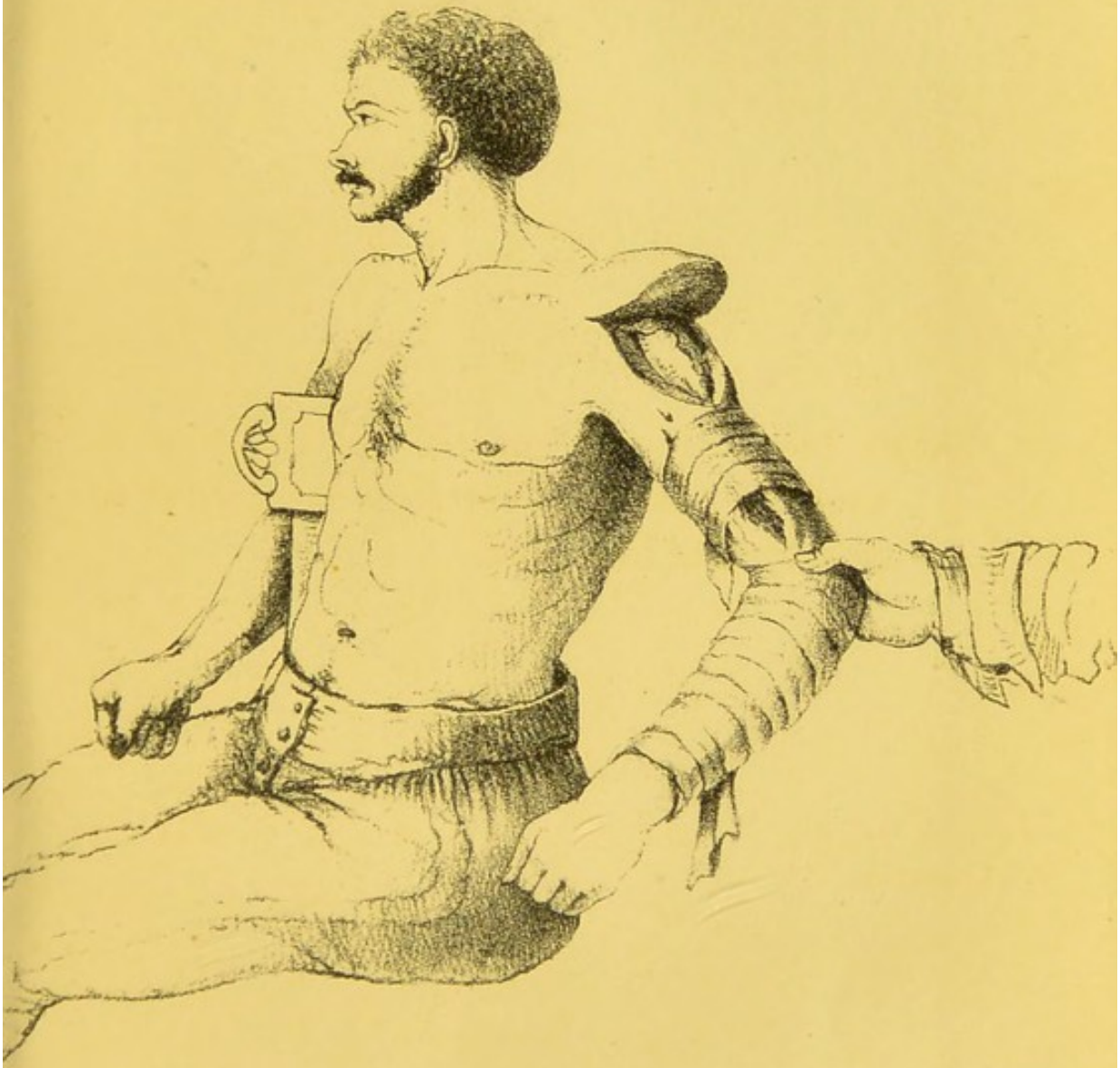

PLATE A. 1 *c*.

This sketch represents the head of the humerus dislocated. The thumb of the surgeon is slipt into the capsule of the joint, and with the fingers of the same hand, on the outside of the integuments of the axilla, he grasps and compresses the axillary artery. By this he prepares to divide the remaining parts of the muscles and integuments.

(1). Place the patient upright* on a chair, put a sheet or table-cloth round the body; and, under the arm to be cut off, let the extremities of this cloth be held by a stout assistant. This is intended to support the patient when the assistant surgeon is pressing his thumb upon the artery, and without this precaution, the patient losing blood, and sinking under the pressure which it is necessary to make

* C. Bell's Operative Surgery.

above the clavicle, the pressure will be ineffectual, and the artery be left free.

(2). Let a stout assistant surgeon stand behind the patient; he is to place his thumb in the hollow above the clavicle, and to press the subclavian artery against the first rib. Let him reserve his most powerful exertion for the latter part of the operation.

(3). The surgeon takes the large amputating knife, and holding it like a sabre, he uses it much after the same fashion; with the left hand he grasps the mass of the deltoid muscle; he then cuts through the integuments and deltoid muscle near its insertion into the humerus, and changing the direction of the edge of the knife, he draws it so as to lift up the whole of the deltoid muscle, leaving it at its origin.

(4). The next part of the operation is to sink the scalpel into the cavity of the shoulder-joint, then the arm bone being drawn down by an assistant, room is given to introduce the fore finger of the left hand into the joint. The ligament is then cut from the glenoid cavity, the finger being the directory. Then, keeping the edge of the knife close to the neck of the humerus, the bone is separated from the soft parts, and the elbow being permitted to drop, the head of the bone rises free from the flesh of the arm.

(5). One motion of the knife cuts through the re-

maining flesh of the arm, and with it the artery and nerves.

(6). The artery is drawn out and tied.

(7). The muscular arteries are sought and secured with ligatures.

(8). Particular care is taken to see that the extremities of the nerves are lodged deep. The flap is let down so as to cover the lower part of the wound, and being secured by adhesive straps, the dressings are kept in their place by the spica bandage, which is a double-headed roller brought round from the opposite side of the body, and crossed over the shoulder.

Every one knows the difference of stopping the pulsation of the artery, and stopping the flow of blood through the artery. It is no security against hæmorrhage that the surgeon, feeling the wrist before proceeding to the operation, finds that the pressure of the assistant has stopt the pulse; notwithstanding this, blood flows from the vessels during the incisions, and velocity is necessary to success.

The dependance which the surgeon is obliged to have upon his assistant in the operation, must often render the operation impracticable.

In some cases the following method may be preferred:

Place the tape of the turniquet in the axilla, and the instrument itself on the top of the shoulder, and screw it tight: the artery is thus secured.

2. Make one decided cut with the large knife across the inner part of the arm. The mouth of the artery is seen gaping and quite distinct, and may be leisurely tied, free of the nerves.
3. Cut or loosen the tape of the turniquet, and make the flap by turning up the deltoid muscle.
4. Cut across the ligament, and separate the humerus, and secure the lesser arteries.

The advantage of this manner of operating would be the leisure and security in tying the great artery, without losing a drop of blood.

The appearance presented is in effect the same as when the operation is begun by forming the flap. Very often it must occur, that the place of the wound, or the destruction of integuments, will produce a necessity for varying the manner of making the flap in this amputation, and which, of course, must be left to the surgeon's judgment.

See pages 95 to 102.

Plate A 2.

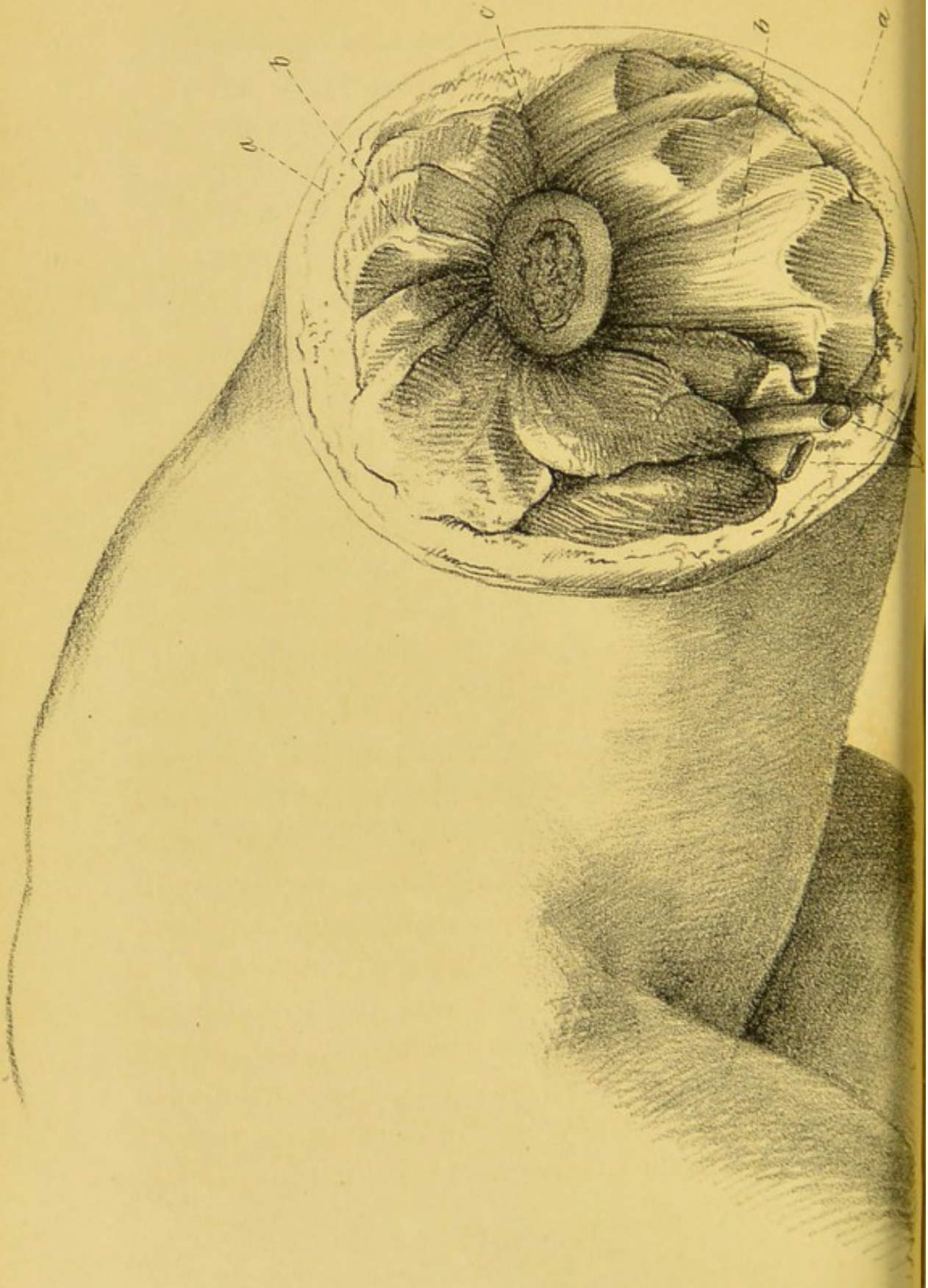

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PLATE A. 2.

Circular Amputation of the Arm.

a. The integuments.
b. The muscles.
c. Os humeri.
d. Vessels and nerves.

Operation.—The patient is generally seated on a chair, with the arm in the extended position, and supported by an assistant, who can also compress the artery in the middle of the arm, or the tourniquet may be used for that purpose. The skin being retracted, and the operator, standing on the outer side of the limb, carries his hand under it, armed with the middle size amputating knife, and makes a circular incision through the skin to the muscles; the integuments are then to be retracted, but not dissected from the subjacent parts, as a few touches of the knife are sufficient to divide whatever slips of cellular membrane that connect them to the muscles.

See pages 88, 89.

At the place where the skin has been reflected to, the surgeon again applies the knife, commencing external to the biceps muscle, and divides the muscles and vessels, cutting them obliquely upwards. He will find it necessary to make a second incision close to the retracted muscles, to divide the remaining soft parts to the bone; after which he detaches from it the muscles for the space of an inch or an inch and a half, or in proportion to the size of the limb: he then protects the soft parts by a retractor, and saws the bone. The vessels next demand his attention,—the principal one will be found internal and a little anterior to the humerus, and one or two to the external side of the stump.

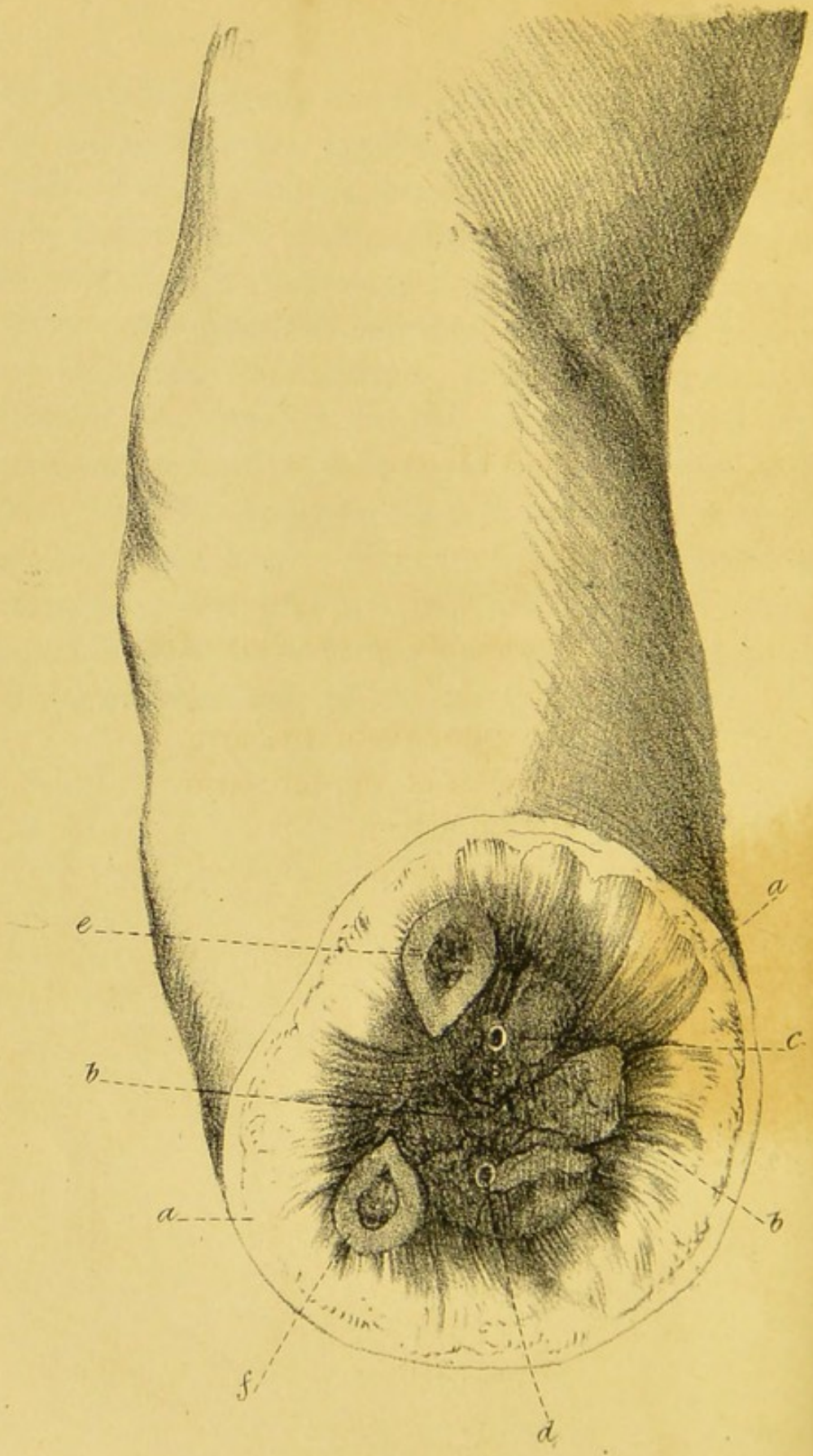

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PLATE A. 2. *a*.

Circular Amputation of the Fore-Arm.

a. a. Integuments of the arm.
b. b. b. Muscles of the fore-arm.
c. Radial artery.
d. Ulnar artery
e. Radius.
f. Ulna.

See page 89.

PLATE A. 2. *b*.

Amputation of the Fore-Arm with the Double Flap.

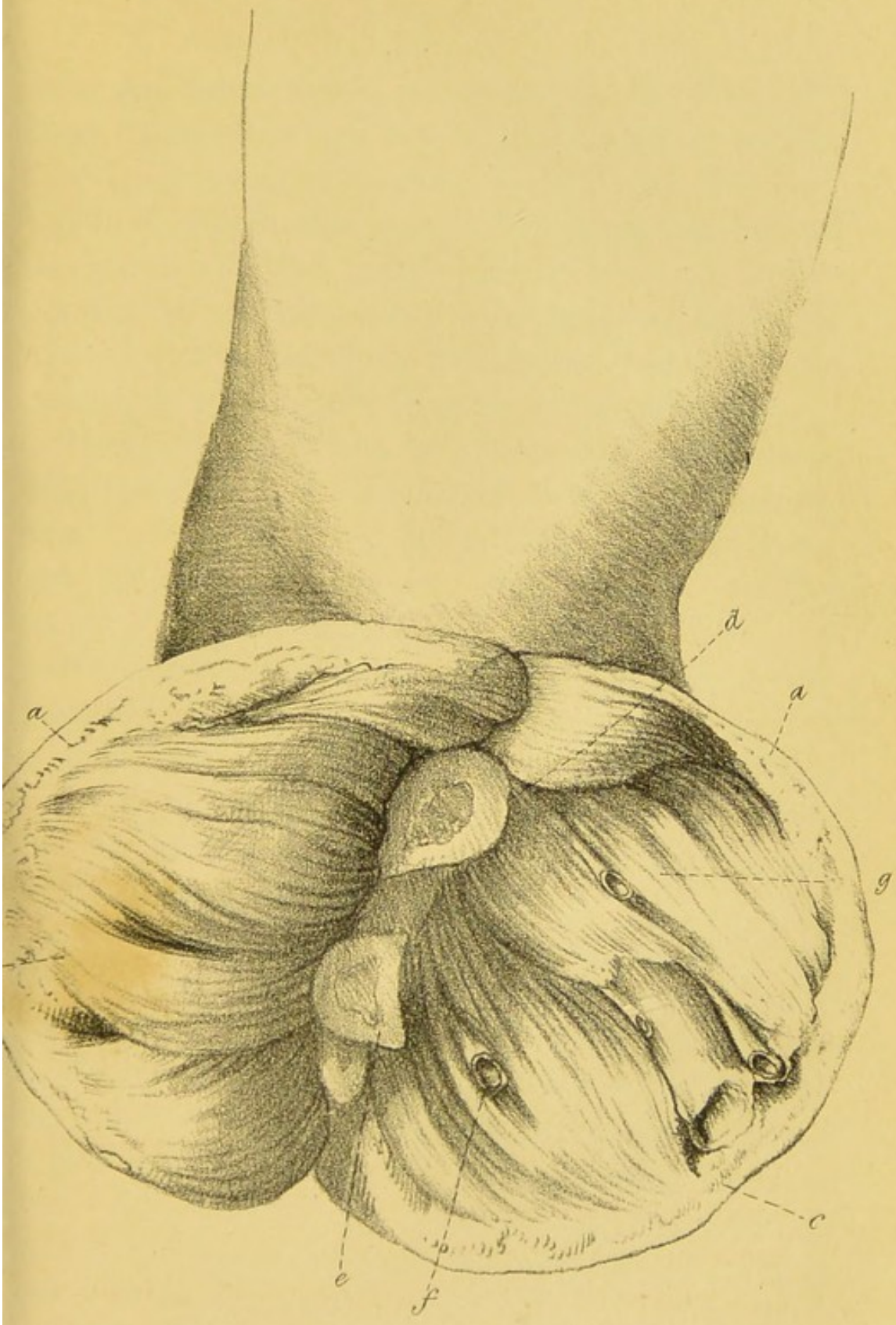
a. a. Integuments of the two flaps.
b. External flap.
c. Internal flap.
d. Radius.
e. Ulna.
f. Ulnar artery.
g. Radial artery.

Operation.—The tourniquet is applied on the humeral artery, whilst an assistant holds the fore-arm in a middle state, between pronation and supination.

The operator placed to the inside of the limb, as in all cases of amputation of the fore-arm, takes hold of the part which is to be removed with his left hand; he thrusts the point of the knife between the bones, from below upwards, through the soft parts, beginning on the inner and anterior side of the ulna, and passes it out at the corresponding point of the

See page 90.

Plate A. 2.b.



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outer and anterior side of the radius, denuding the bones: then he forms a flap, an inch or two in length, by cutting towards the palm of the hand. He then passes the instrument under the integuments, behind the bones, from the point where it came out before the radius, to that on the inner edge of the ulna, where it was first introduced, and forms a flap posteriorly of the same length as the former.

These being held back by an assistant, the operator introduces the point of his knife between the bones, from the anterior side; divides the muscular fibres and interosseous ligament, and draws it out by cutting round the ulna.

He again passes it between the bones from the posterior surface, and withdraws it in a similar manner, by cutting round the radius. By this figure of 8 incision he completely denudes the bones by dividing the muscles, tendons, interosseous ligament, and the periosteum.

Then taking a retractor he passes the middle end between the bones from before and presses it on the posterior flap; he then crosses the two lateral ends of the retractor: the undivided end serves to raise the anterior flap; the assistant draws tight the retractor; the operator then takes a saw in his right hand, and with the left thumb marks the point at which the bones are to be sawn through, the arm being pronated.

Four arteries generally require ligatures,—the radial, ulnar, and the two interosseal.

PLATE A. 3.

Amputation of the Fingers at the First and Second Phalanges.

Fig. 1.

a. The articulating surface of the superior phalanx of the fore finger.

b. to *c.* Extent of circular incision on the back part of the finger.

d. The flap formed by the integuments at the palmar surface of the finger.

Fig. 2.

In this operation the knife is carried from *e.* to *b. c.*, or from *b.* to *e. c.*; the joint is disarticulated at *d.*, and the operation completed by forming the flap *a. b. c.*

See pages 104 to 106.

Fig. 1.

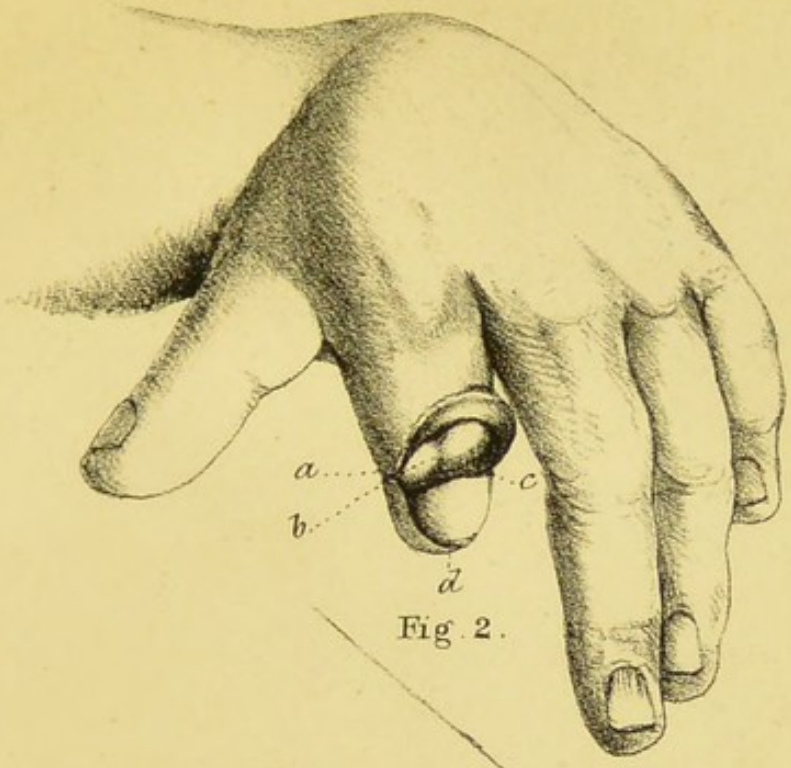

Fig. 2.

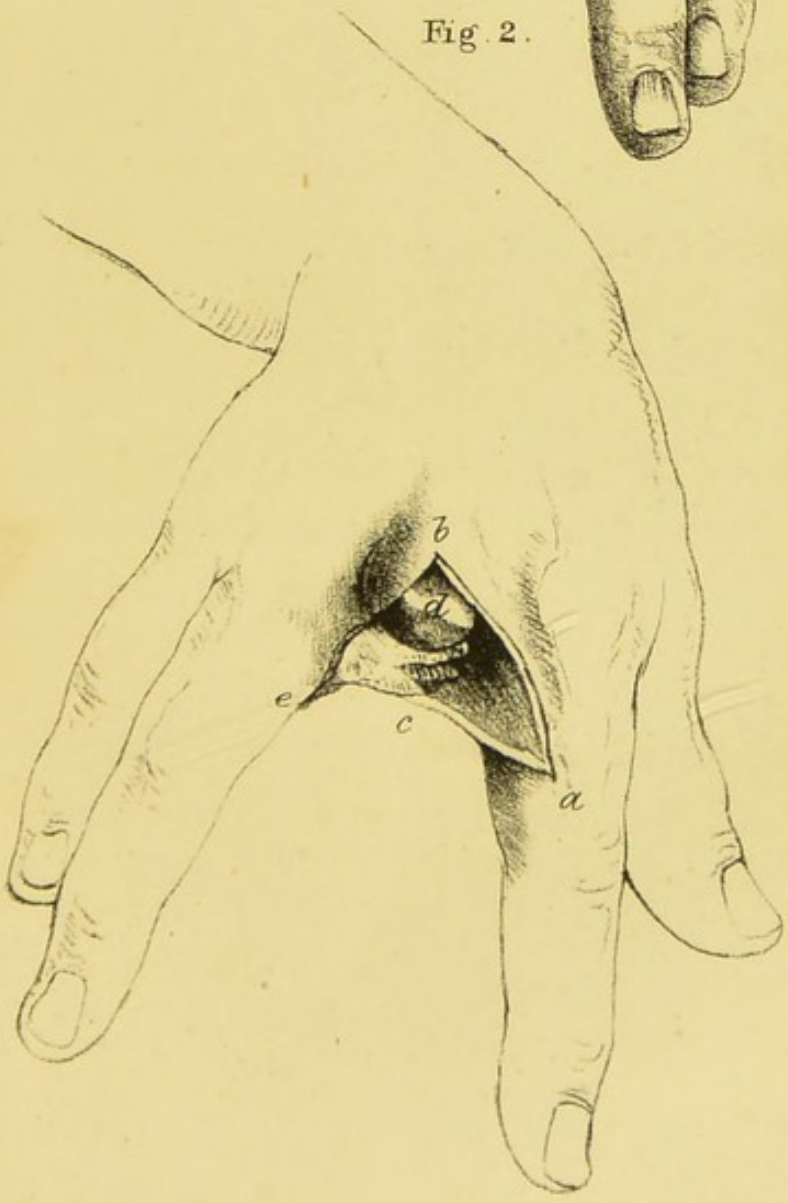

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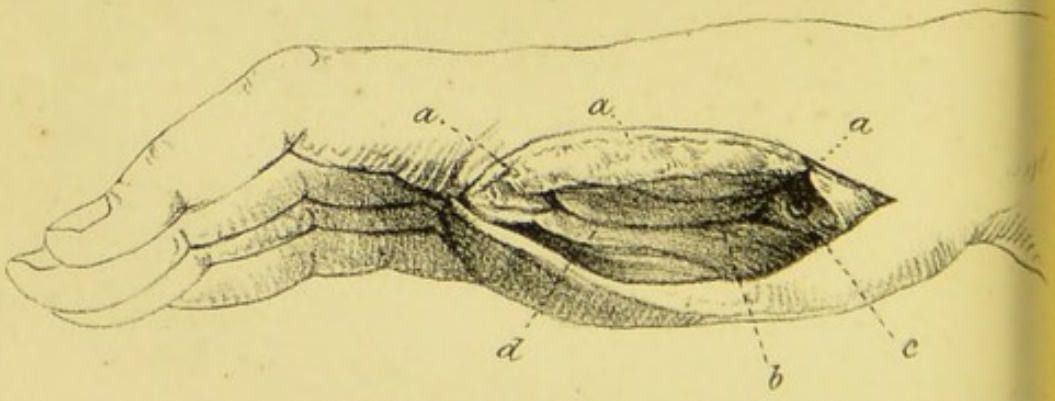
Fig 1.

Fig. 2.



W. Cooke

PLATE A. 3. *a.*

Amputation of the Thumb.

Fig. 1.

Amputation of the thumb at its metacarpo-phalangeal articulation.

a. b. Extent of the incision necessary to disarticulate the thumb.
c. The os trapezium exposed.
d. The flap.

Fig. 2.

Amputation of the thumb according to the method of M. Beclard.

a. a. Integuments.
b. b. Muscles and tendons of the palm of the hand.
c. c. Arteries requiring ligatures.

See pages 104 to 106.

PLATE A. 3. *b*.

Amputation of the Little Finger.

Fig. 1.

a. Extent of the incision.
b. Integuments.
c. Muscular substance.
d. Os unciforme exposed.
e. Flap thrown back.

Fig. 2.

Amputation of the wrist at the radio-cubito-carpal articulation.

a. The carpal extremity of the ulna.
b. The carpal extremity of the radius.
c. to *d*. Extent of the circular incision on the dorsal part of the wrist.
e. The flap formed by the integuments, muscles, and tendons of the palmar portion of the hand.

See pages 104 to 106.

Fig 1

Plate A. 4.

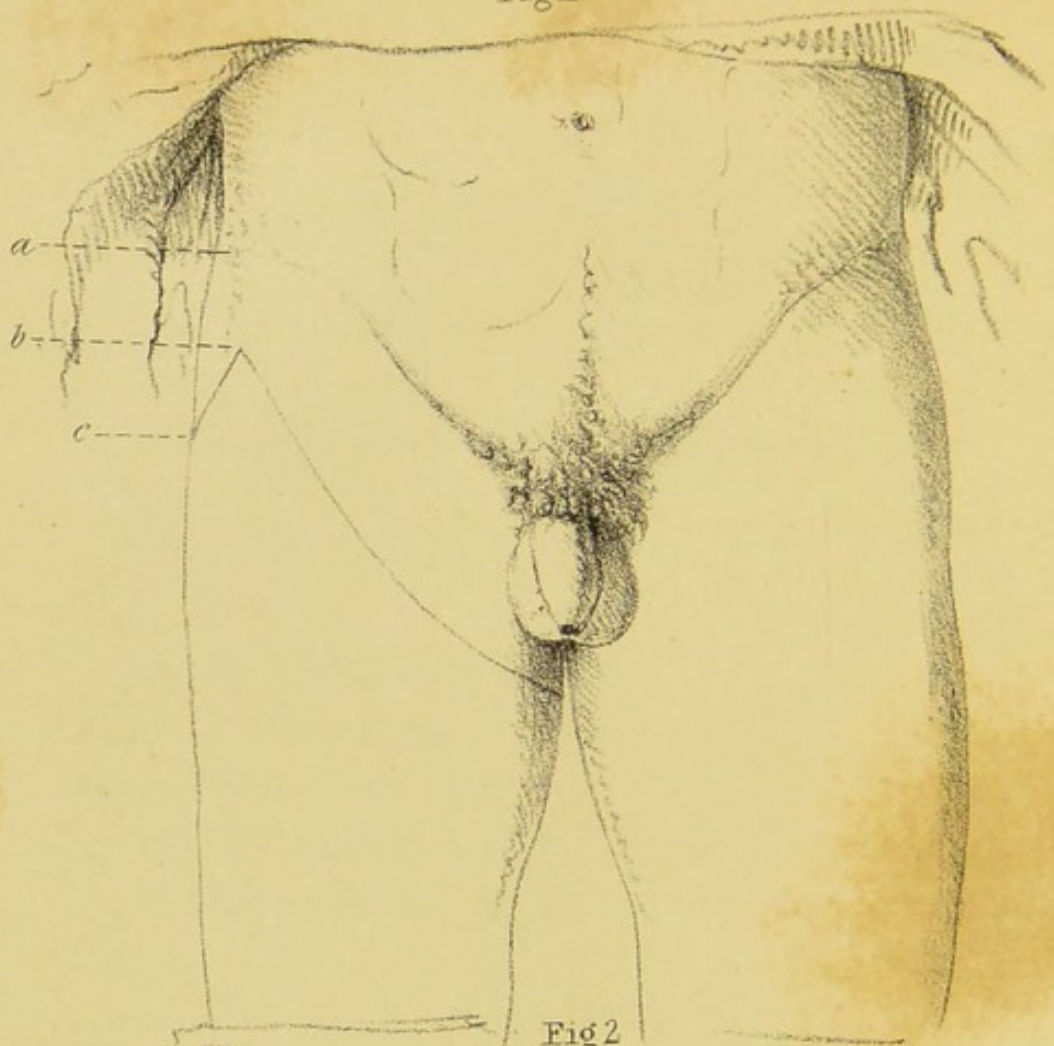


Fig 2

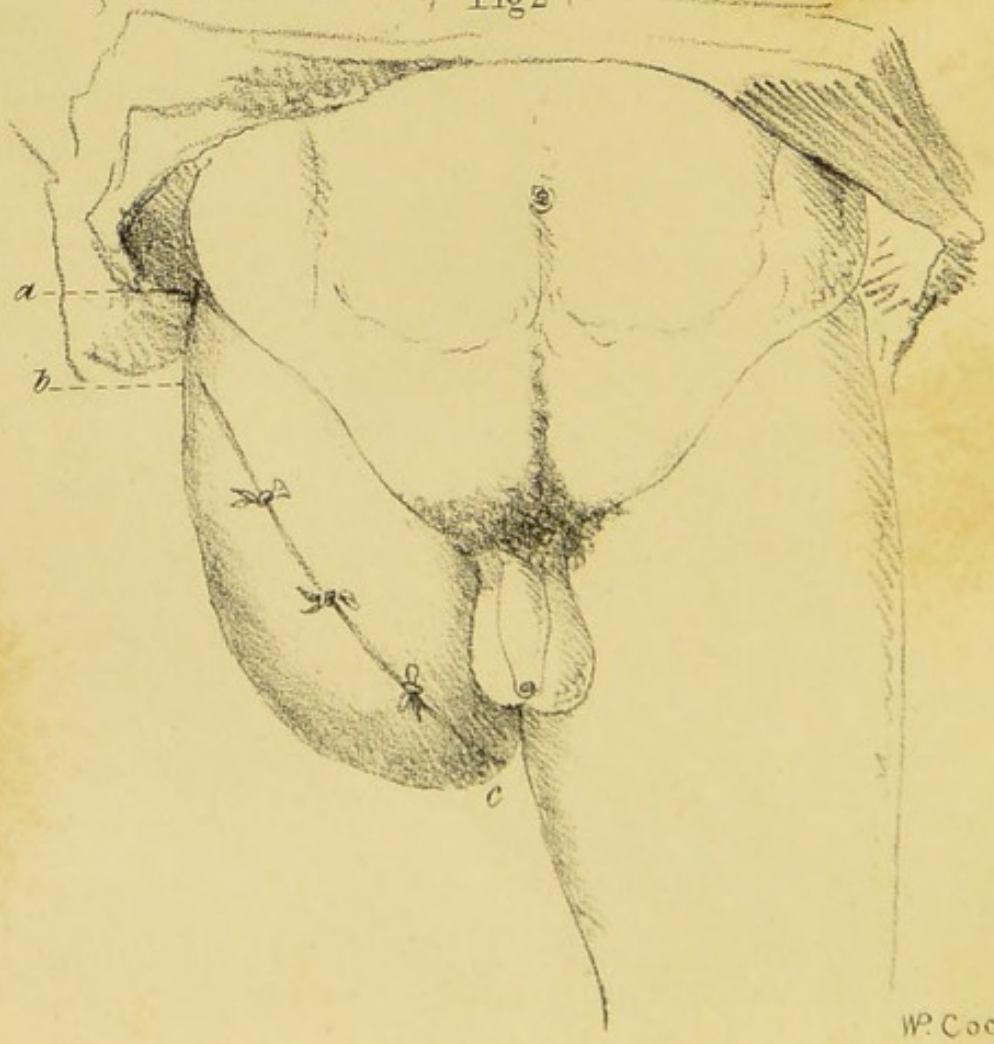


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PLATE A. 4.

Amputation at the Hip-Joint

Fig. 1.

a. The anterior superior spinous process of the ilium.

b. The first incision, commencing about four fingers' breadth and in a direct line below the anterior superior spinous process of the ilium, in a well-proportioned man; and continued round in a slanting direction, at an almost equal distance from the tuberosity of the ischium, nearly opposite to the place where the incision commenced.

Fig. 2.

The wound made after the removal of the bone, and united by sutures. Sometimes the line of union is more horizontal.

a. The anterior superior spinous process of the ilium.

b. The commencement of the line of incision,

See pages 90 to 95.

which runs down to *c*. or the tuberosity of the ischium.

NOTE.—M. Lisfranc gives the following direction to ascertain the exact situation of the hip-joint under any circumstances. In the First place, if a line about an inch and a quarter in extent be drawn from the apex of the anterior superior spinous process, parallel to the axis of the limb; and another transverse line be drawn from the end of this, it will pass on the outer and anterior surface of the joint, about an inch and a half to the inner side of the former. Second:—A line, half an inch in length, drawn parallel to the axis of the limb, from the anterior inferior spinous process of the ilium, will fall on the superior part of the joint. Third:—If a line, two inches and a quarter long, be drawn from the spine of the pubes, and directed transversely outwards, the joint will be found at a quarter of an inch below its extremity. Fourth:—Lastly, if a right-angled triangle be drawn, one of the sides of which, about half an inch long and parallel to the axis of the limb, terminates inferiorly on the fore and upper part of the great trochanter; and the other side, of an inch in length, be directed transversely inwards, the superior and internal angle will correspond to the outer side of the head of the femur.

Plate A A a

W. Cooke

PLATE A. 4. *a.*

This sketch represents a singular case of a successful amputation at the hip-joint, performed January 17th, 1824, on William Jones, aged 47, at Guy's Hospital, by Sir A. Cooper, Bart.

PLATE A. 5.

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*Circular Amputation of the Thigh.**

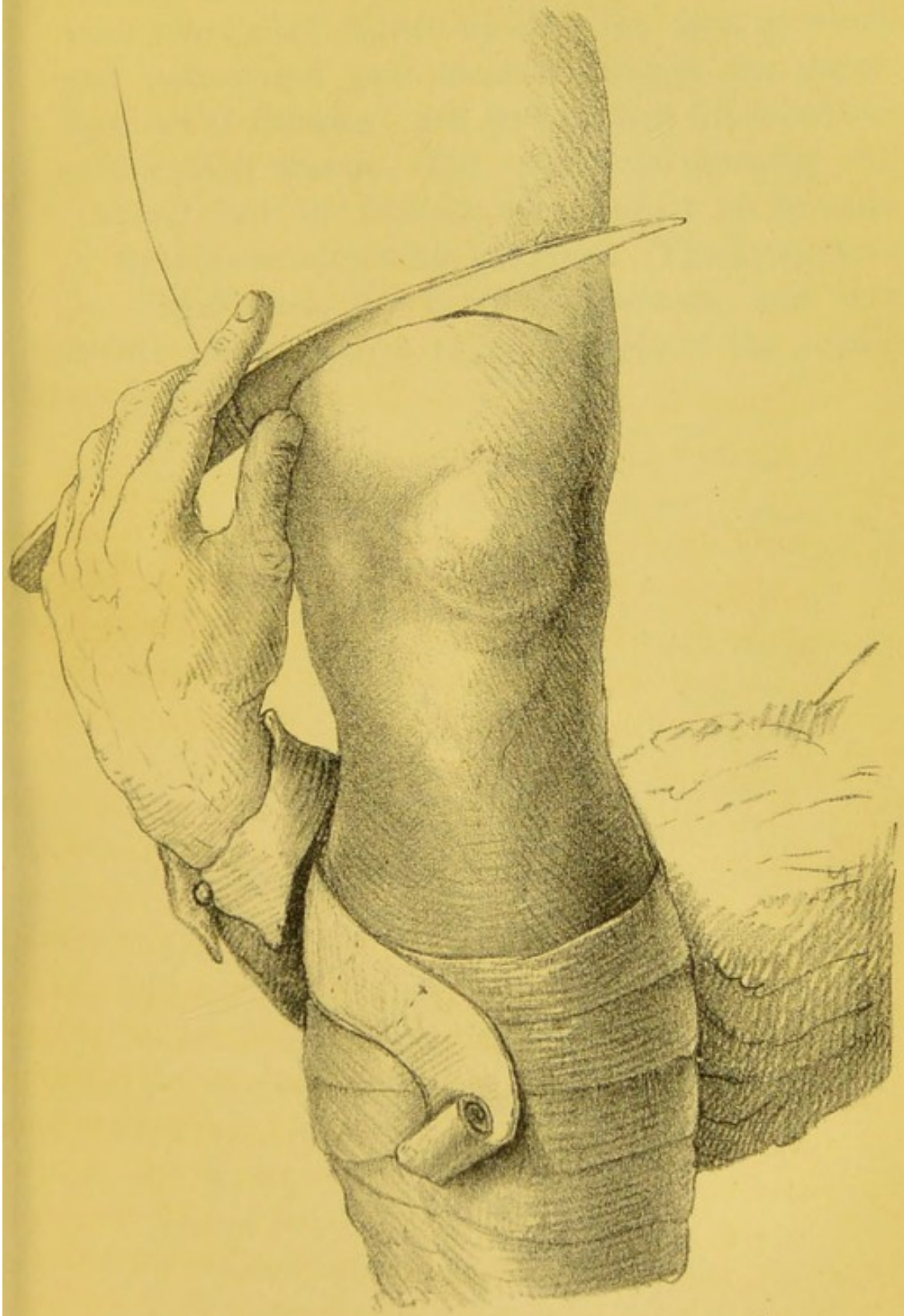
This sketch represents the manner in which the first incision is to be made.

Operation.—The patient is generally seated on the side of a table, with his back against a mattrass or pillow; the tourniquet is applied as high as possible on the course of the femoral artery, or an experienced assistant makes compression against the os pubis with his fingers or a pad.

The artery being compressed, the arm of the operator is carried under the limb, till the knife reaches almost round to the same side on which he stands; with one sweep penetrating to the fascia, the knife is brought round to the point where it first touched the skin; dissect them back as far as may be thought necessary for the purpose of covering the stump. You are then to cut through the superficial set of muscles, and divide the deeper seated

* In consequence of a mistake in the placing of this sketch on the stone, the surgeon is represented operating with his left hand.

Plate A. 5



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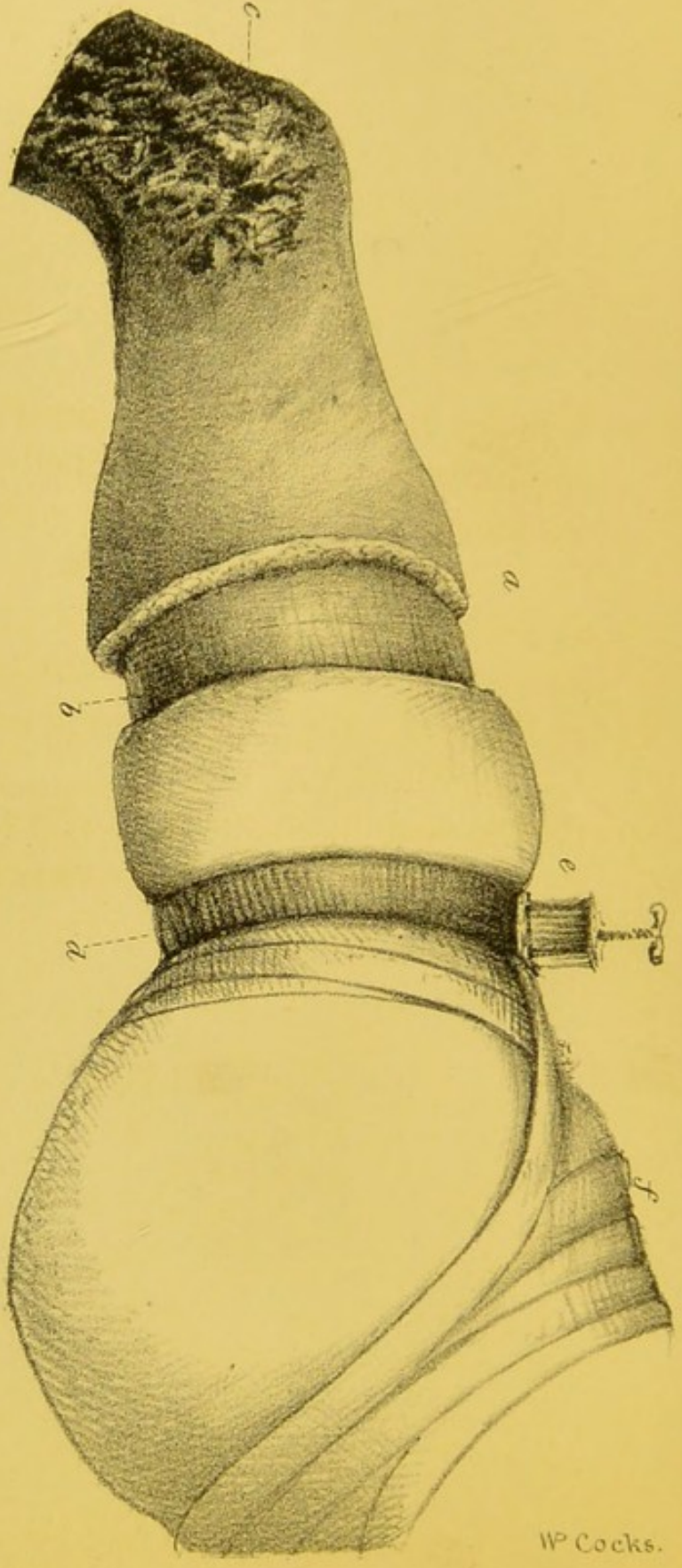
muscles situated immediately round the bone, at least two inches higher up than the spot at which you commenced your incision through the superficial set of muscles: this will prevent the formation of a conical stump. The superficial muscles will contract, but the deeper ones cannot on account of their connection with the bone. The arteries to be secured are, the femoral, profunda, and that branch which runs in or by the side of the sciatic nerve.

PLATE A. 6.

The second stage of the operation.—It represents the integuments freely divided, and considerably retracted.

a. The divided integuments.
b. The fascia.
c. Extensive disease of the knee-joint.
d. The bandage.
e. The tourniquet.
f. A portion of the bandage encircling the abdomen.

Plate A. 6.



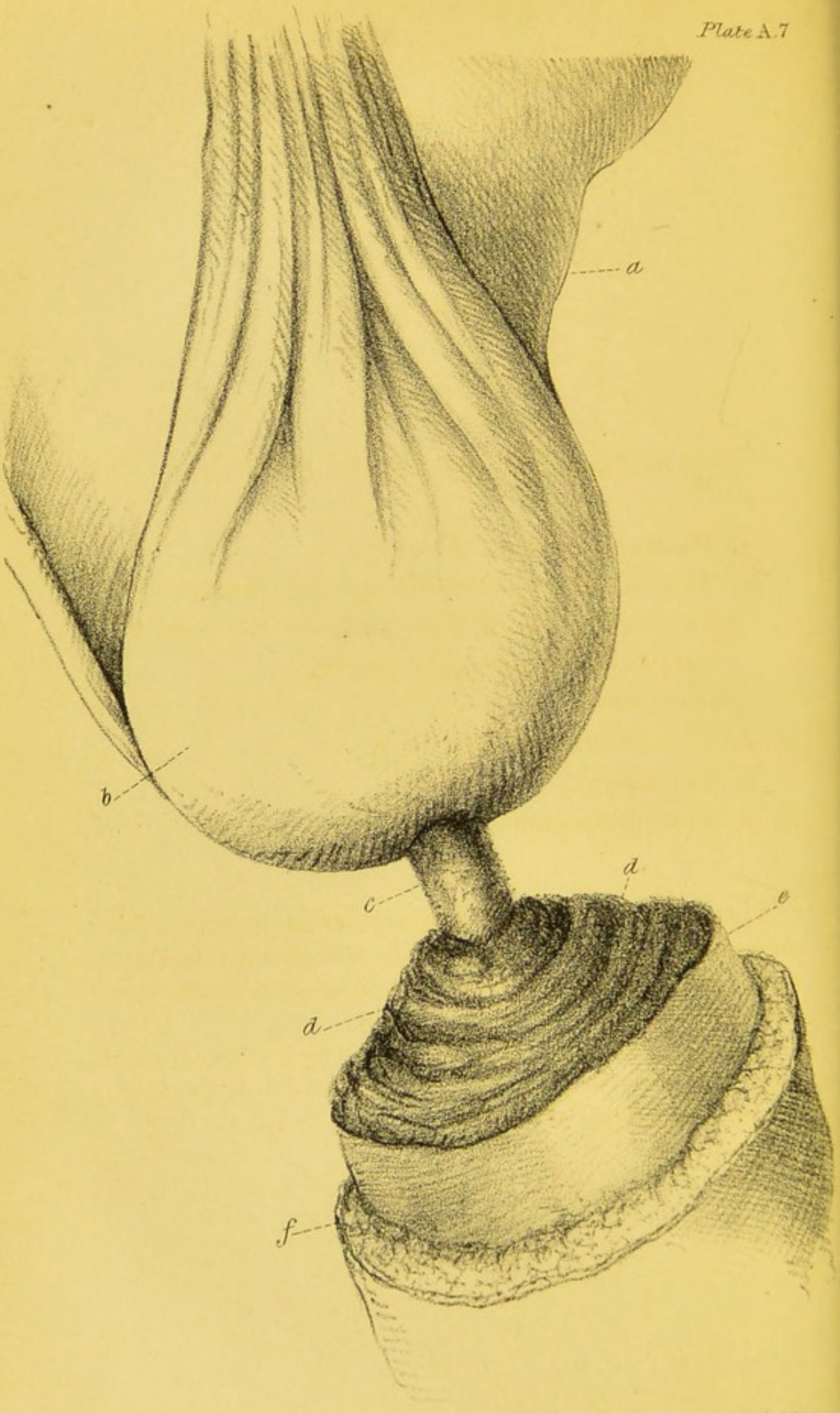


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PLATE A. 7.

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*The Method of applying the Retractor.**

a. Posterior part of the thigh.
b. The retractor, supporting and protecting the soft parts from the teeth of the saw when employed in dividing the bone.
c. Os femoris.
d. d. The muscles of the thigh.
e. The fascia.
f. The integuments.

* All the muscular fibres on every side having been cut down to the bone, a piece of linen, somewhat broader than the diameter of the wound, should be torn at one end along its middle part, to the extent of about eight or ten inches.

This is called a retractor, and is applied by placing the exposed part of the bone in the slit, and drawing the ends of the linen upward on each side of the stump.

See page 73.

PLATE A. 8.

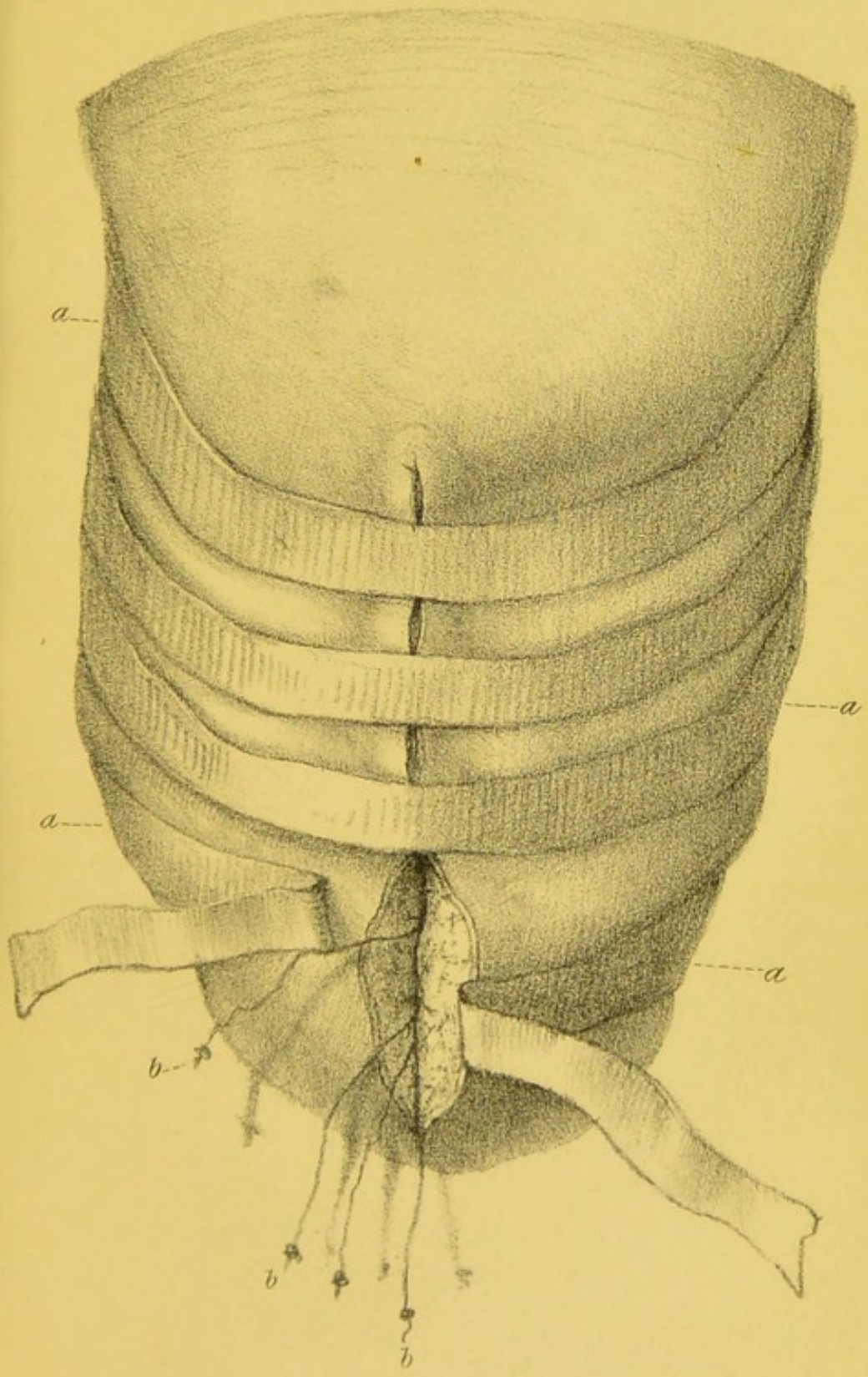
The method of bringing the lips of the wound together by means of strips of adhesive plaster.

a. a. a. Strips of adhesive plaster keeping the edges of the wound in close contact.

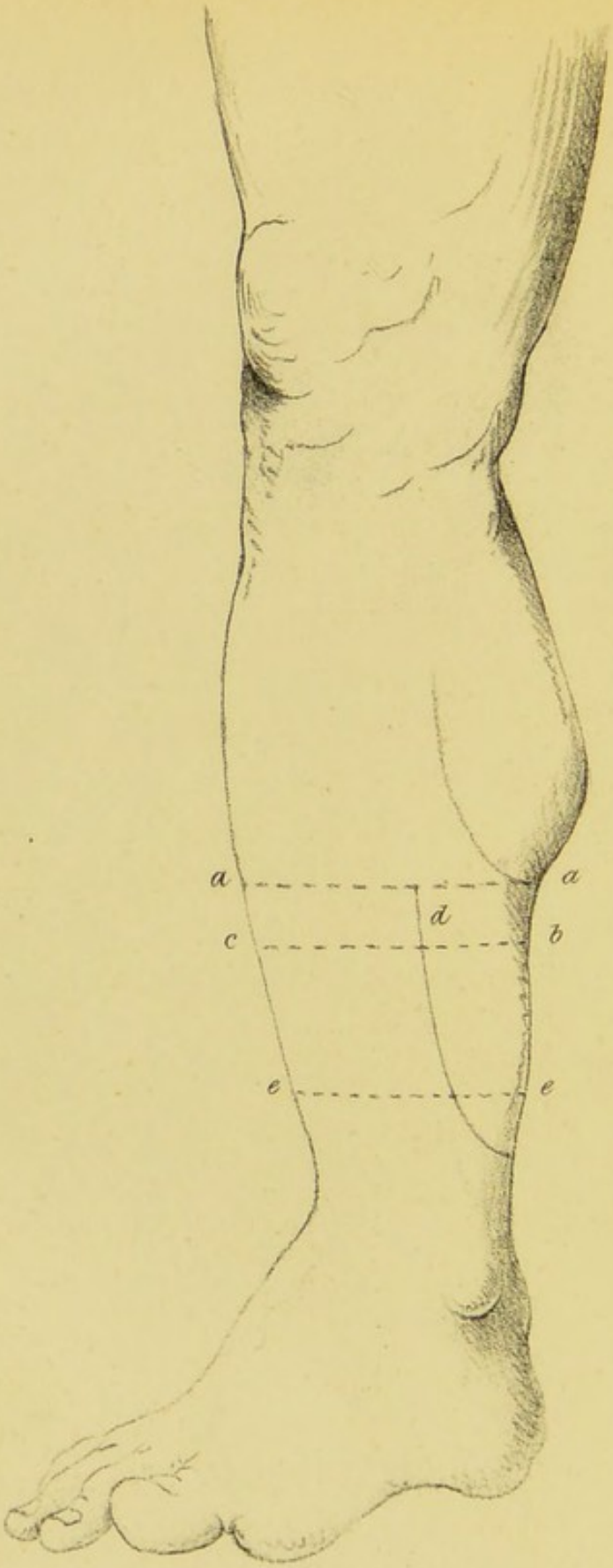
b. b. b. Ligatures.*

* After amputation, having disposed your ligatures in a line with each other, and leaving them to hang out at the most depending part of the wound, all that you have to do, is, to apply your adhesive straps, and other bandages if necessary.

See page 77.



W^p. Cocks.



W. Cocks

PLATE A. 9.

Flap Operation of the Leg.

a. a. The highest circular line, where the bones are to be sawn through.

d. The course the catling ought to take in the formation of the flap.

e. e. A circular line, a little below which the catling ought to be brought out.

b. c. A circular line, made one inch below the superior one, where the integuments are to be divided.

c. to *d.* Marks the course of the incision through the skin, on the anterior part of the leg.

Mr. Hay says:—To ascertain, with precision, the place where the bones of the leg are to be divided with the saw, together with the length and breadth of the flap, I draw upon the limb five lines; three of them circular, and two longitudinal. The situation of these lines is determined in the following manner:—I first measure the length of the leg from

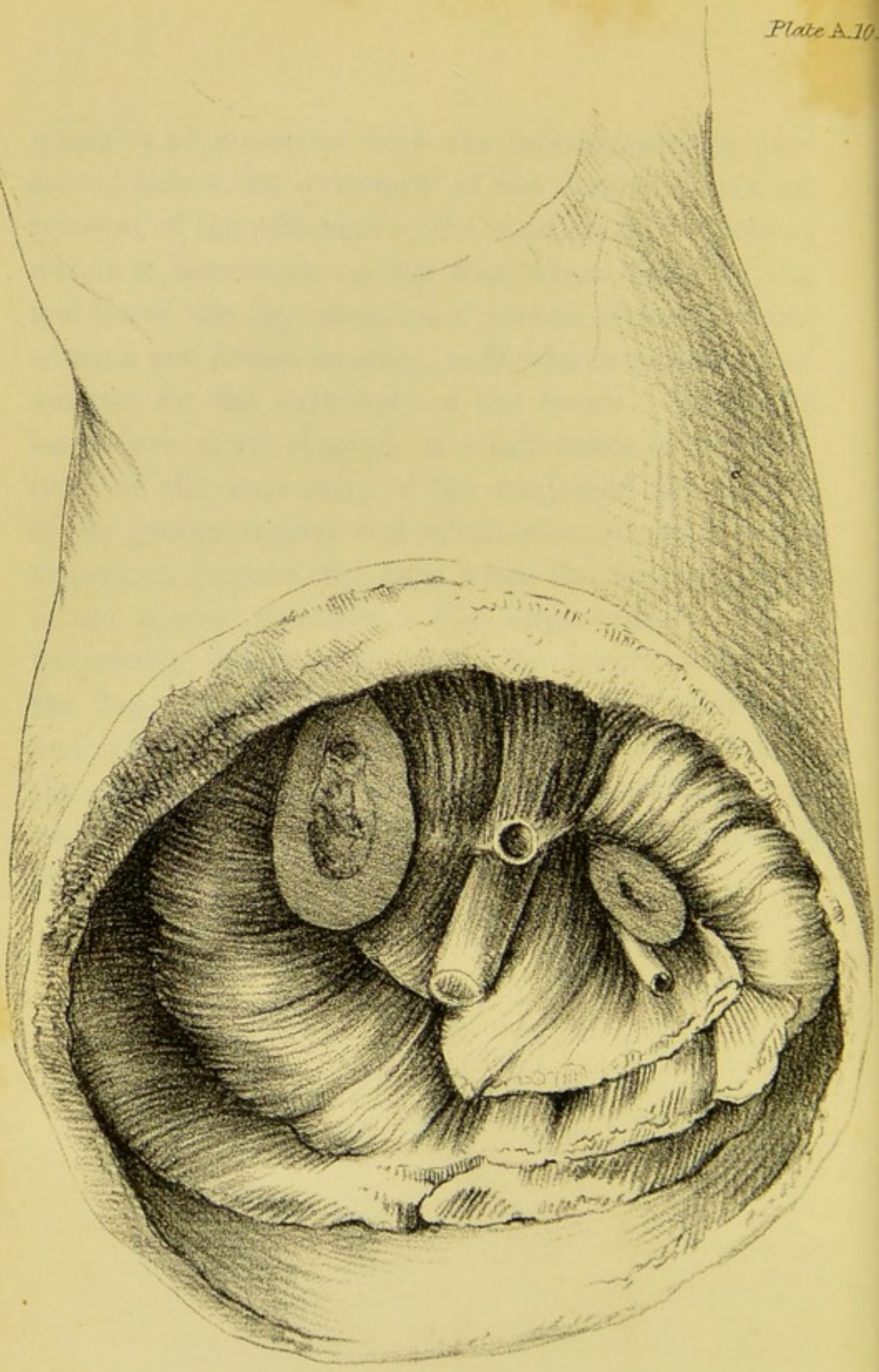
See pages 86 to 88.

the knee to the ankle; that is, from the highest part of the tibia to the middle of the inferior protuberance of the fibula. At the midway between these two joints, I make the first or highest circular mark upon the leg. This mark is to point out the place where the bones are to be sawn through. At this mark also I measure the circumference of the leg, and thence determine the length and breadth of the flaps—each of which is to be equal to one-third of the circumference. In measuring the circumference of the limb, I make use of a piece of marked tape or riband, and place the extremity of this measure upon the anterior edge of the tibia. I will suppose the circumference to be twelve inches; in which case, I make a dot in the circular mark on each side of the leg, at the distance of four inches from the anterior edge of the tibia. It is evident that these dots will be found four inches distant from each other, when the measure is applied to the posterior part of the leg. From each of these dots I draw a straight line downwards, four inches in length, and parallel to the anterior edge of the tibia. These lines mark the course which the catling is to take in the formation of the flap. At the extremity of these lines I make a second circular mark upon the leg, which points out the place where the flap is to terminate. Lastly, I make a third circular mark, at the distance of an inch below the superior one which was first made; which intermediate mark is designed to direct the circular incision through

the integuments on the anterior part of the limb. The course and extent of the different incisions being thus marked out, the operation may be performed with the greatest precision. The catling which is used for the purpose of making the flap, ought to be longer than those which are commonly made for a case of instruments; and I push it through the leg a little below the place where the transverse incision is to be made of those muscles which are not included in the flaps. Having placed the limb in a position nearly horizontal, with the fibula upwards and the knee bent, I push the catling through the leg at *d.*, and carry it downwards along the course of the longitudinal marks, till it approaches the lowest circular mark, which it joins in the course of the curved line; and the incision then terminates a little below the inferior circular line *e. c.* The flap being held back, I divide the integuments on the anterior part of the limb along the course of the circular mark *b. d.*

There is always a considerable retraction of the skin after it is divided, if the integuments are in a sound state; and if a proper allowance were not made for this retraction, the extremity of the tibia would be left uncovered, and the flap could not be applied with so much ease to the patient, nor with a certainty of a union by the adhesive process. The muscles which are not included in the flap are then divided transversely, a little below the place where the bones are to be sawn through; but no great

quantity of muscular flesh can be conveniently preserved below the extremity of the divided bones, on account of the adhesion of the muscles to the bones; nor is it necessary, as the flap, when made in the middle of the leg, contains a portion of the gastrocnemius and soleus muscles, sufficient to make a good cushion for the extremity of the bones. When the bones are sawn through, it is advisable to cut off a little of the extremity of the conjoined flat tendon of the gastrocnemius and soleus muscles, as it is apt to project beyond the skin when the flap is placed in its proper situation. The large crural nerve is frequently found lying upon the inner surface of the flap: it should then always be dissected out; and when gently extended, should be divided near the extremity of the stump. By this method, it will retire so far as to suffer no compression from the flap.



W. Cocks.

PLATE A. 10.

Circular Amputation of the Leg.

Operation.—The patient is to be placed upon a firm table, as in the amputation of the thigh; and the leg being properly held by an assistant, while the integuments are drawn up by another, the surgeon, with one quick stroke of the knife, is to make a circular incision about two hands breadth below the patella, through the integuments, all around the limb.* This being completed, the muscles are to be cut through, nearly on a level with the first incision, and down to the bones. The interosseous ligament between the tibia and fibula is to be divided with the catling; and as several of the

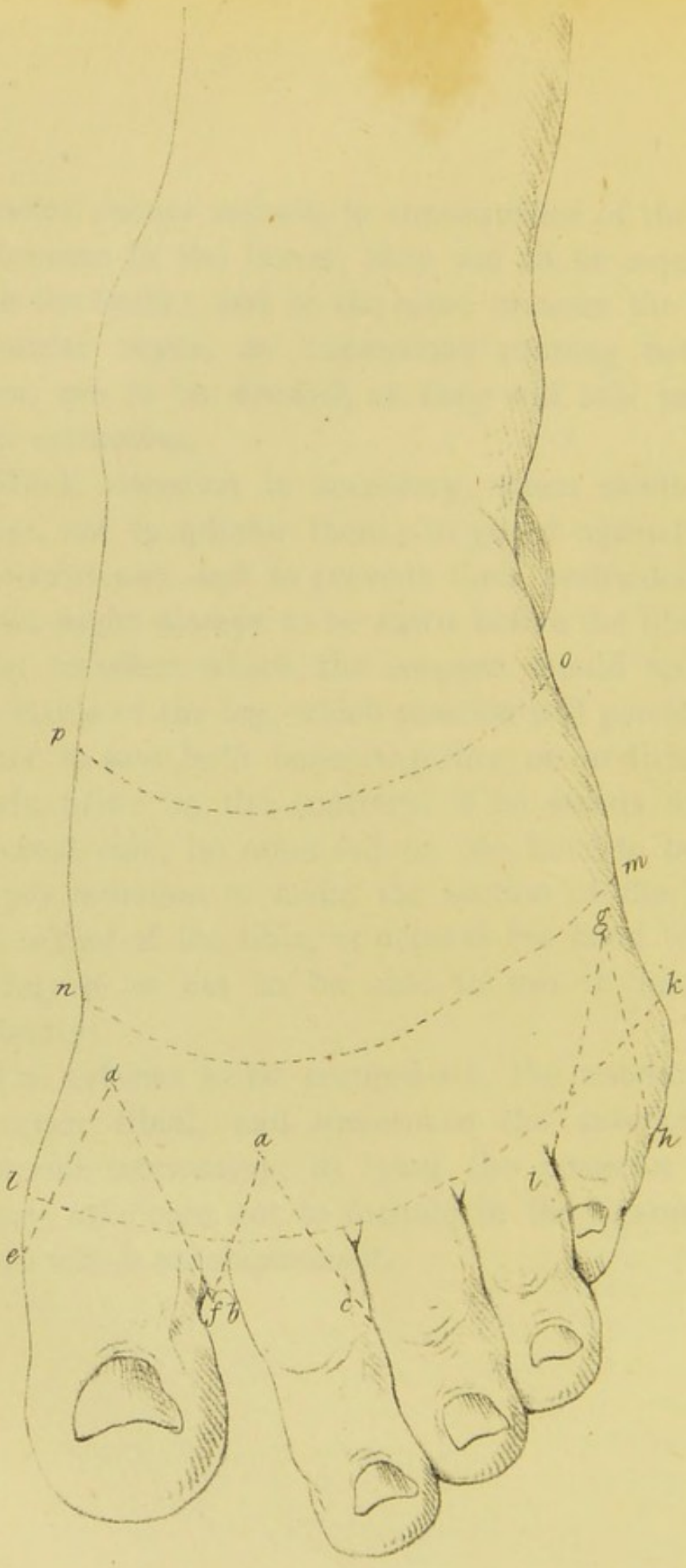
* The limb should be a little bent, and the circular incision made with the catling, through the skin and integuments to the bone on the fore part, and to the muscles on the outside and back part; and as the attachment of the skin to the bone will not readily allow of its retraction, it must be dissected back all round, and separated from the fascia—the division of which, in the first incision, would avail nothing, from its strong attachments to the parts beneath.

See pages 83 to 85.

muscles cannot retract, in consequence of their attachments to the bones, they are to be separated with the knife; and in the same manner the intermuscular septa, or expansions running between them, are to be divided, as they will still prevent their retraction.

Much attention is necessary, when sawing the bones, not to splinter them; to guard against such an occurrence, and to prevent their protrusion, the fibula ought always to be sawn before the tibia; in order to effect which, the surgeon should stand at the inside of the leg, which position will permit him either to saw both bones together, or to divide the fibula first; on the contrary, if he stands at the external side, he must fall on one knee to be in a proper situation to make the section of the fibula before that of the tibia, or depress his hand to such a degree as not to be able to use it but with difficulty.

The arteries to be secured are, the anterior and posterior tibial, and sometimes the anterior and posterior interosseal; in tying the posterior tibial artery, take care not to include in the ligature the nerve which accompanies it.



W^m Cocks.

PLATE A. 11.

Represents the foot crossed by lines, which are bounded by letters, indicating not only the different kinds of amputations, but also the course of the knife. The direction of the lines marks out the incisions; the letters determine the extent.

a. b. c. Amputation of the toes at the metatarsal articulation.

d. e. f. Amputation at the continuity of the first metatarsal bone.

g. h. i. Amputation at the continuity of the fifth metatarsal bone.

k. l. Amputation between the metatarsus and first phalanges.

m. n. Amputation at the tarso-metatarsal articulation.

o. p. Amputation between the astragalus and os scaphoides, os calcis and os cuboides.

PLATE A. 12.

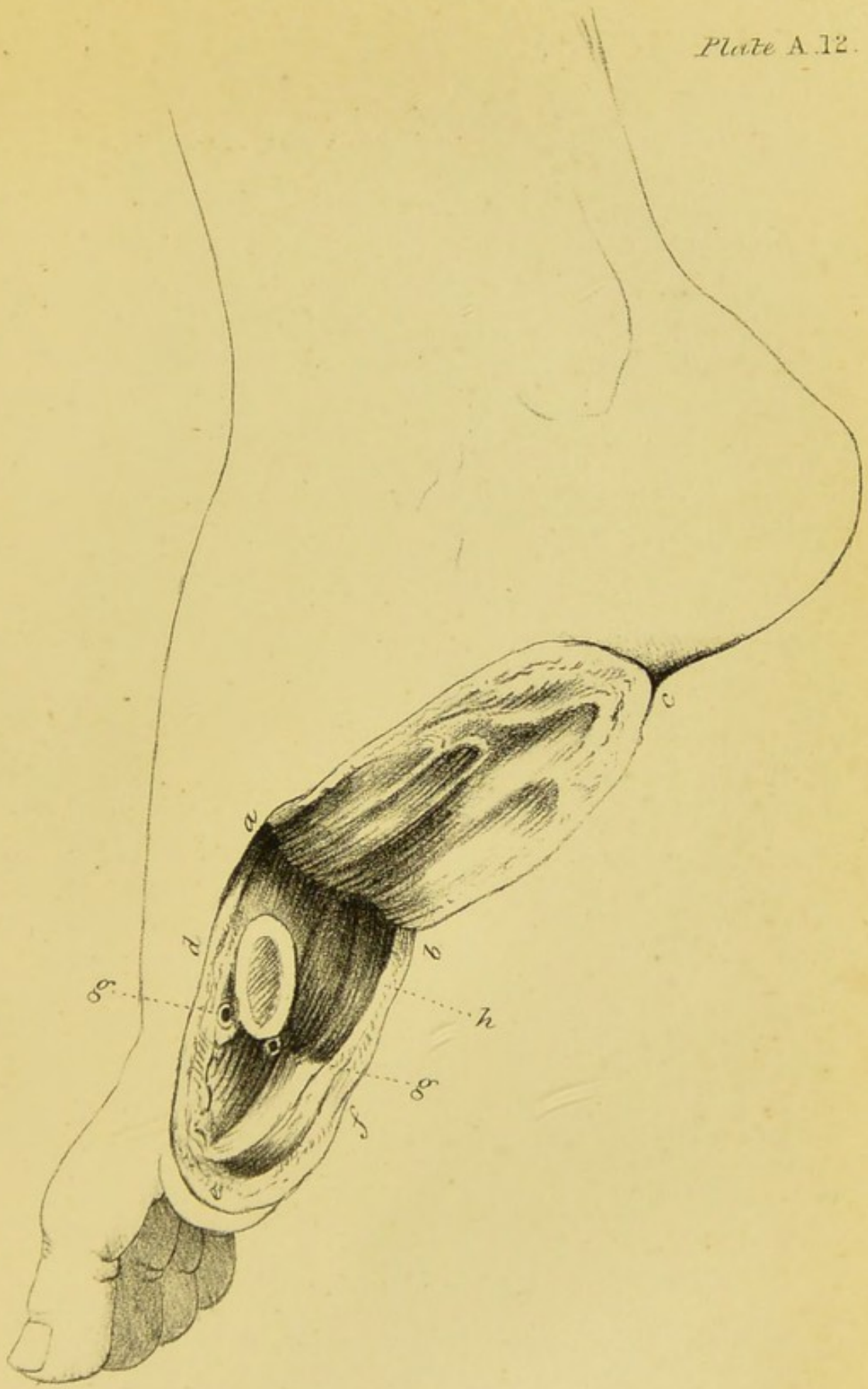
Amputation in the continuity of the First Metatarsal Bone.

The foot is to be held firm by an assistant, the bistoury to be thrust on the inner margin of the first metatarsal bone from *a.* and *b.* to *c.*; the flap thus formed is to be carried backwards: a second incision is then to be made on the outer margin from *d.* *e.* to *f.*—both to be connected by a transverse ——. The bone to be sawn through obliquely.

g. The plantar arteries.
h. Muscles of the foot.
i. Oblique surface of the bone.

See pages 104 to 106.

Plate A.12.



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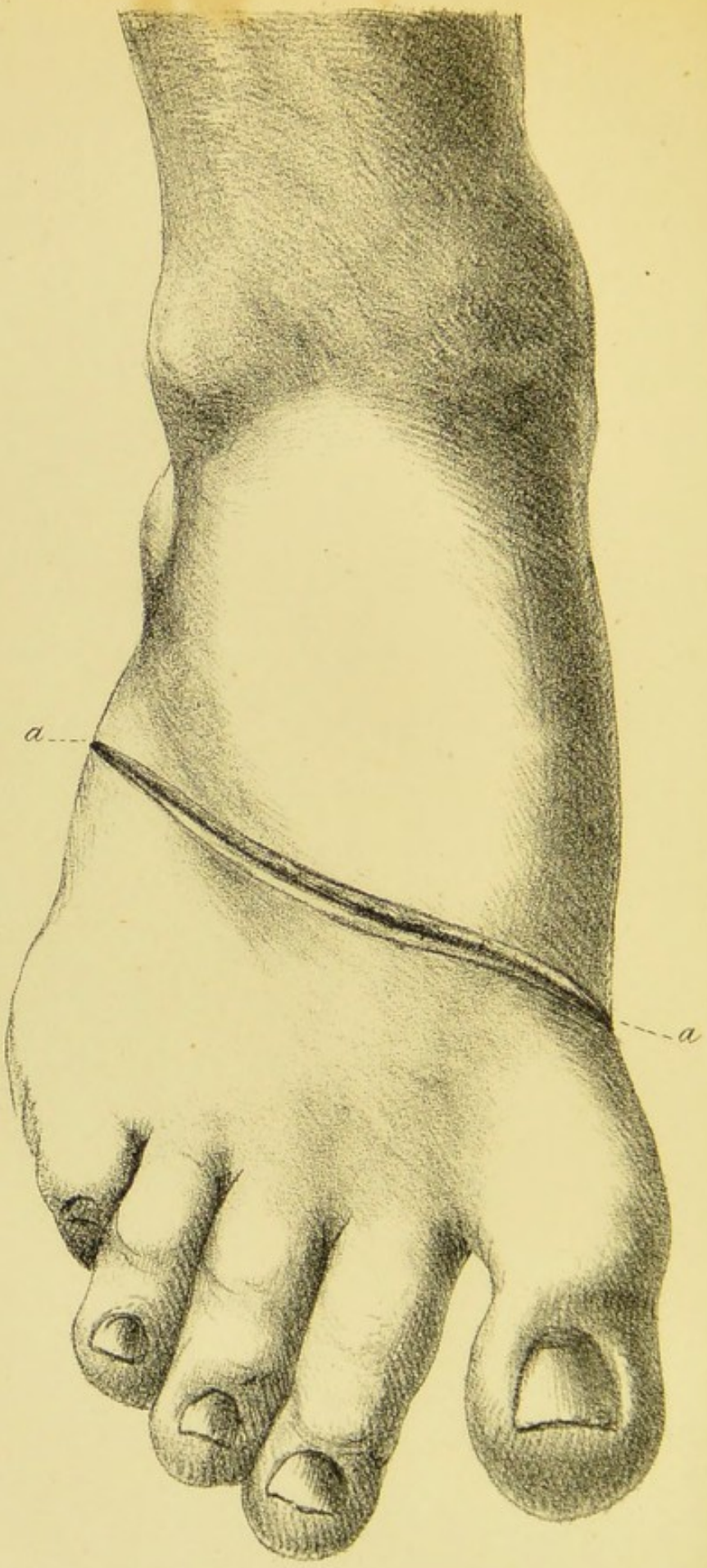
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a

PLATE A. 13.

Amputation of the Foot at the Tarsus.

a. a. The course of the incision on the dorsal region of the foot.

Operation.—The joints of the metatarsus, with the tarsus, being well ascertained, an incision is to be made across the foot, in the direction of the joints, but from half to three quarters of an inch nearer the toes, and the integuments drawn back over the tarsus.

From the extremities of this incision two others are to be made, along the sides of the great and little toe, for about two inches and a half, according to the thickness of the foot; and the ends of these two incisions are to be united by a transverse one down to the bone, on the sole of the foot. The corners being rounded off, as in Plate 14.

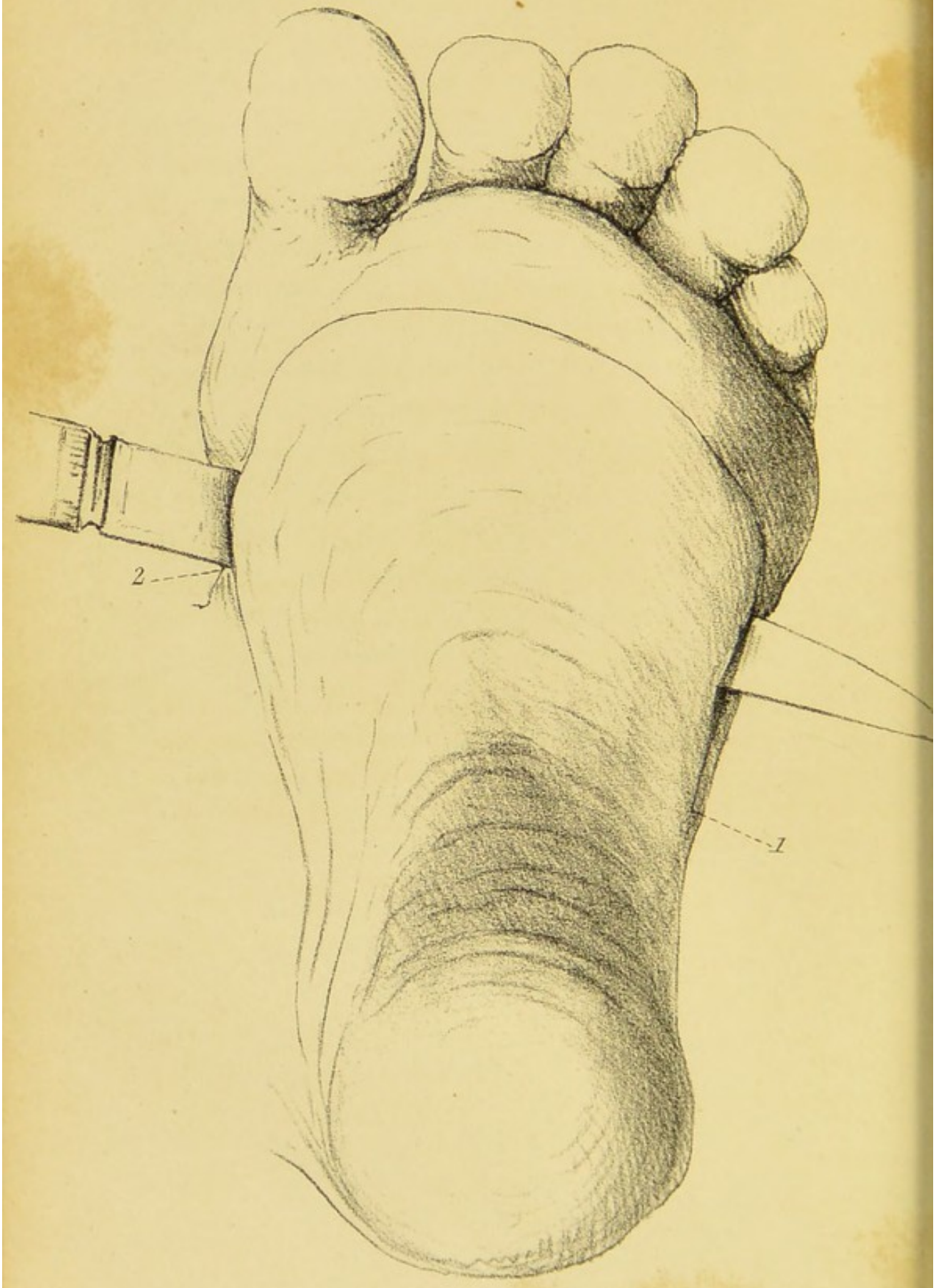
The flap thus formed on the under part is to be dissected back from the metatarsal bones, including

See pages 104 to 106.

as much of the muscular parts as possible, as far as the under part of the joints of the tarsus.

The metatarsal bones are now to be removed, by cutting into and dislocating each joint from the side, commencing on the outside, by placing the edge of the knife immediately above but close to the projection made by the posterior part of the metatarsal bone supporting the little toe,—which prominence is always readily perceived. The arteries are to be secured; any long tendons, and loose capsular ligament, are to be removed with the knife or scissors; and the under flap, formed from the sole of the foot, is to be raised up, so as to make a neat stump when brought into contact with the upper portion of the integuments that were first turned back: the whole to be retained in this position by sutures, adhesive plaster and bandage.*

* Mr. Guthrie, on "Gun Shot Wounds."



W^P Cocks.

PLATE A. 14.

This sketch shews the line of incision,* for the formation of a flap, from the sole of the foot, in the same operation as Plate 13, which is to be raised up to cover the tarsus when the metatarsal bones and toes are removed.

* In sliding the catling flatwise between the skeleton and the flesh, the concavity of the bones readily admits of its being conducted as far as their phalangeal bulging; but that then it will be necessary to depress the edge of the instrument very considerably, in order to terminate the incision.

PLATE A. 15.

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*Amputation of the Foot at the Tarso-Metatarsal Articulation.**

a. The integuments on the dorsal region of the foot.

b. The flap, formed from the plantar surface of the foot.

c. The extent of the semicircular incision on the dorsum of the foot.

d. Os cuboides.

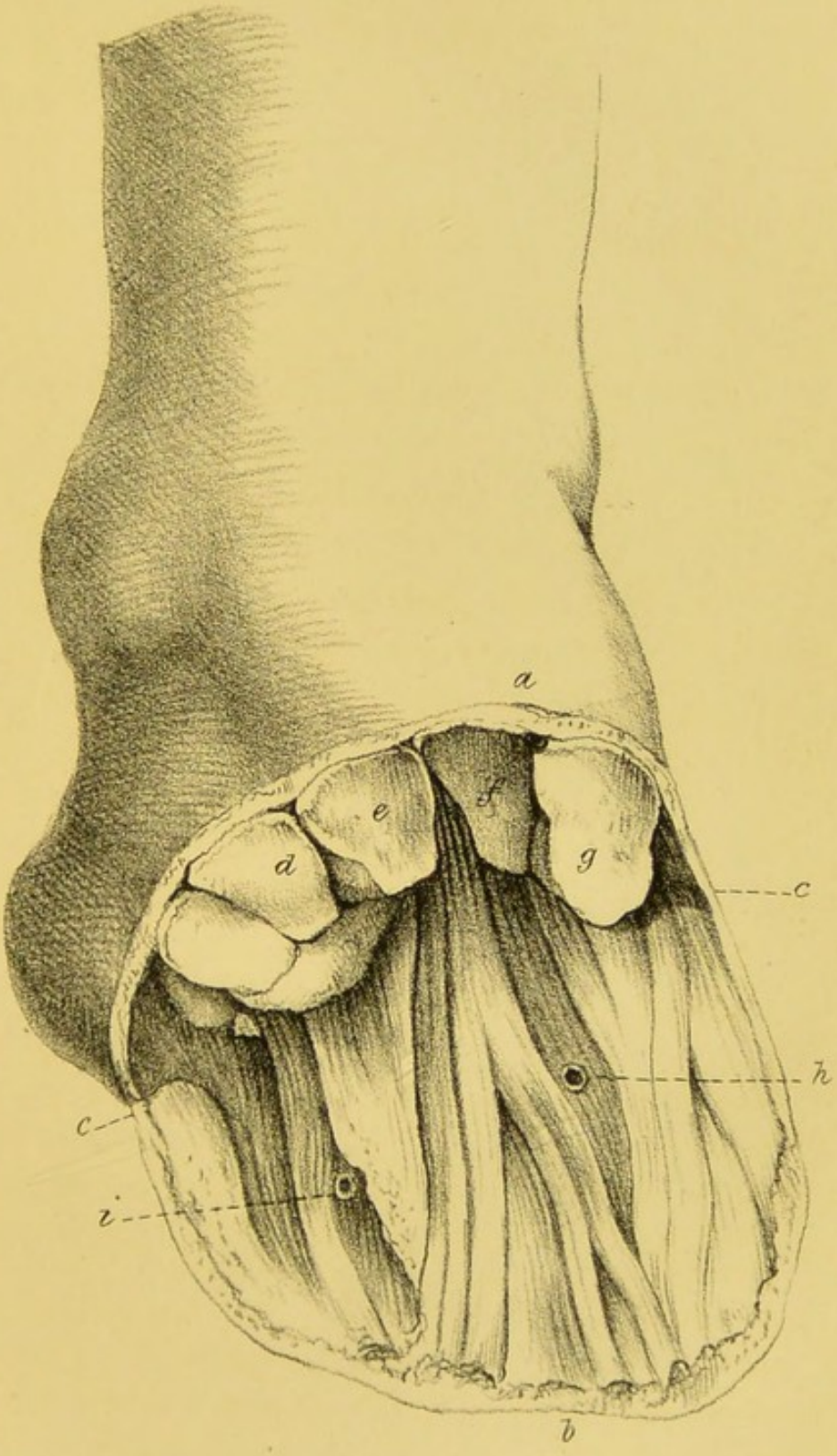
e. Os cuneiforme medium.

f. Os cuneiforme internum.

g. Os cuneiforme externum.

h. *i*. *k*. Plantar arteries.

* The great object in this operation, for its quick performance, is, to mark out the line of the articulations, which may be always effected by the following rule :—as the tubercle of the fifth metatarsal bone can be always discovered in every foot, it will point out the situation of the joint on this side ; if from it, a line be drawn at right angles to the axis of the foot, to its internal side, about half an inch anterior to the place at which it terminates, the articulation will be found, between the first metatarsal, and internal cuneiforme bones ; or if the tendon of the tibialis anticus muscle is very evident, an inch or so anterior to it will also shew the articulation.



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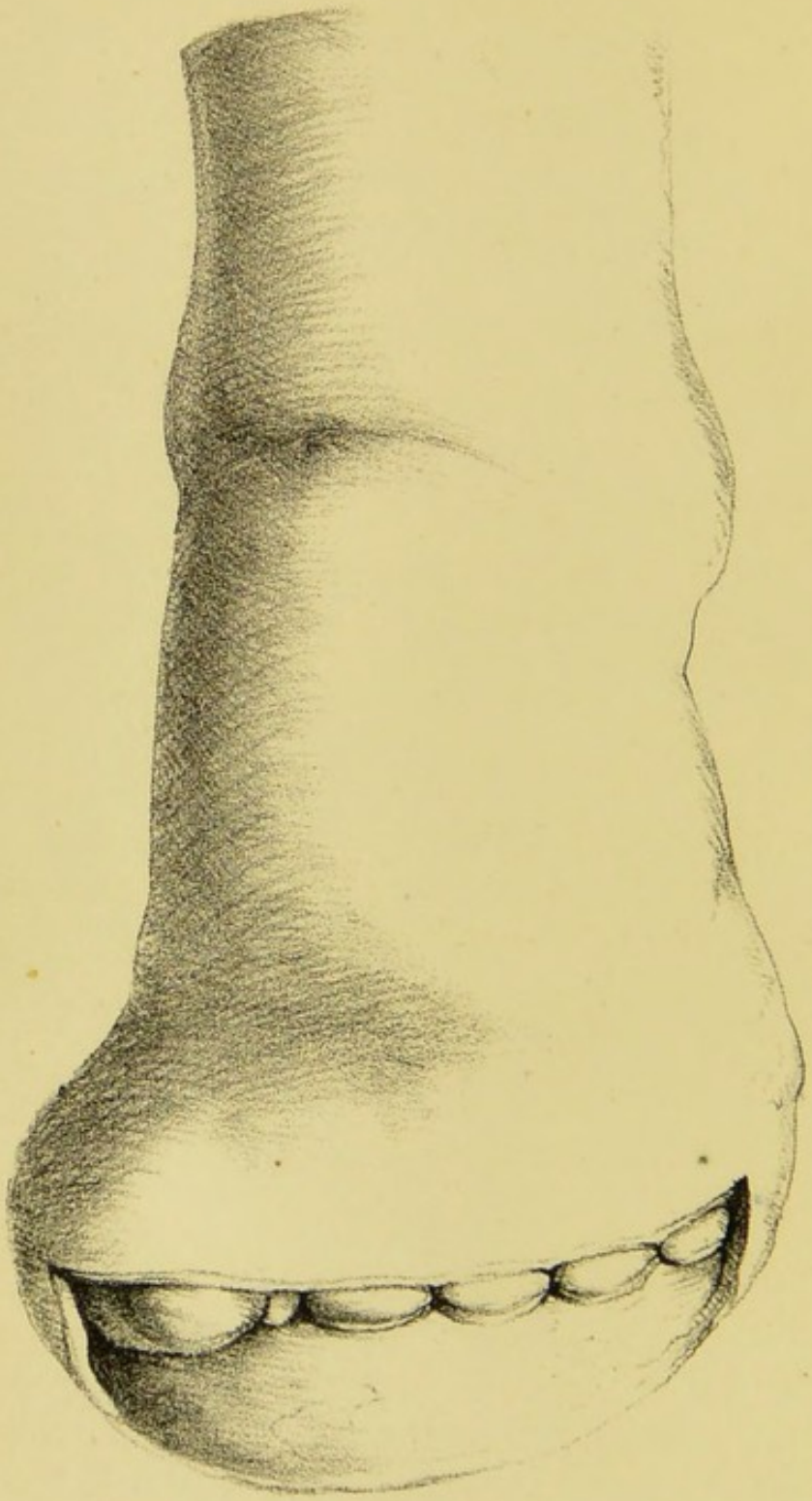

W. Cocks.

PLATE A. 16.

Amputation at the articulations between the first phalanges and the metatarsal bones.

M. Lisfranc's method of operating.—Supposing it the left extremity to be operated on, and the foot steadily fixed by an assistant, the operator feels for the head of the first phalanx of the great toe, which joins the metatarsal bone, and on it places his left thumb; on the same extremity of the little toe he places his left index finger,—the toes resting in the palm of his hand. He then, with a narrow-bladed catling, or amputating knife, makes a semicircular incision, from the point marked by his thumb to that before his index finger, cutting through the integuments and tendons. By a second cut in the same direction he opens the joint, and bending the toes downwards cuts through the ligaments surrounding the articulation. Keeping the toes still bent, he passes the knife horizontally a little way beneath the under surface of the bones, so as to get clear of the articulations. Then raising the toes, and pressing them upwards, he lowers the handle of his knife, and with the point completes the flap

from their under surface by cutting to the commissure of each, separately, beginning at the great toe, —the assistant raising them in regular order, as the knife cuts through the integuments below. In this way a flap is formed of sufficient size to cover the heads of the metatarsal bones, and unite with the divided integuments above.

The arteries which require ligatures being tied, the cut edges are to be kept in contact by adhesive plaster.

In performing the operation on the right foot, the first incision is made from the little toe inwards, and finished in the same manner,—the operator cutting from left to right.